

V. INTERNATIONAL CONFERENCE ON GLOBAL PRACTICE OF MULTIDISCIPLINARY SCIENTIFIC STUDIES

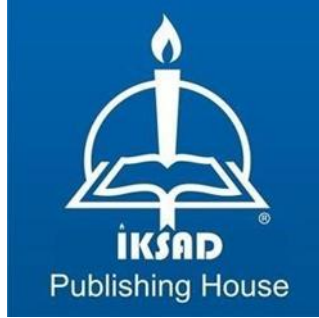
December 10-12, 2023
Baku-AZERBAIJAN

**CONFERENCE
PROCEEDING
BOOKS**

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**Assoc. Prof. Dr. Mehmet Fırat BARAN
Assoc. Prof. Dr. Seyithan SEYDOŞOĞLU
Assoc. Prof. Dr. Arzu ALTUNTAŞ**

**INTERNATIONAL CONFERENCE ON GLOBAL PRACTICE OF
MULTIDISCIPLINARY SCIENTIFIC STUDIES-V**



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**INTERNATIONAL CONFERENCE ON GLOBAL PRACTICE OF
MULTIDISCIPLINARY SCIENTIFIC STUDIES-V**

**INTERNATIONAL CONFERENCE ON GLOBAL PRACTICE OF
MULTIDISCIPLINARY SCIENTIFIC STUDIES-V**

December 10-12, 2023 / Baku, Azerbaijan

PROCEEDINGS BOOK
(Abstracts & Full Texts)

EDITORS

Assoc. Prof. Dr. Mehmet Fırat BARAN
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INTERNATIONAL CONFERENCE ON GLOBAL PRACTICE OF MULTIDISCIPLINARY SCIENTIFIC STUDIES-V

EVALUATION PROCESS and POLICIES

All applications have undergone double blind peer review process. In addition, each paper was accepted and the process of publishing in the book was carried out through editorial oversight. The published papers were presented and discussed at the meeting.

Full texts and abstracts published in accordance with the Symposium Policy have been prepared in accordance with ethical rules and APA standards. Authors of all papers are both ethically and legally responsible.

PARTICIPANTS COUNTRIES

Türkiye, Albania, Algeria, Azerbaijan, Bangladesh, Bulgaria, Ethiopia, Georgia, India, Indonesia, Iran, Kazakhstan, Malaysia, Morocco, Nigeria, Pakistan, Philippines, Saudi Arabia, Slovenia, Sri Lanka, Uganda, Ukraine

TOTAL ACCEPTED ARTICLES: 306

The Number of Accepted Papers from Türkiye: 161
The Number of Accepted Full Papers from Other Countries: 169
The Number of Total Papers:330

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MULTIDISCIPLINARY SCIENTIFIC STUDIES-V**

December 10-12, 2023

Baku, Azerbaijan

SYMPOSIUM SCHEDULE

INTERNATIONAL CONFERENCE ON GLOBAL PRACTICE OF MULTIDISCIPLINARY SCIENTIFIC STUDIES-V

December 10-12, 2023 / Baku, Azerbaijan

CONFERENCE PROGRAM



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- ❖ To be able to attend a meeting online, login via <https://zoom.us/join> site, enter ID "Meeting ID or Personal Link Name" and solidify the session.
- ❖ The Zoom application is free and no need to create an account.
- ❖ The Zoom application can be used without registration.
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- ◆ Make sure your computer has a microphone and is working.
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CONGRESS LANGUAGES: English and All Turkish Dialects

OPENING CEREMONY

Date: 11.12.2023

Baku Local Time: 11:00-12:00

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Face to Face / Khazar University

11.12.2023

HALL-1



BAKU LOCAL TIME



14⁰⁰ : 16⁰⁰



ANKARA LOCAL TIME



13⁰⁰ : 15⁰⁰

HEAD OF SESSION: Dr. Alamettin Bayav

Authors	Affiliation	Presentation title
Yeter Çilesiz Muhammet Tatar Meliha Feryal Sarıkaya Ilker Yüce Kağan Kökten Tolga Karaköy	<i>Sivas University of Science and Technoogy</i>	Determination of some agro-morphological characteristics in F4 and F5 generations of soybean (<i>Glycine max</i>) hybrid populations
Yeter Çilesiz Elif Kaygıner Tolga Karaköy	<i>Sivas University of Science and Technoogy</i>	Transgenic plants
Selma Lubabe Erdoğan Gülşah Çalışkan Koç	<i>Alanya University</i>	Cranberry tarhana: production methods and chemical composition
Selma Lubabe Erdoğan Gülşah Çalışkan Koç Emin Gülден	<i>Alanya University</i>	Investigating the utilization of aquafaba in the food industry
Kadriye Aydemir Oktay Sh. Mukhtarov	<i>Amasya University</i>	Some properties of the multi-interval discontinuous sturm-liouville problem with periodic boundary conditions
Melekber Sülüşoğlu Durul	<i>Kocaeli University</i>	Evaluation of owned stone pine plantations in Kozak region of Türkiye
Bektaş Kadakoğlu Alamettin Bayav Bahri Karlı	<i>Isparta University of Applied Sciences</i>	Evaluating self-sufficiency in dry legumes production in Türkiye
Alamettin Bayav Orhan Gündüz Bektaş Kadakoğlu	<i>Isparta University of Applied Sciences</i>	Pear in a growing world: production and trade in global markets

(All speakers required to be connected to the session 10 min before the session starts)

Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.

Face to Face / Khazar University

11.12.2023

HALL-2



BAKU LOCAL TIME



14⁰⁰ : 16⁰⁰



ANKARA LOCAL TIME



13⁰⁰ : 15⁰⁰

HEAD OF SESSION: Dr.Nafiya Güden

Authors	Affiliation	Presentation title
E. Erdal Yörük	<i>Selcuk University</i>	From distracting to engaging advertising: the impact and advantages of native advertising
Nafiya Güden Seden Turamberk Özerden	<i>Uluslararası Final Üniversitesi</i>	Importance of gastronomy tourism in destination branding: the case of sumada
Emine Aldirmaz Meryem Evecen	<i>Amasya Üniversitesi</i>	Structural and nmr properties of the c16h30n2o4cu compound: a dft study
Emine Aldirmaz Meryem Evecen	<i>Amasya Üniversitesi</i>	Deformation behavior of cualmnzn alloy
M. Erhan Summak	<i>Selcuk University</i>	Cultural sensitivity and diversity management in public relations: strategic approaches
Meryem Evecen Emine Aldirmaz	<i>Amasya University</i>	A spectroscopic analysis of the [(tmeda)zn(acac)2] compound using theoretical method
Meryem Evecen Emine Aldirmaz	<i>Amasya University</i>	Electronic and spectroscopic properties of the (tetramethylethylenediamine)ironbis(acetylacetonate) compound with dft method
Şahin Ay	<i>Siirt University</i>	Merit goods within the scope of the social state
Şahin Ay	<i>Siirt University</i>	The process of understanding the importance of global public goods in public finance

(All speakers required to be connected to the session 10 min before the session starts)

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Face to Face / Khazar University

11.12.2023

HALL-3



BAKU LOCAL TIME



14⁰⁰ : 16⁰⁰



ANKARA LOCAL TIME



13⁰⁰ : 15⁰⁰

HEAD OF SESSION: Dr.Seden Turamberk Özerden

Authors	Affiliation	Presentation title
Ahmet Karabulut	<i>Ağrı İbrahim Çeçen Üniversitesi</i>	Okul öncesi öğretim programında yer alan dil becerileri kazanımlarının öğretmen görüşleri doğrultusunda değerlendirilmesi
Ahmet Karabulut	<i>Ağrı İbrahim Çeçen Üniversitesi</i>	Türkçe öğretmenlerinin “ana dilde iletişim” yetkinlik alanına yönelik görüşlerinin değerlendirilmesi
Onur Bali	<i>Ağrı İbrahim Çeçen Üniversitesi</i>	Yükseköğretimde akademisyen kayırmacılığının öğrenci algılarına göre incelenmesi
Kübra Çiftçi Aktürk Sare Türkmen Çinar Merve Arabacı Yasemin Aydoğan	<i>Gülpınar Altındağ Municipality Kindergarten</i>	The impact of mathematical experiences in the home environment on preschool children's mathematical skills
Sare Türkmen Çinar Merve Arabacı Kübra Çiftçi Aktürk Yasemin Aydoğan	<i>Gülpınar Altındağ Municipality Kindergarten</i>	Sibling jealousy from the perspective of mothers and their children: problems and solution strategies
Ümit Ünsal Kaya Merve Arabacı	<i>Afyon Kocatepe University</i>	The issue of interviews in teacher recruitment in turkey: reflections from the x platform
Merve Arabacı Kübra Çiftçi Aktürk Sare Türkmen Çinar Yasemin Aydoğan	<i>Afyon Kocatepe University</i>	Anatolian tales through children's eyes
Mahir Özhan	<i>Siirt University</i>	Seçmen davranışlarını etkileyen bir faktör olarak cinsiyet
Mehmet Fırat Baran Ahmet Çelik Cihan Demir	<i>Siirt University</i>	The effect of correct tillage on sustainable agriculture

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Face to Face / Khazar University

11.12.2023

HALL-4



BAKU LOCAL TIME



14⁰⁰ : 16⁰⁰



ANKARA LOCAL TIME



13⁰⁰ : 15⁰⁰

HEAD OF SESSION: Dr. Korkmaz Bellitürk

Authors	Affiliation	Presentation title
Bektaş Kadakoğlu Alamettin Bayav Bahri Karli	<i>Isparta University of Applied Sciences</i>	Evaluating self-sufficiency in dry legumes production in türkiye
Ahmet Çelik Cihan Demir Mehmet Fırat Baran Korkmaz Bellitürk	<i>Kırklareli University</i>	Is soil organic matter the most important parameter of agricultural practices?
Canan Yalçintepe Korkmaz Bellitürk	<i>Namık Kemal Üniversitesi</i>	Comparison Effects of Different Organic Fertilizers on Nutrition Status of Spinach (<i>Spinacia oleracea</i> L.): The Case of Macro Elements
Ömercan Altınorak Esra Mankan	<i>Alanya University</i>	Yiyecek içecek işletmeleri menülerinin istanbul'daki müşteri tercihleri üzerine bir inceleme
Bilge Gülen Boyacı	<i>Başkent University</i>	The perception of cognitive triad according to attachment styles with pets and parents
Semih Serkant Aktuğ	<i>Siirt University</i>	Future of employment in the light of global trends
Nilgün Onursal	<i>Siirt University</i>	Modeling the adsorption kinetics of lead with akdoğan-2(gundseyh-2) clay
Hüseyin Şahin Sercan Bıçakcı	<i>Namık Kemal University</i>	A case report: pulmonary artery dissection in a young patient with pulmonary hypertension
Yağmur Kirbayır	<i>Biruni University</i>	The genetics of obsessive-compulsive disorder

(All speakers required to be connected to the session 10 min before the session starts)

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Online Zoom ID: 851 7785 3338 / Passcode: 101112

10.12.2023

HALL-1 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Huong Thi My Nguyen

Authors	Affiliation	Presentation title
Yang Duo Ningbo Liao	<i>Wenzhou University</i>	Atomic-scale design of aluminium-doped lipon solid electrolytes for sico-based all-solid-state batteries
Taghreed A Al-Nashi Ibtehaj Mustaf Hakeem Nagham S Al-Awadi	<i>University of Sulaimani-Iraq</i>	The vital role of caraway extracts and their application in prolonging the shelf life of meat
Pavan Kumar.V Narayanaswamy Harikrishnan	<i>Dr. M.G.R. Educational and Research Institute</i>	Phytoconstituents advancement in cancer treatment
Irina Mitina Rodica Sturza Valentin Mitin Fatih Inci Nedim Haciosmanoglu Dan Zgardan	<i>Technical University of Moldova</i>	Molecular detection and quantification of mycotoxigenic fungi in maize
Imoh Ime Ekanem Aniekan Essienubong Ikpe	<i>Akwa Ibom State Polytechnic</i>	A technical survey on energy potentials of point focus solar collector system: a sustainable resource for energy mix augmentation
Hekuran Sabedini Zanfina Shaqiri Marigona Rama Sabedini	<i>State University of Tetovo</i>	The relationship between parenting styles and emotional intelligence in adolescents
Viorica Bulgaru Liliana Popescu Ilkay Şensoy Rodica Sturza Aliona Ghendov-Moşanu	<i>Technical University of Moldova</i>	Alternative plant-based sources for the production of meat analogues
Huong Thi My Nguyen	<i>Nha Trang University</i>	The effect of hydrolysis time on the functional properties of protein hydrolysates from dolphinfish (<i>coryphaena hippurus</i>) head

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10.12.2023

HALL-2 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Gamze GÜNEY

Authors	Affiliation	Presentation title
Uğur Sesiz	<i>Şırnak University</i>	Unravelling the genetic wealth of turkish durum wheat landraces (<i>triticum turgidum</i> ssp. durum) for the creation of novel cultivars
R. Refika Akçali GiachinoNecip Tosun	<i>Ege University</i>	Sweet potato (<i>ipomoea batatas</i> [L.] lam); a rising trend for healthy food and regional development
Ayşe Muslu Özgül Özdehan Ocak	<i>Alanya University</i>	Edible chitosan films and coatings containing essential oils: use in cheese products
Erhan Kahya Fatma Funda Özdüven Mehmet Fırat Baran Yasin Aslan	<i>Tekirdağ Namık Kemal University</i>	Yolov5 detection of pea (<i>pisum sativum</i>) on the plant by image processing method
Hülya Küçükkoğlu	<i>Yozgat Bozok University</i>	Factors contributing to teacher burnout and the coping strategies
Turhan Yılmaz	<i>Kahramanmaraş Sütçü İmam University</i>	Determination of chilling fulfilment of kabarcık (<i>vitis vinifera</i> L.) for kahramanmaraş
Arif Semerci Muharrem Çınar	<i>Çanakkale Onsekiz Mart University</i>	Determination of resource utilization efficiency in capia pepper (<i>capsicum annuum</i> L.) production: the case of çanakkale province
Gamze Güney Kübra Özdemir Gökhan Yazıcı Ali Burak Toy	<i>Ardahan University</i>	Examining the excellent performance of elite boxers in sports in terms of different variables

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10.12.2023

HALL-3 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Dr.Ozan Toprakçı

Authors	Affiliation	Presentation title
Ozan Toprakçı Hatice Aylin Karahan Toprakçı	Yalova University	Recent developments in smart fibers
Hatice Aylin Karahan Toprakçı Ozan Toprakçı	Yalova University	Recent trends in wearable electronics
Serkan Gündüz Ahmet Kamil Bayhan	Isparta University of Applied Sciences	Mounted type disc harrows occurring defects in and their causes
Hayder Abdulameer Al-Iessa İsa Avcı	Karabuk University	Challenges, architecture, and future trends in intrusion detection systems
Mehmet Eren Nalici İsmet Söylemez Ramazan Ünlü	Abdullah Gül University	Symbolic aggregate approximation-based clustering of monthly natural gas consumption
Cengiz Güler Büşra Üçüncü	Duzce University	Particleboard production from waste scrap paper
Ayşe Güllüoğlu Bestoon Shekhany İbrahim Yaşar Faruk Süzergöz	Harran Üniversitesi	Investigation of antibacterial effects of 5-fluorinated derivatives of schiff bases on some pathogenic bacteria

(All speakers required to be connected to the session 10 min before the session starts)

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10.12.2023

HALL-4 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Dr. Mehmet Ali Ekemen

Authors	Affiliation	Presentation title
Esra Cebeci Mazlum	<i>Selçuk University</i>	Brics-t ülkelerinde inovasyon ve ekonomik büyüme: dumitrescu ve hurlin panel nedensellik analizi
Kürşat Yurdigül	<i>Bağımsız</i>	Geographical and historical investigation of turan-grand congresses (kazakistan/saga ve macaristan/bugac)
Mehmet Ali Ekemen	<i>Lefke Avrupa Üniversitesi</i>	Girişimcilerin uygunsuz davranışları: asi, başına buyruk ve aykırı girişimciler
Özlem Altun Servet Nasifoğlu Elidemir Mete Ünal Girgen	<i>Eastern Mediterranean University</i>	Investigation of cypriot tavern taste spectrum within the context of gastronomy tourism
Irem Karataş Süleyman Balcı	<i>Kırıkkale University</i>	Cognitive emotion regulation skills, marriage satisfaction and self-dissociation levels of married individuals
Ahmet Koyunlu	<i>Kahramanmaraş Sütçü İmam Üniversitesi</i>	Acute effect of plyometric works applied to young wrestlers who performed shalwar wrestling on some selected motor skills
Ahmet Koyunlu	<i>Kahramanmaraş Sütçü İmam Üniversitesi</i>	Does 8 weeks basic movement training applied to young women affect athletic performance?
E. Fazıl Çöllü	<i>Selçuk University</i>	Data-driven public relations: the role of big data analytics and measurement guidelines

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10.12.2023

HALL-5 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Dr. Gökçen İlhan İldiz

Authors	Affiliation	Presentation title
Mehmet Nezir Ceylan	<i>Milli Eğitim Müdürlüğü</i>	The apostle bāqillānī: a medieval muslim scholar's dialogues at the byzantine court and debates with christian clerics
Elmas Ak	<i>Kırşehir Ahi Evran Üniversitesi</i>	Analysis of the effect of sales pressure on organizational cinicism in the banking sector: the case of kırşehir province
Serpil Yalcin Kuzu Ayben Karasu Uysal Mustafa Kaya	<i>Firat University</i>	Category-based machine learning method for j/ψ →e+e- identification
Gökçen İlhan İldiz	<i>Tekirdağ Namık Kemal Üniversitesi</i>	An examining the relationship between secure attachment levels to mothers and fathers in middle childhood and the factors influencing these levels
Abdul Qahar Khatir Burcu Güvenek Zeynep Karaçor	<i>Selçuk Üniversitesi</i>	The role of socio economic demographic, political and cultural factors in immigration decision: case of afganistan
Zeynep Karaçor Burcu Güvenek	<i>Selçuk Üniversitesi</i>	Ekonomi politikasında politika tasarımı: para politikasının etkinliği üzerine bir değerlendirme
Mehmet Furkan Şener	<i>Izmir Bakırçay University</i>	Hydro-geochemical characteristics and economic potentials of niğde, nevşehir and aksaray geothermal areas
Betül Güler Taha Oruç Mustafa Yeşilyurt	<i>Amasya Üniversitesi</i>	Meta-analysis of teachers' education program literacy levels

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HALL-6 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Dr. Arzu Berber

Authors	Affiliation	Presentation title
Leyla Beba Pozharani E. Vildan Burgaz	<i>Eastern Mediterranean University</i>	Polymeric nanoparticles: a revolutionary approach to dermatological treatments
Mahir Kaya	<i>Akdeniz University</i>	Vertebral heart score and vertebral left atrial size: a reference interval study in healthy new zealand white rabbits based on echocardiography
Ibrahim Gün Selma Söyük	<i>Batman Üniversitesi</i>	Mediating role of job satisfaction in the effect of organizational support on affective commitment: an application in healthcare workers
Arzu Berber Ali Emrah Şahin	<i>Kırşehir Ahi Evran University</i>	The role of expectations in macroeconomic policy
Huseyin Husnu Kayikcioglu Elvan Hatipoğlu İhsan Bülent Okur	<i>Ege University</i>	The effect of different organic soil amendments and green manure crops combinations on soil health and olive yield
Gölgen Bahar Öztekin Orkun İkiz	<i>Ege University</i>	Effects of leaf fertilizer and trichoderma harzianum application on cucumber seedling quality
Özlem Yıldız Murat Boyacı Gölgen Bahar Öztekin	<i>Ege University</i>	Evaluation of the innovation process in the field of horticulture

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10.12.2023

HALL-1 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Dr. Ferhat Öztürk

Authors	Affiliation	Presentation title
Görkem Öztürk	<i>Siirt University</i>	An outlook on agricultural organization in Turkey
Hayder Abdulameer Al-Iessa Isa Avcı	<i>Karabuk University</i>	Challenges, architecture, and future trends in intrusion detection systems
Serap Akdemir	<i>Tekirdag Namık Kemal University</i>	Determination of variability in ambient conditions during cold storage of aronia fruits
Ferhat Öztürk Fayık Temur	<i>Sirnak University</i>	Comparison of yield characteristics of some maize varieties under şanlıurfa conditions
Ferhat Öztürk Fayık Temur	<i>Sirnak University</i>	Determination of yield characteristics of some maize varieties under kızıltepe conditions
Ferhat Öztürk Fayık Temur	<i>Sirnak University</i>	Evaluation of yield characteristics of different maize varieties under derik conditions
Ferhat Öztürk Fayık Temur	<i>Sirnak University</i>	Evaluation of yield factors of different corn varieties under mardin conditions

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10.12.2023

HALL-2 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Dr. Ayşe Nur Pektaş

Authors	Affiliation	Presentation title
Ayşe Nur Pektaş	<i>Sivas Cumhuriyet University</i>	Genetic erosion and conservation genetics
Ayşe Nur Pektaş	<i>Sivas Cumhuriyet University</i>	Biodiversity problem and genetic diversity of agricultural products
Samet Güler Lara Özserin Mustafa Yeşilyurt	<i>Amasya Üniversitesi</i>	The effect of simulation supported technology on mental collection in primary school
Ersin Sünbül	<i>Istanbul Nişantaşı University</i>	An econometric analysis of spending patterns of international tourists in turkey: a continental geographical perspective
Seçim Büyükçatalbaş Mustafa Yeşilyurt	<i>Amasya University</i>	The effect of educational games on success in science: a meta-analysis study
Sezgin Altinel Senay Yürür	<i>Yalova Üniversitesi</i>	Kamuda örgütsel vatandaşlık sergileme motivasyonu
Zobayer Ahmed Hakan Acet	<i>Selcuk University</i>	Environmental impact of anthropogenic sources: stirpat model analysis for bangladesh
Zobayer Ahmed Hakan Acet	<i>Selcuk University</i>	Third sector economy publications: a bibliometric analysis

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HALL-3 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Dr. Leila İmanparast

Authors	Affiliation	Presentation title
Seren Ayan Mehmet Anıl Sayiner	<i>İstanbul Nişantaşı University</i>	The effect of corporate social responsibility perception on organizational commitment in the banking sector
Sibel Çiloğlu Deniz Beste Çevik Kiliç	<i>Balıkesir Üniversitesi</i>	A review of postgraduate dissertations published in 2018-2023 on the performance anxiety of music education students in türkiye
Ali Konak	<i>Karabük Üniversitesi</i>	Effects of the central corridor, one of the corridors of the china belt road project, on foreign trade activities between turkey and china: 2002-2022 period
Emirhan Doğan Emine Okur Mustafa Yeşilyurt	<i>Amasya Üniversitesi</i>	The effect of simulation on handless addition in a combined classroom
Aziz İlhan Ferhat Özdemir Onurcan Yalinkiliç	<i>İnönü Üniversitesi</i>	Trends of current studies published in the field of mathematics education: sampling method and level
Hasan Gümüšoğlu	<i>Yalova University</i>	Değerler eğitimi bağlamında hükümlü ve tutuklulara yönelik uygulanan “manevi rehberliği destekliyoruz” projesi’nin önemi ve sonuçları
Medine Aytekin Burcu Arıç Tibet	<i>Ufuk University</i>	Investigation of psychological counselors' unfinished work and psychological resilience levels during their loss experiences
Lütfiye Coşkun	<i>Kilis 7 Aralık University</i>	The sociometric status of syrian children attending preschool education in türkiye

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HALL-4 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Dr. Aylin Aygün

Authors	Affiliation	Presentation title
Yakup Boran Hüsnü Kara	<i>Sakarya University of Applied Sciences</i>	Performance of exchange-correlation functionals on the structural and electronic properties of gaas: a density functional theory study
Murat Kiliç	<i>Gaziantep Üniversitesi</i>	Türkiye'deki yabancıların entegrasyonlarında türkçenin ve türkçe öğretiminin önemi
Dolunay Şenol Gıyasettin Yıldız	<i>Harran Üniversitesi</i>	Street labouring children and their fathers: a journey through changing authorities
Tuğba Dinç Figen Çok	<i>Başkent University</i>	Ebeveyn tükenmişliği, ebeveyn stresi ve ilişkisel yılmazlığın sosyo-demografik değişkenler açısından incelenmesi
Mustafa Ersin Pekdemir Sedanur Altun Sibel Selçuk Pekdemir	<i>Fırat University</i>	Investigation of thermal and shape memory properties of er2o3 doped pla/peg blend composite films
Aylin Aygün Ayşe Belgin Aksoy	<i>Gazi University</i>	The effect of book reading processes with parents on language development of preschool children
Samuel Obinna Okolie Gloria Manyeruke	<i>Near East University</i>	The impact of discrimination on the psychological wellbeing and ethnic identity of international students in north cyprus
Ergül Kuyucu Gülver Özden Mustafa Yeşilyurt	<i>Amasya Üniversitesi</i>	Simülasyon teknolojisinin ilkökul matematiğine etkisi

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HALL-5 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Münevver Gülbağ

Authors	Affiliation	Presentation title
Hasan Hüseyin Yurdağül Umut Zaim Selim Demircan Tolga Hardal Adem Seller M. Fatih Akay	<i>Universal Software</i>	Electricity consumption forecasting using time series based deep learning
Fatma Deniz Mehmet Ali Mazmancı	<i>Mersin University</i>	Water productivity of olive growing in aegean region in turkey
Nihayet Koçyiğit	<i>Batman Üniversitesi</i>	Organic corrosion inhibitors for aluminum and its alloys
Cihat Arda Şevval Yılmaz Hüseyin Ünal Fehim Fındık	<i>Sakarya University of Applied Science</i>	The effect of aerosil thickener on the mechanical properties of unsaturated polyester thermoset resin
Nisan Kuyumcu Mert Selmanoğlu Hüseyin Ünal Fehim Fındık	<i>Sakarya University of Applied Science</i>	Effect of macro particle size basalt and silica powder additives on mechanical properties of thermoset polyester composites
Oguzhan Orhan Şener Özönder Soner Ozgen	<i>Firat University</i>	Investigation of tensile-induced spingapless to half-metal transition in janus-type vsete transition metal dichalcogenides
Münevver Gülbağ	<i>Kırşehir Ahi Evran Üniversitesi</i>	Gülef ve musallar köy oda oyunlarının id, ego, süperego bağlamında değerlendirilmesi
Doğan Arslan Aynur Bilmez Özçınar	<i>Siirt Üniversitesi</i>	The importance and usage areas of sumac (rhus coriaria l.)

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HALL-6 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Dr.Esra Bilici

Authors	Affiliation	Presentation title
Rojda Onuk Gül Dural	<i>Fırat Üniversitesi</i>	Hemodiyaliz tedavisi alan hastalarda tedaviye uyumu etkileyen faktörler
Nazlı Başaran Gül Dural	<i>Fırat Üniversitesi</i>	Kemoterapi alan meme kanserli hastalarda semptom kontrolünde mobil uygulamaların kullanımı
Başak Doğan Arpacı Gül Dural	<i>Fırat University</i>	Yoğun bakımda basınç ülseri, görülme sıklığı ve önlenmesinde hemşirelik bakımı
Mehmet Kartal	<i>Istanbul Gelişim University</i>	The effect of some morphometric measurements in the calculation of carcass weight
Esra Bilici Salih Sezer	<i>Uşak Üniversitesi</i>	Coenzyme Q10
Gökhan Gelen Mustafa Çoban Aykut Bıçak Ayetül Gelen	<i>Bursa Technical University</i>	Experimental investigation of the energy consumption of a mobile robot integrated with manufacturing systems
Cem Çelikleş Neşe Uysal	<i>Amasya Üniversitesi</i>	Determination of quality of life and self-management in individuals with diabetic foot ulcer
Yasin Daştan	<i>Kırşehir Ahi Evran Üniversitesi</i>	Examination of the karagöz screen as an interface

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10.12.2023

HALL-1 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Dr. Osman Gökdoğan

Authors	Affiliation	Presentation title
Gökce Genç Deniz Coşkun Mustafa Yeşilyurt	<i>Amasya Üniversitesi</i>	Effects of simulation technologies on primary school science courses
Fatma Ebru İkiz Dijle Bayındır	<i>Dokuz Eylül Üniversitesi</i>	Okulöncesi dönemde çocuklarda saldırgan davranışlara etki eden etmenlerin sistematik gözden geçirilmesi
Metin Çinaroğlu	<i>İstanbul Nişantaşı University</i>	Shattered ground, resilient minds: psychosocial impacts and recovery in the wake of the 2023 kahramanmaraş earthquakes in türkiye
Haluk Doğan	<i>Manisa Celal Bayar Üniversitesi</i>	The concept of topos as an existential basis in ismet özel's political philosophy
Haluk Doğan	<i>Manisa Celal Bayar Üniversitesi</i>	In search of nomos in a world devoid of nomos: the political philosophy of ismet özel
Bahadır Furkan Kinaci	<i>Karabuk University</i>	Maintenance methods used in rail systems
Bahadır Furkan Kinaci	<i>Karabuk University</i>	Crossings in rail systems
Ümit Çalışır Baki Çiçek	<i>Siirt Üniversitesi</i>	Investigation of photoluminiscence properties of some substituted mwent compounds
Ümit Çalışır Baki Çiçek	<i>Siirt Üniversitesi</i>	Competitive extraction of some original methyl substituted benzothioate compounds and investigation of their metal removal properties from various waters

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10.12.2023

HALL-2 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Dr. Eda Kolçak Gıyak

Authors	Affiliation	Presentation title
Müge Şahin Kerem Mertoğlu	<i>Uşak Üniversitesi</i>	Recent breeding targets in japanese plum (<i>Prunus salicina</i> L.)
Kerem Mertoğlu Müge Şahin	<i>Uşak Üniversitesi</i>	Studies conducted on fire blight disease on pear and Quince species in türkiye
H. Ziya Özek	<i>Tekirdag Namik Kemal University</i>	Evolution of weaving: from primitive loom to weaving machine
H. Ziya Özek	<i>Tekirdag Namik Kemal University</i>	Evaluation of the environmental impacts of textiles and apparel throughout the full life cycle
Zemzem Firat Emrah Ramazanoglu	<i>Harran Üniversitesi</i>	Effect of zinc fertilizer applied at different rates on the growth and nitrogen uptake of pepper (<i>capsicum annum</i> l.) plants in calcareous and alkaline soil
Zemzem Firat Emrah Ramazanoglu	<i>Harran Üniversitesi</i>	Effect of potassium application on the uptake of some agronomic and macro plant nutrients of the corn plant (<i>zea mays</i> l.)
Ilhan Altay	<i>Ilsan Tekstil San. ve Tic. A.Ş</i>	Using electrodialysis method for recycling textile wastewater: advantages, challenges and industrial applicability

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10.12.2023

HALL-3 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Dr. H. Deniz ŞİRELI

Authors	Affiliation	Presentation title
Gülsüm Turhan	<i>Amasya University</i>	Biological immortality and ethical issues: an analysis based on the immortal family novel
Dolunay Şenol Gıyasettin Yıldız	<i>Harran Üniversitesi</i>	Erken yaşta evlenen kadınların dilinden “anne olmak”
Nursel Gündüzalp Gülsever	<i>The Ministry of National Education</i>	The effect of storytelling on the education and development of primary school students
Fatma Eraslan	<i>Kırşehir Ahi Evran Üniversitesi</i>	Türk bozkır kültüründe diplomasinin seyri
H. Deniz Şireli Murat Turan Ömer Ufuk Karahan	<i>Dicle University</i>	Importance of preparation of herd projection in livestock
H. Deniz Şireli Ömer Ufuk Karahan Murat Turan	<i>Dicle University</i>	Roughage and concentrate feed production potential of southeastern anatolia region
Abdurrahim Yılmaz Mustafa Ceritoğlu Sipan Soysal	<i>Siirt University</i>	Use of sheep wool as organic fertilizer in sustainable agriculture
Sipan Soysal Mustafa Ceritoğlu Mustafa Ceritoğlu	<i>Siirt University</i>	Use of chitosan as a biostimulant

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10.12.2023

HALL-4 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Dr. Gülcan Demiroğlu Topçu

Authors	Affiliation	Presentation title
Mustafa Ceritoğlu Sipan Soysal Abdurrahim Yılmaz	<i>Siirt University</i>	Plant growth promoting bacteria as bio-insecticides in sustainable agriculture
Mehmet Emin Polat Nurhan Keskin Adem Yağci	<i>Van Yüzüncü Yıl University</i>	New phytohormone strigolactones and their role in regulation of root architecture in grapevine (<i>vitis vinifera</i> L.)
Muazzez Cömert Acar Özer Hakan Bayraktar	<i>Ege University</i>	Improving organic poultry production: legal regulations and current status
Özer Hakan Bayraktar Muazzez Cömert Acar	<i>Ege University</i>	Agriculture 4.0 applications in poultry production yazı tipi (times new roman) 12 punto
Gülcan Demiroğlu Topçu Hager Gamal Maher Mohamed	<i>Ege University</i>	An overview of the miracle tree and moringa genus
Ibrahim Enes Çınar Gülcan Demiroğlu Topçu	<i>Ege University</i>	The effect of doses of different nitrogen form and doses on some yield characteristics of annual ryegrass (<i>lolium multiflorum lam.</i>)
Serkan Bolat Levent Pelit Hakan Erer	<i>Ege University</i>	Hava örneklerindeki uçucu organik bileşiklerin metal organik kafes yapılar ile tayini
Ekin Varol Banu Yücel	<i>Ege University</i>	Honeybees as bioindicators and their potential for environmental monitoring
Ekin Varol Banu Yücel	<i>Ege University</i>	Impact of environmental factors on bee venom production and quality

(All speakers required to be connected to the session 10 min before the session starts)

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10.12.2023

HALL-5 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Menouar Hanafi

Authors	Affiliation	Presentation title
Fatima Atiku Nasir Abba Yusuf	<i>Ummaru Musa Yar'adua University</i>	Influence of web-based instructional software on secondary school students attitudes towards biology in katsina zonal quality assurance, katsina state
Shalala Huseynova Asaf Omarov	<i>Azerbaijan International Airport</i>	Cross-sectional study, amr salmonella spp. in poultry product in azerbaijan, 2023
Mahmood Ahmed	<i>University of Education</i>	Essential and potentially toxic metals in traditional sweets in pakistan: exposure assessment and human health implications
Lətəfət Beybutova Ələsgər Qizi	<i>Head of scientific research, exposition and fund department</i>	Azərbaycanın xilası-qafqaz islam ordusu
Menouar Hanafi	<i>The University of Science and Technology of ORAN</i>	The production of the gasoline with high quality with high octane number by the use of the bifunctional catalyst pt / re in the catalytic reforming process.
Abdelmoumene Hanafi Menouar Hanafi	<i>The University of Science and Technology of ORAN</i>	The pollution of the sea water by the waste from the l.n.g. plant arzew-algeria and the waste water purifying system
Abdelhakim Hanafi Menouar Hanafi	<i>The University of Science and Technology of ORAN</i>	The study of the water pollution in the west of algeria
Meliha Uzun	<i>Şırnak University</i>	Yaşam Becerileri Davranışlarında Sporun Etkisi: Gençlik ve Spor Personeli Üzerine Bir Araştırma
Hasan Osmanoglu Meliha Uzun	<i>Şırnak University</i>	Doğa yürüyüşleri katılım motivasyonunun incelenmesi: Şırnak ili örneği

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10.12.2023

HALL-6 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Ivan Pavlovic

Authors	Affiliation	Presentation title
Zain Mushtaq	<i>University of the Punjab</i>	Pgpr-press mud application to improve okra growth and development in chromium contaminated soil
Vilayet Abdiyev Boyukkhanim Jafarzade Sevinj Ismayilova Nigar Aliyeva	<i>Baku State University</i>	Study of certain physiological-biochemical processes in barley sprouts etiolated and kept in daylight at different time intervals
Saima Shaheen Nabila Sher Hafsa Zafar Kalsoom Tariq Sosan Rauf	<i>Khyber Girls Medical College</i>	Effect of lipid-based multiple micronutrients supplementation in underweight primigravida pre-eclamptic women on maternal and pregnancy outcomes: randomized clinical trial
Sosan Rauf Nabila Sher Saima Shaheen Zarghuna Mashal Zafar	<i>Khyber Girls Medical College</i>	Effect of duration of use of combined oral contraceptives on serum lipid profiles, fasting blood sugar, blood pressure and bmi in child bearing age women
Lina Khalfallah Imane Haraoubia	<i>University of Algiers 1</i>	A playful approach to the assessment of public transportation in sidi abdellah
Ivan Pavlovic	<i>Scientific Institute of Veterinary Medicine of Serbia</i>	The most common coleopters from the scarabida family which are transitional hosts of macracantarchynchosis
Moses Adeolu Agoi Oluwanifemi Opeyemi Agoi	<i>Lagos State University of Education</i>	Assessing the use of ict among high school teachers in the 21st century
Lalanda Agayeva	<i>Azerbaijan State Pedagogical University</i>	Study of the effects of emotional stress on simple sensorimotor response time emotional stress, response time, exam stress, applicants
Ibrahim Özyaytürk Bahadır Metin Gürçem Özyaytürk	<i>Nigde Omer Halisdemir University</i>	Can higher economics complexity improve public administration efficiency?

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11.12.2023

HALL-1 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Yeganə Ağamalyeva

Authors	Affiliation	Presentation title
Dana Maria Copolovici Cristian Moisa Andreea Lupitu Flavia Bortes Dana Gina Radu Lucian Copolovici	<i>Aurel Vlaicu" University</i>	Antimicrobial peptides: synthesis, characterization and applications
Andreea Lupitu Lucian Copolovici Cristian Moisa Flavia Bortes Virgiliu Ciutina Dana Copolovici	<i>Aurel Vlaicu" University</i>	The influence of elevated carbon dioxide levels in combination with the presence of eurydema ventralis on brassica oleracea var. botrytis plants
Flavia Bortes Andreea Lupitu Cristian Moisa Denisa Peteleu Dana Copolovici Lucian Copolovici	<i>Aurel Vlaicu" University</i>	The influence of elevated carbon dioxide on the growth of raphanus sativus plants under high-temperature conditions
Dosent Yeganə Ağamalyeva Magistr Abbasova Fidan	<i>Azərbaycan Dövlət İqtisad Universiteti</i>	İmici müasir postsənaye məkanında kommunikasiya vasitəsi kimi
Nazlı Ceyhun Gizi Ajdarova Afsana Ceyhun Gizi Hüseynova	<i>"Nahçıvan" Üniversitesi</i>	Doğal kaynakların çevresel yönleri və verimli kullanımı
Radhiyah M. Aljarrah Ali M. Aljawdah	<i>Iraq University of Kufa</i>	Study the effect of doping with silver nanoparticles on the properties of zirconium dioxide membranes and their effect on it as a gas sensor.
Bahman Gorjian Emad Arvand	<i>Islamic Azad University</i>	Using whatsapp application affecting knowledge of learning phrasal verbs
Yebimodei Esther George Eka John Eru Odubo Angonimi	<i>Federal Polytechnic</i>	Importance of resiliency on firm competitive advantage and performance in present day economy

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11.12.2023

HALL-2 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Jaroslava Gburová

Authors	Affiliation	Presentation title
Ahmadova Emiliya	<i>Baku Higher Oil School</i>	State of the halal economy and halal certification in azerbaijan
Sepideh Alahyari Baghnazeri Ali Fazeli	<i>University of Tehran</i>	Simulation and optimization of amin mixtures in absorption of carbon dioxide and hydrogen sulfide for natural gas sweetening by aspen hysys software
Sana Hoseinpour Ali Fazeli	<i>University of Tehran</i>	Investigating the synergistic effect of the combination of scrap tyre and cigarette filters on the amount and quality of bio-oil in the slow pyrolysis process
Saeed Karimian Ali Fazeli	<i>University of Tehran</i>	Recovery of vanadium from cs-promoted catalyst of so2 oxidation reaction
Muhammaed Jawad Husain Kamil M. Al-Jobori	<i>University of Baghdad</i>	Differences in the responses of biochemical characteristics and related cat, mapk6 and p5sc genes expression between iraqi wheat genotypes to single and combined drought and salinity stresses
Jaroslava Gburová Daniela Matušiková	<i>University of Prešov</i>	Marketing tools in the promotion of hotels in heritage objects
Daniela Matušiková Jaroslava Gburová	<i>University of Prešov</i>	Importance of hospitality innovations in heritage objects
Halil Bajrami Venet Shala Blerona Bajrami	<i>University of Mitrovica "Isa Boletini"</i>	The role of managerial decision-making in company performance
Çiğdem Takma Yakut Gevrekçi	<i>Ege University</i>	Tarımsal Araştırmalarda Kayıp Verileri Tamamlama Yöntemlerinin İncelenmesi
Yakut Gevrekçi Çiğdem Takma	<i>Ege University</i>	Biyoteknoloji Ve Hayvan Islahı

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11.12.2023

HALL-3 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Favour Chukwuemeka Uroko

Authors	Affiliation	Presentation title
Guzal Massadikova	<i>Hoca Ahmed Yesevi Uluslararası Türk-Kazak Üniversitesi</i>	Intercultural interaction clothing designs
D. Kamalraj	<i>Bannari Amman Institute of Technology</i>	Wicking and air permeability properties of cotton / banana blended woven fabric
Imoh Ime Ekanem Aniekan Essienubong Ikpe	<i>Akwa Ibom State Polytechnic</i>	A technical survey on energy potentials of point focus solar collector system: a sustainable resource for energy mix augmentation
Mohamed Neffati	<i>Imam Mohammad Ibn Saud Islamic University</i>	Socioeconomic globalization, digitalization, and economic development: evidence from saudi arabia
Humam Kareem Jalghaf Endre Kovács	<i>University of Miskolc</i>	Simulation of building walls with phase change materials using effective heat capacity model by recent numerical methods
Favour Chukwuemeka Uroko	<i>University of Nigeria Nsukka</i>	The old testament and migration dynamics: the nigerian perspective
Ali Zhuniqi Idriz Kovaçi Alberta Tahiri	<i>University "St. Kliment Ohridski"</i>	The performance of the insurance market in kosovo - dukagjini insurance company
Idriz Kovaçi Alberta Tahiri Hekuran Sabedini	<i>University of Applied Sciences in Ferizaj</i>	Promotion of cultural heritage and its impact on the development of tourism in the region of the sharrit-ferizaj, kaçanik, prizren mountains

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11.12.2023

HALL-4 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Zohaib Hassan Sain

Authors	Affiliation	Presentation title
Alberta Tahiri Idriz Kovaçi Ermirë Halili	<i>University of Peja "Haxhi Zeka"</i>	Culture the impact of festivals, fairs, exhibitions in Kosovo
Budişteanu Tudor-Gabriel	<i>Bucharest University of Economic Studies</i>	Exploring legal frameworks for cryptocurrencies: a view across europe
Zohaib Hassan Sain	<i>Superior University</i>	Navigating the chatgpt frontier: balancing innovation and tradition in education
Zohaib Hassan Sain	<i>Superior University</i>	Reviewing the academic landscape: the implementation of elearning initiatives in higher education
Jolana Gubalova	<i>Matej Bel University</i>	Learning analytics from university information systems for enhancing quality of education and management
Olena Kilnitska Maryna Yaremova	<i>Polissia National University</i>	Formation of socio-economic and energy security of ukraine
Nooshin Pishbin	<i>Nuclear Science and Technology Research Institute</i>	Characterization of ion emission in a mather plasma focus device 20 kj
Manoj Kumar Bhatnagar Rina Parmar Dharmendra Kumar	<i>Pt. Deendayal Upadhyay Institute of Archaeology</i>	Benzotriazole and its derivatives as corrosion inhibitors for copper artifacts: a comprehensive review

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11.12.2023

HALL-5 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: John Noel S. Nisperos

Authors	Affiliation	Presentation title
Dahunsi Olusola Oyetade Oluwatoyese	<i>KolaDaisi University</i>	Econometrics analysis of industrial sector and economic growth in nigeria
Chhavi Singla	<i>J P College of Pharmacy</i>	Including inclusive teaching practices for people with disabilities in the development, organization, and implementation of science laboratory lessons
Saranda Kajtazi Hajrullah Hajrullahu	<i>Pristina University "Hasan Prishtina"</i>	Consumer behavior in Kosovo: understanding factors influencing water selection and sustainable practices
Egzona Selimi	<i>University St. Clement of Ohrid</i>	Risks and insurance: a survey of risk management tools in the insurance context
Altina Hasani Martina Augustini Fitore Selimaj Miribane Dërmaku-Sopjani Arleta Rifati-Nixha	<i>University of Prishtina</i>	Synthesis and structural characterization of some new substituted chalcone derivatives starting from 4-nitroacetophenone
Fitore Selimaj Altina Hasani Martina Augustini Arleta Rifati-Nixha Miribane Dërmaku-Sopjani	<i>University of Prishtina</i>	Synthesis and structural characterization of some new substituted chalcone derivatives starting from 3,4-dimethoxyacetophenone
Waseem Khan Mian Abdul Hafeez Muhammad Wahab	<i>University of Veterinary & Animal Sciences</i>	Parasitological, molecular, and epidemiological investigation of trypanosoma evansi infection among dromedary camels in baluchistan province
John Noel S. Nisperos	<i>Memorial State University</i>	Level of proficiency of junior high school students in filipino language and literature

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HALL-6 / SESSION-1



BAKU LOCAL TIME



11⁰⁰ : 13⁰⁰



ANKARA LOCAL TIME



10⁰⁰ : 12⁰⁰

HEAD OF SESSION: Dr. Sevilay Gül

Authors	Affiliation	Presentation title
Sevgi Özen	Recep Tayyip Erdogan University	Influence of calcination temperature of natural clinoptilolite on the properties of mechanical development
Arzu Altuntaş	Siirt Univesrty	İklim değışikliđi, sürdürülebilir kentler ve peyzaj mimarlıđı
Arzu Altuntaş	Siirt Univesrty	Kentsel dönüşümde yeşil altyapı ve sürdürülebilirlik
Fırat Pala Husrev Mennan	Siirt Univesrty	Ecological approaches of weed management
Fırat Pala Husrev Mennan	Siirt Univesrty	Weed management tactics in conservation agriculture
Emrah Koçak Oktay Kizilkaya	Kırşehir Ahi Evran University	Dynamic impact of agricultural productivity on co2 emissions in turkey
Sevilay Gül	Namık Kemal University	Effects of lactic acid bacteria on fermentation and nutrient quality of silage
Vedat Pirinç Erhan Akalp Edip Alas	Dicle University	Isıtmasız Topraklı Sera Şartlarında Bitki Antifirizi Kullanımının Marul Yetiştiriciliđine Etkileri
Akgül Taş Muttalip Gündođdu Melekber Sülüşođlu Durul	Bolu Abant İzzet Baysal University	Meyvelerde hasat sonrası putresin uygulamasıyla kalite özelliklerinin korunması

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11.12.2023

HALL-1 / SESSION-2



BAKU LOCAL TIME



ANKARA LOCAL TIME



13³⁰ : 15³⁰



12³⁰ : 14³⁰

HEAD OF SESSION: Muhammad Mateen Afzal Awan

Authors	Affiliation	Presentation title
Muhammad Mateen Afzal Awan	<i>University of Management and Technology</i>	Imaging of flower pollination algorithm for optimal power extraction from solar photovoltaic system
Laura Diaconu (Maxim) Ionuț-Andrei Pricop	<i>Al. I. Cuza" University of Iasi</i>	Religion, entrepreneurship and economic growth. an empirical investigation
Piotr Kosiński	<i>University of Warmia and Mazury in Olsztyn</i>	The potential of using materials of natural and bio origin for thermal insulation of buildings
Violina Popovici Rodica Sturza Adela Pintea	<i>Technical University of Moldova</i>	Bioactive profile of local berries lipophilic extracts
Hafiza Tuba Ashiq Shahwaiz Tariq Muhammad Adnan Sabir Mughal Shahid Ali Rana Muhammad Shahbakht Momna Mehmood	Muhammad Nawaz Sharif University of Agriculture	Green Microbiology: Symbiotic Solutions for a Changing Planet
Tran Thi Bich Thuy Dang To Uyen Vuong Van Quan	Nha Trang University	Gac By-Product And Its Potential Use For Development Of Edible Film
Amlı Aboo Bakar	Transport and Telecommunication Institute	Artificial Intelligence in Business Transformation: Strategies for Competitive Advantage
Dimitra Kapnisi Athanasios Kriemadis	University of Peloponnese	How to integrate the concept of Human Resource Empowerment in Professional Sport Organizations and Sport Clubs
Laraib Javaid Ayesha Jabeen	University of Management and Technology	Speed of Processing through Stroop Effect, Reading Skills, Arithmetic Performance and Behavioral Issues in School Children
Oxana RADU	Technical University of Moldova	Geriatric Nutrition Improvement Through The Development Of Amaranth Foods

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11.12.2023

HALL-2 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Dr. Ristina Siti Sundari

Authors	Affiliation	Presentation title
Natalia Netreba Viorica Bulgaru Olga Boestean Rodica Sturza Aliona Ghendov-Mosanu	Technical University of Moldova	Applications Of Pumpkin Powder As Novel Ingredient In Biscuits
Lələndə Ağayeva	Azərbaycan Dövlət Pedaqoji Universiteti	Emosional gərginliyin sadə sensomotor reaksiya vaxtına təsirinin tədqiqi
Ali Zhuniqi Idriz Kovaçi Alberta Tahiri	University "St. Kliment Ohridski"	The performance of the insurance market in Kosovo - Dukagjini Insurance Company
Egzona Selimi	University St. Clement of Ohrid	Risks and Insurance: A Survey of Risk Management Tools in the Insurance Context
M K Hamirwasia	Birla Institute of Technology & Science (BITS)	Business Organizations And Ethical Behaviour
Alireza Hosseini	University of Tehran	A Variational Approach based Interpolation for Image Deblurring and Denoising
Ristina Siti Sundari Farhan Ahmad D yadi Heryadi Budhi Wahyu Fitriadi Lucyana Trimo Iwan Setiawan	University of Perjuangan	Traditional Coconut Sugar Added Value
Reny Hidayati Ristina Siti Sundari Bagas Pamungkas Sindi Rosita	University of Perjuangan	Analysis of the technical efficiency of upland farming in Tasikmalaya Regency
Amna Anjum Sarwat Sultan	Bahauddin Zakariya University	Mediated-Moderation through Resilience and Social Support between Occupational Stress and Mental Health Issues among Rescue Workers
Stalin S Shubham Agrawal	Bannari Amman Institute of Technology	Development Of Antimicrobial Properties Of Cotton Fabric Treated With Zinc Monohydrate And Zinc Sulphate Heptahydrate

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HALL-3 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Cardinal, Ihejirika

Authors	Affiliation	Presentation title
Sulaiman Yusuf Ali Nurudeen Abubakar Sadiq Nyako Alhaji Baba Abdulwasiu Bamidele Aremu	Federal Polytechnic Kaltungo	Crime Data and Information Management System
Ali Babaa Shuaibu Abatcha Alhaji Kurna Suleiman Mohammed Gidado Nura Muhammad Sani	Federal Polytechnic Kaltungo	News/Events Automation System
D. Mounikalatha	Rajiv Gandhi Institute Of Veterinary Education And Research Puducherry	Surgical Management Of Teat Laceration In A Cow
Pooja Rasal Gaurav Kasar	JES's SND College of Pharmacy	Pharmacological Activity of Naringin: Preclinical Evidences
Cardinal, Ihejirika	University of Port- Harcourt	Harnessing African Indigenous knowledge Systems for Knowledge production: A re-definition of a culture-centric epistemology.
C.Vijai, M.S.R.Mariyappan, M.Elayaraja	Department of Commerce and Business Administration	Artificial Intelligence in Finance - Opportunities and Risks
Aqsa Mushtaq Ameer Fawad Zahoor	Government College University Faisalabad	Recent Applications Of Mukaiyama Aldol Reaction Towards The Stereoselective Synthesis Of Natural Products
Nadeem Bhatti Rasool Bux Junejo Faiz Muhammad Shaikh	VC Lahore Leads University	A qualitative quantitative mixed methods study of domestic violence against women : A Case study of Shikarpur-Sindh-Pakistan
Muhammed Sani Babakatun Anas Saleh	School of Information and Communications Studies	Social Media Threats To Nigerian Democracy: Use Of Facebook Platform
Favour C. Uroko Chinyere Theresa Nwaoga	University of Nigeria	The impact of the investor and the investee Nigeria- China relationship in a multi-religious Nigeria

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HALL-4 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Ajayi, Olayemi Tosin

Authors	Affiliation	Presentation title
Ajayi, Olayemi Tosin	Lead City University	Reflections Of A Creative Catalyst On 'Sex For Grades' In Nigerian Tertiary Institutions: Consequences And Ways Forward
Le Tran Thanh Liem Pham Ngoc Nhan Nguyen Minh Tri Dao Nhat Tan	Can Tho University	Agricultural Tourism Preservation And Exploitation: A Case Study Of Of The Bay Nui Bull Racing Festival In An Giang Province, Vietnam
Aghil Sharifzadeh	University of Tehran	Antifungal Properties and Chemical Composition of Iranian Fennel Essential Oil: A Study on its Effect on <i>Candida tropicalis</i> Biofilms
Aghil Sharifzadeh	University of Tehran	Assessment of Oropharyngeal Candidiasis and Antifungal Susceptibility of <i>Candida glabrata</i> in HIV-Infected Patients
Asike, Jude Chinweuba	University of Port Harcourt	The Impact Of Philosophy On Social Change Dynamics Of Social Consciousness In Nigeria
Sándor Földvári	Debrecen University	Eszter (Esther) Ojtozi, The Heroic Scholar In The Field Of Old Printed Books, Who Created Internationally Recognized Scientific Results, Despite Strange Harsh Conditions
Olayemi T. Ajayi	The Federal Polytechnic	Utilizing Graphic Design for Socioeconomic Advancement: Exploring Mobigraphy and Experimental Outcomes of a Photo Framing Technique
Bindu Bharathi	Northern Border University	A Phenomenological Study on Experiences of Depressive Older People in India
Ramsha Munir Ameer Fawad Zahoor Sadia Javed Bushra Parveen Asim Mansha Kulsoom Ghulam Ali Ali Irfan Mariusz Mojzych	Government College University Faisalabad	Synthetic Application of Furukawa-Modified Simmons-Smith Cyclopropanation
Rida Zulfiqar	University of Szeged	Crossroads of Cultures: Examining Human Rights Practices in the Context of Migration and Multiculturalism

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11.12.2023

HALL-5 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Daniel ORIFAMAH

Authors	Affiliation	Presentation title
Daniel ORIFAMAH	IMO State University	Redefining Teachers' Professional Development: How Virtual Environment Shape Motivation and Self-efficacy
Moses Adeolu AGOI Oluwanifemi Opeyemi AGOI	Lagos State University of Education	5g Mobile Networks: The Growing Dynamics Of Telecommunication Technology
Fettouch Houari	University of Mostaganem	Order Of Growth Of The Solutions Of Differential Equations
Süreyya Yiğit	New Vision University	Sustainable Development Goals: A Global Challenge
A.A. Yusuf, A.O Akanbi R.E. Mohammed	University of Ilorin	Effects Of Social Media On The Motivation Of Undergraduate Physics Education Students In Ilorin, Nigeria
Saima Shaheen Nabila Sher Hafsa Zafar Gulnaz Begum Sosan Rauf	Khyber Girls Medical College	Effect of Lipid-Based Multiple Micronutrients Supplementation in Underweight Primigravida Pre-Eclamptic Women on Maternal and Pregnancy Outcomes: Randomized Clinical Trial
C.Vijai J.Sridevi M. Elayaraja	Dr. Sagunthala R&D Institute of Science and Technology	Virtual Reality and Augmented Reality Applications
Mohammad Ahmad Zuru Abdullahi Abdu Muhammad Chika Mu'azu Musa Shuaibu Ishaka Muhammad	Usmanu Danfodiyo University	Optimization Of Biogas Production And Compression From Co-Digestion Of Animal Dungs
Mohammed Alaa Alwafaie Bela Kovacs	The University of Miskolc	Electromechanical Energy Harvesting: A Promising Source of Sustainable Power for Various Applications
Hadj Mohamed OUNIS Abdelhafid OUNIS	Mostefa Ben Boulaid University	The Effectiveness Of A Passive Combined System (Fps-Lrb) For The Reduction Of The Dynamic Response Of A Mid-Rise Building

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HALL-6 / SESSION-2



BAKU LOCAL TIME



13³⁰ : 15³⁰



ANKARA LOCAL TIME



12³⁰ : 14³⁰

HEAD OF SESSION: Muwafaq Mahdi Salih

Authors	Affiliation	Presentation title
Sapna Dhaliwal Harleen Kaur	Mata Sundri College for Women	Nurturing Spiritual Health in Young Adults: Insights and Implications
Muwafaq Mahdi Salih	University of Duhok	On Quasi-Fat and Pseudo-Fat Sets in Relator Spaces
Samuel Mores Geddam N. Nethravathi	St. Joseph's University	New Education Policy 2020 Contribution to OBE and SDGs
W. Smoleń J. Marczyk M. Łach T.X. Nguyen K. Korniejenko	Cracow University of Technology	Effect of microsilica addition on properties of geopolymer composites
Salah Mohammed Fezea Rana Kareem Mohammed Rehab Kadhim Raheem Al-Shemary	University of Baghdad	Formulation and spectroscopy of Cu(II) nano complexes of monobasic tri- or bidentate (NNO, NO) azo dye ligands
Fowotade, S.A., Sunusi S.K., Haruna D.A., Saleh, I., Zainab S.J. Murtala Y.D.	College of Science and Technology	Trace Metal Analysis of Sachet Water Sold In Kazaure Local Government Area Jigawa State Nigeria.
Fowotade, S.A., Sunusi S.K., Haruna D.A., Saleh, I., Zainab S.J. Murtala Y.D.	College of Science and Technology	Assessment Of The Physicochemical Properties Of Neat Lubricating Oil For Automobiles
Azzam Alarab Alaa Abusakour Bayan Khalilieh Esraa Rayan Ghaida' Shawawreh Mohammed Muneef Salma Jaber	Palestine Ahliya University	Dry Needling Technique versus Maitland Mobilization Technique in managing chronic non-specific neck pain
Sènakpon Socrate Sosthène TOBADA Adamou SIDDO	Université André Salifou	Signe, Sens Et Symbole Pour Une Semiotique Du Developpement Chez L'artiste Slameur Hamani Karimou Alias Johnel Au Niger
Wilson, Emmanuel Okon Idiong, Kokoette. E	Akwa Ibom State Polytechnic	Electrochemical Potential-Based Diagnostics Of Steel Rebar Corrosion In Concrete

(All speakers required to be connected to the session 10 min before the session starts)

Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.

Online Zoom ID: 851 7785 3338 / Passcode: 101112

11.12.2023

HALL-1 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Deepali Tomar

Authors	Affiliation	Presentation title
Rosanilio Yagos Chinchin Demayo Cesar Demayo	JH Cerilles State College	Ichthyofauna in four interconnected rivers traversing several communities in two Zamboanga Provinces
Sara Shokrpoo Roya Ezzati beyg balaghi Samansa Salehi Mahta Moghadasi	University of Tehran	Comedocarcinoma In A Cat: Histopathological Findings
Sara Shokrpoo Mohammad Sadegh Khanbabaii Samansa Salehi Fateme Sheikhian	University of Tehran	Oral Squamous Cell Carcinoma In A Dog
Sara Shokrpoo Yasaman Ebrahim Zadeh Ardestani Narges Dareh Giraei Fatemeh Pourali	University of Tehran	Polycystic Kidney Disease In A Yorkshire Terrier
Wajahat Ali Shakeel javaid	Aligarh Muslim University	Artificial Intelligence -Powered Route Optimization and Autonomous Vehicles: Transforming Logistics Efficiency in Transportation
Sepideh Abbaszadeh Aghil Sharifzadeh Maryam Taghdir	Baqiyatallah University of Medical Sciences	Inhibitory effects of Menthol and Eugenol on the yeasts as food spoiling agents
Abdul-karim, I. F., Subair, S.K. Yusuf, O.J., Adefalu, L. L.,	Cocoa Research Institute of Nigeria Ibadan	Constraints to Adoption of Export Standard Practices (ESP) among Coffee-based Farmers in Kogi State, Nigeria
Deepali Tomar	University Of Kota	An Analysis of Share of Women in MSME Sector - A Comparative Study Of Rajasthan and Uttarakhand
Mohammed Baba Abdullahi Farah Aini Abdullah	Kampala International University	Application of Optimal Control to Plasmodium Knowlesi Malaria in Human and Macaques
Mohammed Baba Abdullahi Farah Aini Abdullah	Kampala International University	Fractional Order Seasonal Forcing of Plasmodium Knowlesi Malaria Model Transmission Dynamics

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11.12.2023

HALL-2 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Davletova Saltanat

Authors	Affiliation	Presentation title
Omarkhan Samarkanov Masoud Riazi	Nazarbayev University	Predicting Oil Production: A Machine Learning Approach
Davletova Saltanat	L.N.Gumilyov Eurasian National University	Vernacular Content In Toponymy And Its Linguistic And Cognitive-Communicative Features
Nika Ichkiti Marina Kuparadze Gigi Gorgadze Ia Avaliani Edward Limonjiani Giorgi Zhorzholiani	Tbilisi State Medical Univerisity	Vasculitis syndromes should be considered as a pathogenesis mechanism in several systemic diseases - A case report of Takayasu Arteritis.
Rehman Khan Hasnain Saleem Usama Haider Khan	Swedish college of Engineering and Technology	Design and fabrication of Electro-magnetic clutch
Rehman Khan Usama Haider Khan Hasnain Saleem	Swedish college of Engineering and Technology	Sterling Engine
S.Saravanan K.Gajalakshmi	Annamalai University	Machine learning Approach to predict Weld aspect ratio and tensile strength in laser welding of UNS S32750 steel
Olawale Oyemade OYEKANMI	School of Arts and Social Sciences	Clarion Call: Saving The Planet From Air Pollution
Md Alimul Haque Ankit Kumar Kushboo Mishra B.K.Mishra	Veer Kunwar Singh University	Strengthening Cybersecurity with Artificial Intelligence: Revealing Threats, Counteractions, and Mitigation Strategies
Ojiagu, Nkechi C.	Nnamdi Azikiwe University	Incorporating Effectiveness and Accountability for Member Good: Possible Choices for Cooperatives in Sub-Sahara Africa
Mohamed Rhaya Hicham Abou Oualid Redouane Haounati Hamza Ighnih Brahim Ennasraoui Hassan Ouachtak Amane Jada Abdelaziz Ait Addi	Ibn Zohr University	Enhanced photocatalytic degradation of malachite green MG dye under sunlight using a novel ternary nanocomposite

(All speakers required to be connected to the session 10 min before the session starts)

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Online Zoom ID: 851 7785 3338 / Passcode: 101112

11.12.2023

HALL-3 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Raja Mohammad Latif

Authors	Affiliation	Presentation title
Raja Mohammad Latif	Prince Mohammad Bin Fahd University	Alpha Weakly Semi - Continuous And Alpha Weakly Semi - Irresolute Mappings In Topological Spaces
Raja Mohammad Latif	Prince Mohammad Bin Fahd University	Alpha Weakly Semi - Open And Alpha Weakly Semi -Closed Mappings In Topological Spaces
Zainab Onozare Maiyaki	Federal University Gusau	Strategic Frameworks for Nurturing Sustainable Competitive Advantage through Innovation Management across Diverse Industries within Nigeria
Vaibhav Yavalkar	A. P. Shah Institute of Technology	A Survey on Channel Capacity Estimation for Massive Multiuser MIMO Systems
Shehu Ahmadu Nadamau Ibrahim Mustapha	Ahmadu Bello University	Antibiofilm of Plants origin in Antimicrobial resistance control
Jolana Gubalova	Matej Bel University	Integrated Data Analysis From University Information Systems For Enhancing Quality Of Education
Ryzhova Yulia Ilyinichna Kiseleva Marianna Vladimirovna	Russian State University A.N. Kosygin	The Use Of High-Tech Materials In Clothing
Hooman Rahmati-Holasoo Hosseinali Ebrahimzadeh Musavi	University of Tehran	Survey on parasitic infection in 3 ornamental fish farms in alborz province
Yahaya Riko Yunusa Zubairu Darma Umar Kamaluddeen Kabir	Umaru Musa 'Yar'adua University	Beyond Food: Reviewing Recent Trends In The Application Of Sorghum bicolor L. (Moench) In Phytoremediation
Chems Eddine Boukhedimi	University of Tizi Ouzou	Examination of the correlation between the age of tourists and willingness for internal tourism in Algeria

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11.12.2023

HALL-4 / SESSION-3



BAKU LOCAL TIME



16⁰⁰ : 18⁰⁰



ANKARA LOCAL TIME



15⁰⁰ : 17⁰⁰

HEAD OF SESSION: Adnane Ghiat

Authors	Affiliation	Presentation title
Yeganə Ağamaliyeva Abbasova Fidan	Azərbaycan Dövlət İqtisad Universiteti	İmic Müasir Postsənaye Məkanında Kommunikasiya Vasitəsi Kimi
Hyo Jeong Lee Young Joo Na	Inha University	Silla face-inlaid glass bead and its verification
Munima Bano Mohemmed Faraz Khan Saimah Khan	Integral University	Investigating the biochemical impact of diphenyl pyrazole in biological system
Ochigbo, J.E., Michael I. Ali	Federal University Wukari	On the effect of Livestock Availability on Malaria transmission with Optimal Control
Manvi singh Rahmuddin khan	SGT University	Exploring The Potential Of Terbinafine-Loaded Nanoemulgel For Treating Dermatophytosis
Ifeoma Juliet Opara Igbudu Sewuese Felicity	Federal University Wukari	Production of Briquettes from Sawdust biomass and Coal Blend Using Cornstarch as Binder
Adnane Ghiat	Antenna Subsystems INPT Rabat	Microstrip Patch Antenna: Bridging Connectivity in the LTE and WiMAX Era
Yunana, N., Abalaka, M.E., Daniyan, S.Y.	Federal University of Technology	Antibacterial Activity Of Buchholzia Coriaceae Extract Against Oral Pathogens Isolated From Patients Attending General Hospital, Minna, Nigeria
Mohammed Mohammed Ndagi Ibrahim Abdulrahman Dauda Adamu Abubakar	Ahmadu Bello University	The Effect Of Work-Life Balance, Job Satisfaction And Organizational Commitment On Employee Performance In Nigerian Institute Of Leather And Science Technology, Zaria
Saba Munawar Ameer Fawad Zahoor Syed Ali Raza Naqvi Ali Irfan	Government College University Faisalabad	A Review on Synthesis of Natural Products via Mitsunobu Reaction

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ABSTRACT

CRANBERRY TARHANA: PRODUCTION METHODS AND CHEMICAL COMPOSITION

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Özet

Tarhana is a food product produced with various names in different countries around the world, including Egypt, Greece, and Finland. It is made by making a dough prepared with wheat flour, yogurt, peppers, salt, onions, tomatoes, and spices, fermenting, drying, and grinding the prepared dough. In Turkey, the ingredients, production methods, and the final composition of tarhana vary by region. Various types of tarhana produced in different parts of the country, including Ege, wet (Trakya and Kastamonu), Göce (Ankara, Maraş, Muğla, and Aydın), ball (Isparta), sweet (üzümlü, Tokat), Kiren (cranberry, Bolu), white (Kütahya), milk (Çanakkale), meat (Karaman), Maraş, etc. Cranberry tarhana is specifically produced in the provinces of Kastamonu, Kütahya, Bolu, Bursa, and Zonguldak. Cranberry tarhana is typically a locally consumed product and remains relatively unknown in many regions of our country. However, cranberry fruit is a rich source of valuable components such as anthocyanins and phenols, making cranberry tarhana quite important for health. It can be prepared by mixing wheat flour, cranberry pulp, and salt and then drying. Alternatively, it can also be produced by adding cranberry pulp to traditional tarhana ingredients (tomatoes, pepper, onion, yogurt, and spices), followed by fermentation and drying. Cranberry tarhana has a more acidic structure compared to traditional tarhana. It contains rich phenolic components (557.89mg GAE/100g dry matter basis) and has high anthocyanin and fiber contents (0.17%, dry matter basis), which can have positive health effects. The moisture content (6.28-15.44%, dry matter basis), ash content (1.75-3.96%, dry matter basis), and protein content (11.01-13.80%, dry matter basis) of cranberry tarhana produced in Bolu vary depending on the production methods and conditions. The purpose of this review is to examine the ingredients, production methods, and chemical composition of cranberry tarhana produced in different regions in Turkey. This review will provide information about how traditional foods like cranberry tarhana vary depending on local culture and geography, and their nutritional value.

Keywords: Tarhana, cranberry, phenolic, anthocyanin

KÜRESEL KAMUSAL MALLARIN KAMU MALİYESİNDEKİ ÖNEMİNİN KAVRANMASI SÜRECİ

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Özet

Yoksulluğun azaltılmasında ve kalkınmanın sağlanmasında çok önemli bir yere sahip olan küresel kamusal mallar pek çok ülkenin bir arada hareket etmesiyle anlamlılık kazanmaktadır. İş birliklerinin olmaması durumunda dışşallığın etkisiyle istenilen amaca ulaşılamamaktadır. Ekonomik, sosyal, çevresel ve sağlık alanlarında var olan küresel kamusal mallar için ülkeler büyük harcamalar yapmakta ve bu durum tüm ülkelerin kamu harcamalarına ciddi biçimde yük getirmektedir. Savunma harcamalarının had safhada olduğu günümüz dünyasında, küresel kamusal mallar konusunda ülkelerin belirli işbirliklerini samimiyet çerçevesinde yapmaları her ne kadar ütopya gibi görünse de dünya barışına ve dünyadaki bireylerin daha sağlıklı bir ortamda, temel hak ve özgürlüklerini yaşayabilmelerine olanak sağlayacaktır. Global kamusal malların çevresel mal ve hizmet sınıfı kapsamına giren küresel iklim değişiklikleri buna bağlı olarak ortaya çıkan kuraklık gibi durumlar ile ozon tabakasında meydana gelen tahribatların ne derece doğru olduğu bilgisi sadece belirli ülkelerin araştırmalarına bırakılmamalı ve tüm devletlerin doğru bilgiye ulaşmaları sağlanmalıdır. Böyle bir durumda kamu harcamalarının ülkeler bazında daha doğru bir şekilde yapılması ülke ekonomilerine olumlu anlamda katkı sağlayacaktır.

Anahtar Kelimeler: Küreselleşme, Global Kamusal Mallar, Uluslararası İşbirliği

**THE PROCESS OF UNDERSTANDING THE IMPORTANCE OF GLOBAL PUBLIC
GOODS IN PUBLIC FINANCE**

Abstract

Global public goods, which have a very important place in reducing poverty and ensuring development, gain meaning when many countries act together. In the absence of cooperation, the desired goal cannot be achieved due to the effect of externalities. Countries make large expenditures for global public goods in the economic, social, environmental and health fields, and this puts a serious burden on the public expenditures of all countries. In today's world, where defense expenditures are at the highest level, countries' sincerity in certain collaborations regarding global public goods may seem like a utopia, but it will enable world peace and individuals in the world to enjoy their fundamental rights and freedoms in a healthier environment. Information on the extent of global climate changes, droughts, and ozone layer damage, which fall within the scope of the environmental goods and services class of global public goods, should not be left to the research of only certain countries, and all states should be provided with access to accurate information. In such a case, making public expenditures more accurately on a country basis will contribute positively to the country's economies.

Keywords: Globalization, Global Public Goods, International Cooperation

**NUMERICAL DESIGN OF ALUMINUM-DOPED LIPON SOLID-ELECTROLYTES
FOR SiCO-BASED SOLID-STATE BATTERIES**

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Abstract

As an emerging battery technology, all-solid-state lithium battery (ASSB) has attracted extensive attention and research. Compared with traditional liquid lithium batteries, all-solid-state lithium batteries show advantages of higher safety, higher energy density and faster charging and discharging speed. The main challenges for ASSBs are poor interfacial stability and high interfacial impedance. This work focuses on overall design of new solid-state electrolyte for SiCO-based ASSBs. The charge transfer, adhesion energy, adsorption energy, interfacial formation energy, diffusion barrier and density of state changes are calculated to evaluate the compatibility and stability of the interfaces. The results show that LiPON solid-state electrolytes exhibit excellent interfacial properties with SiCO, and the interfacial performances are further improved with doping of Al in LiPON.

Keywords: emerging battery technology, all-solid-state lithium battery

**THE VITAL ROLE OF CARAWAY EXTRACTS AND THEIR APPLICATION IN
PROLONGING THE SHELF LIFE OF MEAT**

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Abstract

In this study the antimicrobial activity of Carway (*Carm carvi*) extracts was evaluated against three species of Gram negative bacteria (*Pseudomonas putidi*, *Escherichia coli*, and *Klebsiella* species of Gram positive bacteria (*Bacillus subtilus* and (*Staphylococcus aureus*) and three species of molds pneumonia) and two *Aspergillus flavus* *Fusarium oxysporium*, and *Penicillium digitatum*). MIC, MBC and MFC of the extracts were determined at 37°. The aqueous and alcoholic extracts didn't have antibacterial and antifungal activity while the essential oil has antimicrobial effects. Among the tested Gram-positive bacteria *Bacillus subtilus* was the most sensitive strain among the tested Gram-negative bacteria *Klebsiella pneumonia* was the most sensitive strain and among all bacteria tested in this study *Staphylococcus aureus* was the most resistible. The concentrations (2000, 1000, 500 and 250 ppm) of essential oil has antifungal activity while the concentration 125 ppm showed simple inhibition activity on molds used and 60 ppm concentration has no antifungal activity on any of the fungi used in the study. The results obtained expanded the possibilities for application of studied oils not only as flavour enhancers, but even as natural antimicrobials in chilled meat products.

Keywords: caraway seeds, ground meat, Essential oils, *Carm carvi* L., natural antimicrobial, plant extract

PHYTOCONSTITUENTS ADVANCEMENT IN CANCER TREATMENT

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Abstract

Cancer is intense fitness trouble that is still considered to be the main reason for its demise worldwide. Nanotechnology considered as rising disciplines in technology and generation, which may be implemented to synthesize new materials on the nanoscale level. The application of nanotechnology in the treatment of several types of cancers has acquired a significant interest in current years. Cancer nanotechnology is an upcoming unique technique with vast application towards most cancers thru in time diagnosis, estimation and inhibition with the help of personalized medications. Plant occurring natural compounds considered as phytochemicals, crucial assets for most cancers remedy. Some traditional examples consist of curcumin, resveratrol, flavonoids, celastrol, berberine, camptothecins, vinca alkaloids (vincristine & vinblastine), taxol derivatives, and podophyllotoxin derivatives. These phytoconstituents directly act on molecular pathways that are inhibiting in increase and development of several cancers. Phytochemicals used in foods, supplements, and prescribed drugs is inadequate because of lower bioavailability, low solubility, less therapeutic efficacy, and stability problem. To get rid of these issues a modern and advanced novel delivery technique has been developed. These naturally occurring phytochemicals can be incorporated in the form of liposomes, niosomes, nanosomes, nanoparticles, and nanoemulsions to produce better therapeutic efficacy against cancer. This review focuses on the recent advancement and development of nanophytoconstituents in cancer therapy.

Keywords: Phytochemicals, Nanotechnology, Cancer therapy, Nanocarrier, Medicinal plants, Drug delivery.

MOLECULAR DETECTION AND QUANTIFICATION OF MYCOTOXIGENIC FUNGI IN MAIZE

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Abstract

Mycotoxins are secondary metabolites of filamentous fungi, capable of producing toxic effects to humans and animals. Since they are naturally occurring, their potential presence in food, beverages and feed causes a significant concern worldwide. Currently detection of mycotoxins include analytical and immunological screening methods, which are rapid but expensive and limited by the availability of antibodies. In recent years, there have been considerable efforts to develop alternative methods of detection based on molecular biology techniques. This research focuses on real-time PCR detection and quantification of *Fusarium spp.*, potential producer of class *B fumonisin* mycotoxins in mature corn kernels using primers designed to genes FUM1 and FUM6, involved in mycotoxin biosynthesis. Three pairs of primers specific to genes involved in the synthesis of mycotoxin FB known to contaminate maize and maize products were developed and a pair of primers specific to a conserved *Fusarium* beta-tubulin gene, aimed at detection of most *Fusarium* species. There has been applied quantitative PCR assay for quantification of total *Fusarium* spp. and potentially mycotoxigenic *Fusarium verticillioides*. As a result of this work we developed three pairs of primers specific to genes involved in the synthesis of mycotoxin FB known to contaminate maize and maize products. We also developed a pair of primers specific to a conserved *Fusarium* beta-tubulin gene, aimed at detection of most *Fusarium* species. We set the quantitative PCR assay for quantification of total *Fusarium* spp. and potentially mycotoxigenic *Fusarium verticillioides*. We tested four maize samples and compared the amount of *Fusarium* spp.

and *Fusarium verticillioides* in those samples. The real-time PCR assay can be used for detecting and quantifying potentially mycotoxigenic *Fusarium* in the maize kernels by the genes involved in mycotoxin synthesis. This can be a step towards establishing a possible correlation between the amount of mycotoxigenic pathogen and amount of mycotoxin in food sample.

Keywords: mycotoxins, qPCR, *Fusarium*, fumonisin, specific primers, corn kernels.

ALTERNATIVE PLANT-BASED SOURCES FOR THE PRODUCTION OF MEAT ANALOGUES

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Abstract

Consumer concern about food choices and their possible health and environmental implications have led to noticeable changes in dietary patterns, including the consumption of meat products. Nowadays, consumers are becoming aware of the importance of adopting plant-based foods due to ethical concerns, campaigns to reduce meat consumption by animal rights/welfare organizations, and increased emissions of environmentally harmful greenhouse gases. In this context, legumes and some cereals can serve as a significant source of protein in obtaining meat analogues with the use of ecofriendly technologies. The varieties of chickpea and soryz were used for the research. The content of dry matter, proteins, amino acids profile, mass per 1000 grains, grains hectolitre mass, acidity of dried grains were determined. The results obtained, regarding the chemical composition, demonstrated that all the analyzed chickpea and soryz varieties are potential sources of valuable macronutrients. For analyzed plant based sources, close values were obtained for the dry matter content. The chickpea varieties presented the highest protein content compared to the soryz samples. Significant amounts of amino acids were obtained for (in descending order): glutamic acid, aspartic acid, arginine, lysine, leucine, proline. Glutamic acid is the major amino acid in the soryz proteins. It constitutes 34% of all amino acids, followed by the content of asparagine, alanine, leucine and arginine. The 1000 grains mass and hectolitre mass showed that analyzed samples were of high quality, well developed, grown in appropriate conditions. The legumes acidity was low, it could be influenced by the amino acid content. The obtained results demonstrate that the analyzed varieties of chickpea and soryz are rich sources of proteins, essential amino acids, important in human nutrition and can be used as vegetable sources to replace animal origin proteins in composite food products, also improving their nutritional and biological value.

Keywords: meat analogues, legumes, proteins, chickpea, soryz.

Acknowledgment: Moldovan-Turkish Bilateral Project Sustainable Nutrient-Rich New Generation Food Products Development: evaluating the relationship between ingredients, processing methods used, and techno- and bio-functional properties.

**THE EFFECT OF HYDROLYSIS TIME ON THE FUNCTIONAL PROPERTIES OF
PROTEIN HYDROLYSATES FROM DOLPHINFISH (*Coryphaena hippurus*) HEAD**

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Abstract

The effect of hydrolysis time on the functional properties of protein hydrolysates from dolphinfish head such as solubility, foaming capacity and emulsifying capacity was studied. Six protein hydrolysates were obtained by enzymatic hydrolysis of dolphinfish head with Protamex 0.5% at the temperature of 50°C and different hydrolysis times (1h, 2h, 3h, 4h, 5h, 6h). The study results showed that the dolphinfish head protein hydrolysate obtained after 6h of hydrolysis had the contents of protein 71.5 %, lipid 1.8 % and ash 8.4 %. The hydrolysis time had a significant effect on the functional properties of protein hydrolysates. The solubility of protein hydrolysates from dolphinfish head increased when hydrolysis time increased. The protein hydrolysate with hydrolysis time of 6 h had the highest solubility (97.4%) at pH 8. The foaming capacity and emulsifying capacity of dolphinfish head protein hydrolysates decreased with increasing hydrolysis time and reached the highest values of 43.8% and 26.2 ml/g respectively after 1 h of hydrolysis. The study results suggested that with the important functional properties, the protein hydrolysate from dolphinfish head could be used as a protein source in food systems and was a promising potential food ingredient.

Keywords: Dolphinfish head, fish protein hydrolysate, functional properties, hydrolysis time.

**UNRAVELLING THE GENETIC WEALTH OF TURKISH DURUM WHEAT
LANDRACES (*Triticum Turgidum* Ssp. *Durum*) FOR THE CREATION OF NOVEL
CULTIVARS**

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Abstract

Durum wheat (*Triticum turgidum* ssp. *durum*) is a significant cereal in human consumption, mostly utilized in Mediterranean countries for various foods such as pasta, flatbread, couscous, and bulgur. It accounts for approximately 5-10% of the total global wheat production. Turkey is a leading producer of durum wheat, making it critical to maintain a sustainable yield not only in the region but also globally. Selection has resulted in a genetic bottleneck in wheat diversity over thousands of years, resulting in the loss of many vital genes/alleles and a narrowing of genetic diversity. Wheat geneticists and breeders are currently working to reintroduce these lost genes into wheat by utilizing wild relatives and abandoned landraces. Wheat landraces, cultivated by humans for thousands of years, have been overshadowed by the emergence of modern cultivars, especially with the widespread adoption of dwarf wheat after the Green Revolution. Consequently, many farmers abandoned their cultivation. These landraces, however, harbor crucial genes related to plant resistance as well as other agro-morphological and phenological traits. These valuable traits can be transferred to modern cultivars through hybridization programs. This study compared agro-morphological and phenological traits of 42 Turkish landraces and 84 modern cultivars in a durum wheat population. The study was conducted under both field and greenhouse conditions, with the trials set up according to randomized complete block design (RCBD). The statistical analyses revealed significant variability in the population as well as within the landraces. The population was divided into two distinct subpopulations, P1 and P2, using the Silhouette clustering method. Except for one landrace, all of the landraces and 26 cultivars were classified as P1, while rest of the cultivars were classified as P2, indicating a significant difference between landraces and modern cultivars. Furthermore, the population was divided into three groups using principal component analysis (PCA) based on the evaluated traits: G1 (plant height and peduncle height), G2 (spike length and spikelet numbers per spike), and G3 (spike weight, grain number per spike, spike yield, and heading date). This division enabled a clear separation of genotypes based on their respective traits, providing valuable insights into the characteristics of the durum wheat population under study.

Keywords: Durum wheat, landraces, characterization, diversity

**SWEET POTATO (*Ipomoea batatas* [L.] Lam); A RISING TREND FOR HEALTHY
FOOD AND REGIONAL DEVELOPMENT**

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Abstract

Sweet potatoes, widely recognized for their nutritional benefits, play a significant role in promoting community well-being and sustainable agriculture. This research underscores the significance of sweet potatoes in improving dietary quality through their abundant vitamin, mineral, and antioxidant content, thereby contributing to overall public health. The paper explores sustainable agriculture practices linked to sweet potato cultivation, highlighting their contribution to both food security and environmental sustainability. Sweet potatoes' adaptability to diverse climatic conditions makes them a resilient crop that can support sustainable farming initiatives. The paper covers integrated product management strategies for sweet potatoes, focusing on maximizing yield and quality while minimizing losses and environmental impact. Methods for cultivation, harvest, storage, and marketing are outlined in clear, concise language to ensure comprehension. The application of these strategies is crucial for maintaining the sustainable production and supply chain of sweet potatoes, supporting their role as a burgeoning trend in healthy food and regional development. In conclusion, this paper highlights the various advantages of sweet potatoes, such as promoting public health, supporting sustainable agricultural practices, and contributing to local economic growth. It calls for increased focus and investment in sweet potato cultivation to attain multiple developmental objectives.

Keywords: Sweet potatoes, healthy food, economic growth

EDIBLE CHITOSAN FILMS AND COATINGS CONTAINING ESSENTIAL OILS: USE IN CHEESE PRODUCTS

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Abstract

Edible films and coatings have become an important choice in packaging technology to overcome polymer recycling issues and meet the demands for safe food. These biodegradable materials aim to extend the shelf life of foods and preserve their quality. Particularly, chitosan is a significant component of edible film technology that can replace synthetic polymers and is effective against both gram-positive and gram-negative bacteria. In the literature, it has been observed that chitosan coatings containing essential oils such as peppermint oil, thyme oil, bay leaf oil, and lavender oil exhibit antioxidant, antifungal, and antibacterial effects, thereby extending the shelf life of food products. Dairy products, particularly cheeses, are sensitive during storage and distribution processes. Plant essential oils not only contribute additional flavor layers to cheeses but also stand out for their ability to prevent oxidative deterioration. Several studies have demonstrated that chitosan coatings loaded with thyme essential oil extend the shelf life of cheese, and the antibacterial effects of *M. longifolia* essential oil are evident. These effects have been reported to be particularly associated with the concentrations of thymol and p-cymene in thyme and pulegone organic compounds in *M. longifolia* essential oil. The advanced research in this field has the potential to pave the way for the development of novel and effective methodologies in cheese preservation. Particularly, the optimization of chitosan film and coating processes loaded with essential oils holds critical significance in obtaining products with desired characteristics. The homogeneous integration of essential oils into the chitosan matrix stands as a pivotal factor determining product quality. Future research in this domain holds promise in offering innovative solutions for food preservation.

Keywords: Edible films and coatings, chitosan, cheese, food preservation, antibacterial effect, antioxidant effect

**DETERMINATION OF CHILLING FULFILMENT OF KABARCIK (*Vitis Vinifera* L.)
FOR KAHRAMANMARAS**

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Abstract

It is known that grapevines can come up with week, nonuniform and late bud break phenology when not chilling fulfilment performed, which highlights the importance of chilling in grapevines. Chilling requirement under room temperature was tested both hours (nine) and days (fourteen) main effects. The effect hours which were control (no chilling), 48, 96, 144, 192, 240, 288, 336 and 384 treatments and the effect days, which were 28 days (with every 2 days record and 14 times) totally were analyzed for chilling accumulation. Bud break score was not different from 2 to 18 days while it was gradually increased from day 18, and ended up days 28. Therefore, days 20, 22, 24, 26 and 28 (which were different each other) were statistically different than days from 2, 4, 6, 8, 10, 12, 14, 16 and 18 (which were not different each other). The best bud break score of Kabarcık had obtained under 240 hours; and, it was not statistically different than 192- and 298-hours. The less bud break scores had acquired the hours 48 and 384. Although 384 hours had more chilling than 48 hours, they were not statically different each other which means the samples started to decay in 4 °C after some hours. There was the same scenario in that the buds started to be had less broken buds after the hours 240 treatment. Therefore, in this study, it was reported the chilling requirement of Kabarcık is between 192 and 298 hours, at least 240 hours, for Kahramanmaraş province.

Keywords; grapevine, chilling requirement, Kabarcık, bud break, Kahramanmaraş

ASILIR TİP DİSKLİ TIRMIKLARDA MEYDANA GELEN ARIZALAR VE NEDENLERİ

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Özet

Bu çalışmada, Manisa ili, Salihli ilçesinde yaygın olarak kullanılan asılıp tip diskli tırmıklarda meydana gelen arızalar ve nedenlerinin belirlenmesi amaçlanmıştır. Bu amaçla, asılıp tip diskli tırmıkların kullanımı sırasında en sık rastlanan arızalar saptanarak bunların kullanım mı veya imalat kaynaklı hatalar mı olup olmadıkları ayrı ayrı belirlenmiştir. İmalat ve kullanıcı hatalarının asgariye çekilmesi için dikkat edilmesi gereken konular ele alınmıştır. Arıza sebebiyle makinelerin kullanım dışı kalması, birim zamanda alınacak ürün miktarını kısıtlayan en önemli faktörlerden biridir. O halde üretim maliyetini ve bunu doğrudan etkileyen üretimin aksamasını azaltmak için işletmelerde onarım amacıyla harcanan sürenin en aza indirilmesi gerekmektedir. Araştırma materyali olarak tarım makineleri tamiratı yapan bir torna atölyesinin imkânları ile müşteri kitlesi dikkate alınmıştır. Tamir için işyerine 2022 ve 2023 yılı bitkisel üretim sezonlarında arızalanarak gelen 100 adet asılıp tip diskli tırmığın arızaları tek tek incelenerek arıza tipi ve nedenleri tespit edilmeye çalışılmıştır. Belirlenen en sık arızaların rulman yataklarının düzenli yağlanmaması, diskli tırmık bataryalarının sorunsuz dönüp dönmediğinin kontrol edilmemesi ve bağlantı elemanlarının gevşeme durumunun düzenli olarak kontrol edilerek giderilmemesi gibi kullanıcı hataları şeklinde olduğu tespit edilmiştir. Kullanıcının rulman yataklarını yağsız bırakmaması, özellikle batarya somunları gevşediğinde bunun bakımını yapması ve yaptırmaması, bozuk ve hasarlı durumda kullanmayıp daha fazla arızaya sebep vermemesi gerekir. Ayrıca diskli tırmık üzerine fazla ağırlık konularak oluşturulan zorlamaların disk ve şasede kırılmalara yol açtığı da saptanmıştır.

Anahtar Kelimeler: Diskli tırmık, Diskli tırmık arızaları, Arıza analizi

MOUNTED TYPE DISC HARROWS OCCURRING DEFECTS IN AND THEIR CAUSES

Abstract

In this study, it is aimed to determine the malfunctions and their causes in the mounted type disc harrows, which are widely used in the Salihli district of Manisa province. For this purpose, the most common faults during the use of the mounted disc harrows were determined and it was determined separately whether they were usage or manufacturing errors. The most common malfunctions during the use of the suspended type disc harrow are determined, and the issues that need attention in order to determine whether they are user or manufacturing faults and to minimize manufacturing and user errors are discussed. Stopping the machines due to a malfunction is one of the most important factors limiting the amount of product to be purchased per unit time. In that case, the cost of production and the production cost that directly affects it. In order to reduce the downtime, the time spent for maintenance in industrial enterprises should be minimized. As the research material, the possibilities of a lathe workshop that repairs agricultural machinery and the customer base were taken into consideration. The malfunctions of 100 mounted disc harrows, which came to the workplace for repair in the 2022 and 2023 crop production seasons, were examined one by one, and the type and causes of the malfunction were tried to be determined. According to the results of the research, the most common causes of failure are the lack of regular lubrication of the bearings, the failure to regularly check whether the disc harrow groups rotate smoothly, and the failure to eliminate the looseness of the fasteners by regularly checking. The user should not leave the bearings without oil, especially when the disc harrow group nuts are loosened, they should be maintained and made, and they should not cause more malfunctions by not using them in a broken and damaged way. It has been determined that forcing too much weight on the disc harrow causes breakage in the disc and chassis.

Keywords: Disk harrow, Disk harrow faults, Failure analysis

SYMBOLIC AGGREGATE APPROXIMATION-BASED CLUSTERING OF MONTHLY NATURAL GAS CONSUMPTION

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Abstract

Natural gas is an indispensable non-renewable energy source for many countries. It is used in many different areas such as heating and kitchen appliances in homes, and heat treatment and electricity generation in industry. Natural gas is an essential component of the transportation sector, providing a cleaner alternative to traditional fuels in vehicles and fleets. Additionally, its versatility extends to petrochemical production, where it acts as a feedstock for manufacturing various essential products such as fertilizers, chemicals, and plastics. Moreover, natural gas plays a vital role in boosting energy efficiency through the development of combined heat and power (CHP) systems. These systems produce electricity and useful heat concurrently. As nations move towards more sustainable energy solutions, natural gas has gained prominence as a transitional fuel. This is due to its lower carbon emissions when compared to coal and oil, thus making it an essential component of the global energy framework. In this study, monthly natural gas consumption data of 28 different European countries between 2014 and 2022 are used. Symbolic Aggregate Approximation (SAX) method is used to analyze the data. Analyses are made with different numbers of segments and numbers of alphabet size, and alphabet vectors of each country are created. These letter vectors are used in hierarchical clustering and dendrogram graphs are created. Furthermore, the elbow method is used to determine the appropriate number of clusters. Clusters of countries are created according to the determined number of clusters. In addition, it is interpreted according to the consumption trends of the countries in the determined clusters.

Keywords: Machine Learning, Symbolic Aggregate Approximation, Clustering

**INVESTIGATION OF ANTIBACTERIAL EFFECTS OF 5-FLUORINATED
DERIVATIVES OF SCHIFF BASES ON SOME PATHOGENIC BACTERIA**

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Abstract

Background: Antibiotics still maintain their importance as the first treatment method used in the treatment of microbial diseases, where many new treatment approaches continue to be investigated. Studies conducted with various derivatives of medically important Schiff bases provide clues that these compounds may have antibacterial properties. Materials and Methods: The antibacterial effects of five-fluorine Schiff base derivatives were tested on *Klebsiella pneumoniae*, *Proteus mirabilis* and *Streptococcus pyogenes* bacterial strains with a high risk of developing drug resistance. Compounds (1-6) were dissolved in ethanol and then added in triplicate to 96-well culture plates at 1, 10, 100 and 1000 μM . Ethanol was used as a negative control and gentamicin was used as a positive control. After the bacteria were adjusted to 0.5 McFarland standard in nutrient broth, they were added to each well in an amount of 100 μL and incubated for 24 hours at 37 $^{\circ}\text{C}$. Then, 10 μL of MTT solution (250 μM) was added to each well and incubated for another 4 hours. After adding 100 μl of dimethyl sulfoxide to each well to dissolve MTT-formazan crystals, the culture plates were read in an ELIZA microplate reader at a wavelength of 570 nm and optical density (OD) values were determined for each well. The MIC₅₀ value for each compound was calculated by linear regression analysis using OD values. Results: The strongest effect on *Klebsiella pneumoniae* was provided by compound 1 (F₅ SAL MIC₅₀ value 2.95 μM and gentamicin MIC₅₀: 2.02 μM). The effect of the compounds on *Proteus mirabilis* was observed to be weak (MIC₅₀ values of compounds 1-6 are 8.72-21.9 μM while gentamicin's MIC₅₀: 2.95 μM). The strongest effect on *Streptococcus pyogenes* was obtained with compound 2 (F₅ 3TBS MIC₅₀ value 4.01 μM and gentamicin MIC₅₀: 2.85 μM). Discussion: Due to their antibacterial capacity against antibiotic-resistant bacteria, fluorinated derivatives of Schiff bases may provide medical benefits as an alternative antibiotic source in the treatment of diseases caused by these infectious agents.

Keywords: Schiff base, fluorine, antibacterial, MIC₅₀, MTT assay.

**(KAZAKISTAN/SAGA VE MACARISTAN/BUGAC)'DA DÜZENLENEN
TURAN-BÜYÜK KURULTAYLARIN COĞRAFI VE TARİHİ YÖNDEN İNCELENMESİ**

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Özet

Türk Kurultaylarının farklı yerlerde farklı isimlerle düzenlenip adlandırıldığı bilinmektedir. Bu kurultaylar Türk Dünyası'nın coğrafi ve tarihi açıdan önemli yer tutan şehirlerinde düzenlenmektedir. Bunun da sebebi Türk Dünyasını bir araya getirmek ve canlı tutmaktır. Bu kurultaylardan biri 2007 yılında Kazakistan Saga'da başlayan 2008 yılından itibaren her 2 yılda bir düzenlenen Macaristan Budapeşte'de düzenlenen Turan-Büyük Kurultay'dır. Bu gibi kurultaylar, özellikle 1992 Yılında SSCB'nin dağılmasıyla beraber Türk Devletlerinin bağımsızlıklarını ilan etmesiyle birlikte kurultaylar düzenlenmeye başlamış ve sayıları artmıştır. Önce Kazakistan daha sonra Macaristan'da düzenlenen bu kurultay Türk devletleri arasındaki sosyal, kültürel, siyasi vb. gibi konularda ilişkilerin gelişmesine ve güçlenmesine katkı sağlamaktadır. Turan-Büyük Kurultay'ı Macar-Turan Vakfı ve bu vakıf tarafından kurulmuş Turan Birliği tarafından düzenlenmekte olup, sadece bağımsız Türk Devletleri değil özerk Türk toplulukları da davet edilmekte ve katılım sağlanmaktadır. Her kurultayda katılımcı sayısı artarak devam etmektedir. Çalışmanın amacı; Kazakistan ve Macaristan'da düzenlenen Türk Dünyası kurultaylarından olan Turan-Büyük Kurultayın Türk Devletleri açısından coğrafi ve tarihi değerlendirilmesidir. Böylelikle Türk Dünyasının bütünleşme sürecindeki önemli unsur olan kurultaya vurgu yapılacaktır.

Anahtar Kelimeler: Kurultay, devlet, coğrafya, tarih.

**GEOGRAPHICAL AND HISTORICAL INVESTIGATION OF TURAN-GRAND
CONGRESSES (KAZAKİSTAN/SAGA VE MACARİSTAN/BUGAC)**

Abstract

It is known that Turkish Congresses are organized and named under different names in different places. These congresses are held in geographically and historically important cities of the Turkish World. The reason for this is to bring the Turkish World together and keep it alive. One of these congresses is the Turan-Grand Congress, which started in 2007 in Kazakhstan Saga and has been held every 2 years since 2008 in Budapest, Hungary. Such congresses began to be organized, especially after the collapse of the USSR in 1992 and the Turkish States declared their independence, and their numbers increased. This congress, which was held first in Kazakhstan and then in Hungary, discussed social, cultural, political, etc. issues between the Turkish states. It contributes to the development and strengthening of relations on issues such as. Turan-Grand Congress is organized by the Hungarian-Turan Foundation and the Turan Union established by this foundation, and not only independent Turkish States but also autonomous Turkish communities are invited and participated. The number of participants continues to increase with each congress. Purpose of the study; It is the geographical and historical evaluation of the Turan-Great Congress, one of the congresses of the Turkic World held in Kazakhstan and Hungary, from the perspective of the Turkish States. Thus, emphasis will be placed on the congress, which is an important element in the integration process of the Turkish World.

Keywords: Congress, state, geography, history.

**INVESTIGATION OF CYPRIOT TAVERN TASTE SPECTRUM WITHIN THE
CONTEXT OF GASTRONOMY TOURISM**

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Abstract

In today's diverse tourism industry, gastronomy tourism is quite significant. Due to their interest in food and drink, many people today base their trip plans on the nations and locations where the gastronomy culture is strong. Cyprus, the third-largest island in the Mediterranean, has a tremendously developed culinary and alcoholic tradition. The primary goal of this research is to introduce the flavors of taverns 'meyhanes' in Cyprus' eating and drinking culture and to explain the notion of gastronomy tourism, which has gained popularity worldwide. The promotion of tastes, which are highly valued in Cyprus's culinary tradition, serves as a secondary goal. It also invites visitors who are coming to Cyprus for gastronomy tourism and want to know what flavors they should try when they get there. There was no thorough academic investigation on Cyprus meyhane tastes in the literature review. A very fine illustration of Cyprus's tastes and food, where many different civilizations converge, will be provided by the study of gastronomy tourism, which will also add to the body of literature. The study will clarify the terms "gastronomy" and "gastronomy tourism," and it will be the first academic examination of Northern Cyprus's food, culture, and preferences. It is intended to undertake a literature review on the Cyprus cuisine generally in order to ensure the validity of the study. On the other hand, it's important to preserve the Cypriot culinary tradition and pass it on to future generations.

Keywords: Gastronomy Tourism, Cyprus Culinary Culture, Northern Cyprus Tavern Taste

**POLYMERIC NANOPARTICLES: A REVOLUTIONARY APPROACH TO
DERMATOLOGICAL TREATMENTS**

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Abstract

In the pursuit of advanced dermatological treatments, polymeric nanoparticles, especially those derived from poly(lactic-co-glycolic acid) (PLGA), have emerged as a promising technology. This study focused on the preparation of PLGA nanoparticles using the spontaneous emulsification solvent diffusion (SESD) method. We meticulously investigated the parameters that influence nanoparticle synthesis, such as polymer concentration, choice of solvent, and selection of emulsifying agents—namely Polyvinyl Alcohol (PVA), Tween 80, and Sodium Dodecyl Sulfate (SDS)—to fine-tune the particle size and maximize drug loading efficiency. The surface morphology and particle size were characterized using optical microscopy and laser light scattering techniques. The resulting nanoparticles were spherical in shape, with sizes ranging from 250 to 350 nm, and exhibited an optimal zeta potential that suggests a stable colloidal system. PVA, in particular, was identified as a superior emulsifier for the production of nanoparticles, markedly improving the encapsulation efficiency of hydrophobic drug representative to a commendable 65.63-88.52%. These results highlight the adaptability of PLGA nanoparticles and their significant potential in enhancing dermatological treatments. The successful development of these nanoparticles marks a step forward in the field of targeted therapy, signaling a future of improved therapeutic outcomes for skin-related ailments.

Keywords: PLGA Nanoparticles, Emulsification, Polyvinyl Alcohol (PVA), Hydrophobic Drug Encapsulation, Dermatological Drug Delivery

THE ROLE OF EXPACTATIONS IN MACROECONOMIC POLICY

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Abstract

In macroeconomic policy, it is important how the public's expectations about the economy are formed and how these expectations affect the economy. In this study, rational expectations and policymaking, Lucas criticism, the role of reliability and nominal anchor, evaluation of aggregate demand and supply shocks in the context of reliability and finally approaches to ensuring the reliability of central banks are examined. The accommodationist expectations put forward by economists in the 1950s and 60s, benefiting from experiences, lost their reality over time and were replaced by rational expectations. Rational expectations include the same as optimal predictions obtained using all available information. The Lucas administration, on the other hand, investigates whether rules or precaution are important in policy management. The time inconsistency problem is associated with conservatism. An important way to limit conservatism is to apply a nominal diameter. The importance of reliability in positive and negative aggregate shocks is also discussed in the study. The effects of oil shocks on inflation and unemployment are again explained by the reliability of central banks. Finally, approaches to the reliability of central banks are inflation targeting, nominal GDP targeting, appointment of conservative people to the central bank and increasing its independence.

Keywords : expectations, prudence, reliability, central bank

TÜRKİYE'DE TARIMSAL ÖRGÜTLENME ÜZERİNE BİR BAKIŞ

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Özet

Tarım kooperatifleri, bitkisel üretim, hayvansal üretim, sera işletmeciliği, depolama, pazarlama, taşımacılık ve girdi temini gibi çeşitli temel tarımsal faaliyetleri bünyesinde barındırarak, tarımsal işletmelerin gelirlerini doğrudan etkileyen organizasyonlar olarak öne çıkar. Türkiye'de, tarım işletmelerinin çoğunluğu küçük ölçekte faaliyet göstermektedir. Bu küçük işletmeler ürünlerini düşük fiyatlarla satmak zorunda kalmaları ve girdileri yüksek maliyetlerle temin etmeleri nedeniyle pazarlarda rekabet gücü eksikliği yaşamaktadır. Türkiye'de 2022 yılında toplam 12501 tarımsal amaçlı kooperatif bulunmaktadır. Bu kooperatiflerin toplam 3677946 ortağı bulunmaktadır. Tarımsal Kalkınma Kooperatifleri ve diğer kooperatiflerdeki bölge birliği içinde yer alan kooperatiflerin üst örgütlenmesinde; KÖYKOOP, TARIMKOOP, HAYKOOP, ORKOOP, ÇAYKOOP, SÜRKOOP, PANKOBİRLİK ve Tarım Kredi Kooperatifleri Merkez Birliği yer almaktadır. 12501 tarımsal amaçlı kooperatif bulunmasına rağmen tarımsal kooperatiflerin tarımsal ürün alımlarında payı özellikle AB ülkelerine göre hala düşük kalmaktadır.

Anahtar Kelimeler: örgütlenme, kooperatif, tarımsal pazarlama

ULUSLARARASI TURİSTLERİN HARCAMA EĞİLİMLERİNİN GELDİKLERİ KİTA COĞRAFYASI ÖZELİNDE ARAŞTIRILMASI: TÜRKİYE İÇİN EKONOMETRİK BİR UYGULAMA

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Özet

Çalışmanın amacı Türkiye'ye turizm tüketimi amacıyla gelen ve transit giriş yapan insanların harcama eğilimlerini geldikleri kıta coğrafyası özelinde araştırmaktır. Bu maksatla harcama değişkeni olarak toplam harcama miktarı (y_1), turist amaçlı gelenlerin harcamaları (y_2) ve transit yolcu harcamaları (y_3) olarak üç bağımlı değişkenden oluşmaktadır. Toplam harcama miktarı toplam turizm geliri olarak da değerlendirilebilir. Diğer tarafta turistlerin geldikleri kıta coğrafyasına göre sekiz kategoride değerlendirilmiş (x_1 ; x_8) ve bağımsız değişkenleri oluşturmuştur. (x_8) değişkeni milliyeti bilinmeyen yolcuların harcama miktarını göstermesi açısından çalışmayı önemli kılmaktadır. Verilere Birleşik Milletler Dünya Turizm Örgütü'nün (UNWTO) Web sayfasından ikincil kaynak olarak ulaşılmıştır. Araştırma örneklemini 1995'ten 2021 yılına kadar 27 gözlemlilik yıllık zaman serisi verilerinden oluşmaktadır. Çalışmada zaman serisi analizleri kapsamında; durağanlık kontrolü için Augmented Dickey-Fuller, Phillips-Perron ve Kwiatkowski-Phillips-Schmidt-Shin (KPSS) birim kök testleri birlikte kullanılmıştır. Seriler arasındaki ilişki için Engle-Granger Nedensellik analizi ve Granger Eşbütünleşme testleri yapılmıştır. Çalışma sonucunda, bağımlı değişkenler (y_1 ; y_3) ile bağımsız değişkenlerin tamamı (x_1 ; x_8) arasında nedensellik ilişkisi belirlenmiştir. Diğer taraftan yine bağımlı değişken (y_1) ile bağımsız değişkenler (x_1 ; x_7) arasında eşbütünleşme ilişkisi belirlenmiştir. Ancak (x_8) milliyeti bilinmeyen turist sayısı ile (y_1) turistlerin toplam harcamaları arasında herhangi bir eşbütünleşme ilişkisine rastlanmamıştır. Çalışmadaki önemli bulgulardan birisi de 2007 yılında milliyeti bilinmeyen turist sayısında (x_8) yaşanan %15,5'lik artışın büyük oranda %13,19'luk artışla turist harcamalarında (y_1) yansımalarıdır.

Anahtar kelimeler: Uluslararası Turist, Turizm Harcamaları, Hizmet Sektörü, Zaman Serisi, Nedensellik, Eşbütünleşme.

AN ECONOMETRIC ANALYSIS OF SPENDING PATTERNS OF INTERNATIONAL TOURISTS IN TURKEY: A CONTINENTAL GEOGRAPHICAL PERSPECTIVE

Abstract

The aim of this study is to investigate the spending patterns of individuals entering Turkey for tourism consumption and transit purposes based on their continental geographical origin. For this purpose, the expenditure variable consists of three dependent variables: total expenditure amount (y1), expenditures of those coming for tourism purposes (y2), and transit passenger expenditures (y3). The total expenditure amount can also be considered as total tourism revenue. On the other hand, tourists were categorized into eight categories (x1; x8) based on their continental geographical origin, forming independent variables. The variable (x8) is crucial in indicating the spending amount of passengers whose nationality is unknown. Data were accessed as secondary sources from the United Nations World Tourism Organization's (UNWTO) website. The research sample consists of 27 annual time series observations from 1995 to 2021. In the scope of time series analyses in the study, Augmented Dickey-Fuller, Phillips-Perron, and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root tests were used together for stationarity control. Engle-Granger Causality analysis and Granger Cointegration tests were conducted for the relationship between the series. As a result of the study, a causal relationship was determined between all dependent variables (y1; y3) and all independent variables (x1; x8). On the other hand, a cointegration relationship was found between the dependent variable (y1) and independent variables (x1; x7). However, no cointegration relationship was found between the unknown nationality of tourists (x8) and total tourist expenditures (y1). One of the significant findings in the study is the substantial impact of a 15.5% increase in the number of tourists with unknown nationality (x8) in 2007, reflecting largely in a 13.19% increase in tourist expenditures (y1).

Keywords: International Tourist, Tourism Expenditures, Service Sector, Time Series, Causality, Cointegration.

KAMUDA ÖRGÜTSEL VATANDAŞLIK SERGILEME MOTİVASYONU

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Özet

Bu araştırmanın amacı, kamu çalışanlarının örgütsel vatandaşlık davranışı (ÖVD) gösterme motivasyonlarını araştırmaktır. ÖVD, biçimsel ödül sisteminde doğrudan tanımlanmayan, zorlayıcı olmayan ve bir bütün olarak örgütsel etkinliği yükselten, çalışanın iş rollerinin ötesinde gönüllü veya ilaveten gerçekleştirdiği davranışlardır (İşbaşı, 2000). Eğitim kurumlarında görev alarak geleceğin bireylerini yetiştiren öğretmenlerin ÖVD sergilemeleri bu kurumların amacına ulaşmasında kritik bir öneme sahiptir. Bu bağlamda araştırmanın örneklemini devlet okullarında görev yapan öğretmenlerden oluşturulmuştur. Araştırmada nitel ve nicel yöntemler birlikte kullanılmış, nicel veriler anket aracılığıyla, nitel veriler ise katılımcı gözlem tekniği ve mülakatla toplanmıştır. İnsanın sosyal alandaki dinamik değişkenlere verdiği tepkilerin karmaşıklığı dikkate alındığında nicel ve deneysel araştırmaların yetersiz kaldığı düşüncesiyle katılımcı gözlem ve mülakat yoluyla da öğretmenlerin ÖVD gösterme durumları incelenmiş ve yapılan anket sonucunda elde edilen nicel veriler ile nitel verilerin arasında farklılıklar olduğu anlaşılmıştır. Nicel verilerin analizi neticesinde öğretmenlerin ÖVD boyutlarının (özgecilik, vicdanlılık, sportmenlik, nezaket, sivil erdem) tamamında yüksek seviyede (4.09) ÖVD gösterdiği bulgusuna ulaşılmıştır. Katılımcı gözlem tekniğiyle toplanan verilere göre ise öğretmenlerin ÖVD gösterdiği sonucuna ulaşılmış, ancak yapılan içerik analizi sonucunda ÖVD boyutlarına ait temalar ele alındığında öğretmenlerin nicel verilerin aksine ÖVD boyutlarındaki davranışları yüksek seviyede sergilemediği bulgusuna ulaşılmıştır. Öğretmenlerin özellikle sportmenlik boyutuna karşıt davranışlar sergilediği gözlemlenirken, sivil erdem boyutunda da örgüt faaliyetlerine aktif katılım göstermedikleri gözlemlenmiştir. Nicel ve nitel verilerin arasında farklılıkların ortaya çıkmasının nedeninin, katılımcıların bazı sorulara dürüst ve tam yanıt verme eğiliminde olmamalarından kaynaklandığı düşünülmektedir (Arıkan, 2018) Mülakatlar, öğretmenlerin örgüt bürokrasisini angarya ve gereksiz olarak değerlendirdikleri için ÖVD sergileme eğiliminde olmadığını, ancak öğrenci ile ilişkilerinde yüksek derecede ÖVD sergilediklerini ortaya koymuştur. Sosyal mübadele kuramına dayalı olarak, sevgi ve statü kaynaklarının öğretmenlerde ÖVD motivasyonu oluşturduğu tespit edilmiştir (Foa ve Foa, 1980; 2012) Ayrıca, araştırma, ÖVD algısının kültürel farklılıklar çerçevesinde değişebileceğini göstermiştir. Bazı durumlarda, rol davranışlarının ÖVD olarak algılandığı ve bu algının kültürler arası değişiklik gösterebileceği belirlenmiştir (Hofstede, 1980).
Anahtar Kelimeler: Örgütsel Vatandaşlık Davranışı, Kamu sektörü, Sosyal değişim

MOTIVATION FOR ORGANIZATIONAL CITIZENSHIP BEHAVIOR IN THE PUBLIC SECTOR

Abstract

The aim of this research is to investigate the motivation of public sector employees to exhibit organizational citizenship behavior. The demonstration of Organizational Citizenship Behavior (OCB) by teachers, who play a crucial role in shaping the future individuals by working in educational institutions, holds critical importance in achieving the goals of these institutions. In this context, the sample of the research consists of teachers working in public schools. Both qualitative and quantitative methods were employed in the research. Quantitative data were collected through surveys, while qualitative data were gathered through participant observation technique and interviews. Considering the complexity of human reactions to dynamic variables in the social domain, and the perceived inadequacy of quantitative and experimental research, participant observation and interviews were also used to examine teachers' OCB situations. The analysis of quantitative data revealed that teachers exhibited high levels (4.09) of OCB in all dimensions (altruism, conscientiousness, sportsmanship, courtesy, civic virtue). However, qualitative data gathered through participant observation suggested that teachers exhibited OCB, but when the themes related to OCB dimensions were analyzed, it was found that teachers did not exhibit behaviors at a high level compared to the quantitative data. Particularly, teachers were observed to exhibit contrary behaviors in the sportsmanship dimension, and they did not actively participate in organizational activities in the civic virtue dimension. The discrepancy between quantitative and qualitative data is thought to be due to participants not being inclined to provide honest and complete answers to certain questions (Arıkan, 2018). In the interview study, it was found that teachers were not inclined to exhibit OCB because they perceived most bureaucratic tasks and responsibilities related to the organization's functioning as "burdensome and unnecessary." However, it was determined that they exhibited a high tendency to exhibit OCB in their relationships with students. In the interviews, it was found that abstract sources such as love and status, which are subject to social exchange theory, motivated teachers to exhibit OCB (Foa and Foa, 1980; 2012). Furthermore, it was concluded that the perception of organizational citizenship behavior varies within the cultural differences of countries. In some cases, the fulfillment of role behaviors was observed to be perceived as OCB, and as a result, it was concluded that the perception of OCB could vary across cultures (Hofstede, 1980).

Keywords: Organizational Citizenship Behavior, Public sector, Social exchange

**THE EFFECT OF CORPORATE SOCIAL RESPONSIBILITY PERCEPTION ON
ORGANIZATIONAL COMMITMENT IN THE BANKING SECTOR**

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Abstract

In this study, the effect of corporate social responsibility perception on organizational commitment in the banking sector was investigated. Four sub-dimensions of corporate social responsibility, namely economic, legal, ethical and discretionary, and three sub-dimensions of organizational commitment, namely affective, continuance and normative, were examined within the scope of the research. In addition, the relationship between demographic variables and organizational commitment was also discussed within the scope of the research. As a result of the analyses, a high level of relationship was found only between general corporate social responsibility and affective organizational commitment. A moderate relationship was found between general corporate social responsibility and general and normative organizational commitment. When we look at the other dimensions with a medium level relationship, it is seen that there is a medium level relationship between economic, ethical, legal and discretionary corporate social responsibility and general, affective and normative organizational commitment. On the other hand, a weak relationship was found between general corporate social responsibility and all its sub-dimensions and the organizational commitment continuance dimension. A relationship was determined between business seniority, which is one of the demographic variables, and general organizational commitment, and between business seniority, age and gender variables and affective organizational commitment. No relationship could be detected between the variables of marital status, total job seniority and type of bank worked at and organizational commitment. As a result, in studies on organizational commitment in the banking sector, the impact of corporate social responsibility perception and its sub-dimensions, which have been found to have an impact on organizational commitment and its sub-dimensions, should be taken into consideration. Likewise, the relationship between organizational commitment and its sub-dimensions and demographic variables should also be taken into consideration in studies on organizational commitment concept.

Keywords: Corporate social responsibility, organizational commitment, demographic variables, banking

INVESTIGATION OF PSYCHOLOGICAL COUNSELORS' UNFINISHED WORK AND PSYCHOLOGICAL RESILANCE LEVELS DURING THEIR LOSS EXPERIENCES

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Abstract

Aytekin, Medine. Investigation of the Effect of Unfinished Business and Psychological Resilience Levels of Psychological Counselors' Loss Experiences, Master Thesis, Ankara, 2022

The aim of this study is to examine the effect of unfinished business and psychological resilience levels of psychological counselors in their loss experiences. For this purpose, the average scores of psychological counselors' unfinished business and psychological resilience in loss experiences, gender, age, education level, professional seniority, time passed after the loss, the cause of the loss and the disappeared person variables were examined. This research is suitable for the relational screening model. The research was carried out with the data obtained from 211 (150 girls, 61 boys) who provided psychological counseling in the 2022-2023 academic year. In the research, the data were collected through the "Unfinished Business in Lost Experiences Scale-Short Form", "Short Psychological Resilience Scale" and the "Personal Information Form" prepared by the researcher. The analysis of the data was provided by pearsoncorrelation, t test, one-way analysis of variance (ANOVA) and regression tests. Research findings; According to the data obtained, it was found that the level of unfinished business and psychological resilience in the loss experiences showed a significant difference according to the cause of the loss and the person who was lost. The average scores of unfinished business in their lost life; It was seen that there was no significant difference according to the variables of gender, age, education level, professional seniority, time passed after the loss. The mean scores of psychological resilience; It is seen that there is no difference according to gender, age, education level, professional seniority, and the type of time passed after the loss. Various suggestions have been presented to colleagues and researchers who provide psychological counseling in order to increase the psychological resilience level of psychological counselors and to reduce their unfinished business in their loss experiences.

Keywords: Unfinished Business, Unfinished Business in Lost Experiences, Resilience, Counselor

“TÜRKİYE’DEKİ YABANCILARIN ENTEGRASYONLARINDA TÜRKÇENİN VE TÜRKÇE ÖĞRETİMİNİN ÖNEMİ”

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Özet

1999-2012 yılları arası (13 yıl) Gaziantep Üniversitesi ile Halep Üniversitesi arasındaki işbirliği protokolü çerçevesinde Halep Üniversitesi bünyesinde açılan Yüksek Diller Enstitüsü Türk Dili Öğretimi Merkezinde, aynı zamanda Halep Üniversitesi Edebiyat Fakültesinin çeşitli bölümlerinde 2. Seçmeli yabancı dil olarak Türkçe öğretimi görevinde bulunduk. 1999’dan günümüze kadarki 24 yıllık süre içerisinde başta Suriyeliler başta olmak üzere Türkiye’de yaşayan bütün yabancılara yönelik Türkçe öğretimi çalışmalarımız devam etmektedir. Türkiye’deki bütün yabancılardan Türkiye’ye entegrasyonlarını sağlayacak ve kolaylaştıracak unsur iletişim ve anlaşma aracı olan Türkçedir. Hedef dil Türkçenin dinleme, konuşma, okuma, yazma olarak 4 becerisiyle en iyi şekilde öğrenilmesi, yabancılardan Türkiye’ye, Türklere, Türk Kültürüne entegrasyonu kolaylaştıracaktır. Yabancılardan Türkçe öğrenimi, aynı zamanda Türklerin de yabancılara daha iyi tanımlarını, yabancılardan daha iyi anlaşmalarını, yabancılardan hakkındaki ön yargılardan kurtulmalarını da sağlayacaktır. Bütün yabancılara en başta, Türkçe öğrenimlerinin ne kadar önemli olduğu algısının verilmesi gerekir. Her şey Türkçe öğrenimiyle başlayacaktır. Türkiye’deki bütün yabancılara; çocuklara, gençlere, ihtiyarlara, okuma yazma bilenlere ve bilmeyenlere, ev hanımlarına vb. Türkçenin doğru öğretimi yapılması çok önemlidir. Halk ağzından, televizyonlardan, Türkçeyi doğru düzgün konuşamayan insanlardan Türkçe öğrenimi, Türklerle iletişimde ileriki zamanlarda büyük sıkıntılara yol açacaktır. Türk anaokulu, ilkokulu, ortaokulu ve liselerinde öğrenim gören yabancılardan Türkçe öğrenimleri çok daha kolay ve hızlı olmaktadır. Ağaç yaşken eğilir. Türk Üniversitelerinde okuyan ve okuyacak Suriyelilerin Türkçe öğrenimleri biraz daha yavaş olmaktadır. Okul çağında olmasına rağmen okula gidemeyen, çalışan ya da çalışmak zorunda olan bütün yabancılardan; buldukları ortamda konuşulan Türkçeyi öğrenmektedirler. Okuma yazma bilmeyen yabancılardan, yaşlılar, ev hanımları, iş adamları vb. Türkçe öğrenirken çok sıkıntılar yaşamakta ve çoğunlukla da Türkçeyi öğrenememekteyiz. Türkçe öğrenmekte zorluk yaşayan ya da Türkçe öğrenmek istemeyenlere, “Dil Arkadaşı Uygulaması” gibi özel Türkçe öğrenim/ öğretim metotları uygulanmalıdır. Yabancılardan Türkiye’ye uyumu, Türklerle daha iyi anlaşabilmeleri, Türkiye’de daha rahat yaşayabilmeleri, Türkiye’de her alanda daha başarılı olabilmeleri; aynı zamanda da Türklerin yabancılara daha iyi tanıyıp onlarla daha iyi geçinmeleri, onlar hakkındaki ön yargılardan kurtulabilmelerinin yolu yabancılardan Türkçeyi ne kadar doğru ve iyi öğrendikleriyle doğru orantılı olarak artacak ya da azalacaktır. Türkçe öğrenmeyen ya da öğrenemeyen yabancılardan, kendi aralarında kapalı bir ortam oluşturacaklar ve toplumsal uyum ve kaynaşma sıkıntılarını yaşayarak ileriki zamanlarda önü alınamayacak sorunlar yaşayacak ve sorunlarla karşılaşacaklardır. Türkçe öğretimi uzmanlarının rehberliğinde Türkçe öğretiminin yabancılara en iyi şekilde yapılacağına inanıyoruz.

Anahtar kelimeler: entegrasyon, Türkçe öğretimi, Türkiye’ye ve Türklere uyum, dört dil becerisi,

**THE IMPACT OF DISCRIMINATION ON THE PSYCHOLOGICAL WELLBEING
AND ETHNIC IDENTITY OF INTERNATIONAL STUDENTS IN NORTH CYPRUS**

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Abstract

The social categorization theory suggests that ingroup bias is a common cognitive bias that can result in discrimination against outgroup members. Considering the recent increase in the number and diversity of international students around the globe, attention should be drawn to how this affects intergroup dynamics. The aim of the current study is to investigate the influence of discrimination and ethnic identity on the psychological well-being of international students. A sample of 386 students was recruited from 2 universities in Northern Cyprus using a convenience sampling technique. The findings show a positive relationship between discrimination and psychological distress. The findings also show that ethnic identity is negatively correlated with discrimination and psychological distress. Discrimination was also associated with higher levels of stress and depression. This can be attributed to the isolation and social exclusion characteristics of discrimination. Discrimination was also found to be negatively correlated to ethnic identity scores among international students. The study shows that ethnic identity does not mediate the impact of discrimination on psychological well-being (psychological distress, depression, anxiety, stress). The findings also show that there are significant differences in discrimination based on race and religion this may be linked to cultural distance between the host and home countries. There are also significant differences in discrimination according to educational institutions where schools with more diversity have lower discrimination scores. Considering these findings, educational institutions should increase support services offered to international students in order to help and offer awareness and sensitivity training for multicultural interactions.

Keywords: Discrimination, Ethnic identity, Emotional states, Psychological Wellbeing, Inequality

ELECTRICITY CONSUMPTION FORECASTING USING TIME SERIES BASED DEEP LEARNING

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Abstract

Electricity is the most important part of modern life and has an important place in human life. Electricity is used in many areas such as lighting, heating and operating machines, and its use is increasing day by day with the rapidly growing industry. It is a type of energy obtained using oil, renewable energy sources, hydraulics and coal. However, since this energy cannot be stored and natural resources in production are limited, companies aim to meet future electricity needs and produce sufficient amounts of electricity. This study focuses on the development of deep learning models to predict future electricity consumption. Two different datasets, annual and household, were used in the study. The dataset used in the annual electricity consumption prediction model is between 01.06.2007-01.04.2021, and the dataset used in the household electricity consumption prediction model is between 08.05.2017-01.04.2021. Long Short Term Memory (LSTM), one of the time series based deep learning algorithms, has been used in the development of electricity consumption prediction models. Mean Absolute Percentage Error (MAPE) has been used to evaluate the performance of the developed models. The results show that LSTM can be used in electricity consumption forecasting with an acceptable margin of error.

Keywords: Deep Learning, Electricity Consumption Forecasting, Time Series

**INVESTIGATION OF TENSILE-INDUCED SPINGAPLESS TO HALF-METAL
TRANSITION IN JANUS-TYPE VSeTe TRANSITION METAL DICHALCOGENIDES**

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Abstract

Within the realm of materials science, Janus-type transition metal dichalcogenides (TMDs) have emerged as a pivotal area of research. Their distinct electronic, optical, and spintronic properties, which exhibit considerable tunability through dimensional and compositional modifications, render them ideal for extensive scientific inquiry and technological innovation. This investigation primarily focuses on elucidating the electronic transitions in H phase monolayer VSeTe, a Janus-type TMD, under applied biaxial tensile strains. Employing density functional theory (DFT), this study methodically subjected VSeTe to incremental biaxial tensile strains ranging from 1% to 5%. The initial characterization identified the unstrained H phase monolayer VSeTe as an II-type spin gapless semiconductor. Subsequent application of tensile strain induced notable alterations in its electronic configuration. Incremental strain augmentation from 1% to 5% resulted in a diminution of the energy gap in the up-spin channels, concurrently with an expansion in the down-spin channels. This dual modulation of spin channels reached a pivotal transition at a strain threshold of 5%. At this juncture, the up-spin channel transitioned into a metallic state, accompanied by the emergence of a 0.57 eV energy gap within the down-spin channel, signifying a metamorphosis into a half-metal phase from its intrinsic II-type spin gapless semiconductor. This transition bears profound implications for technological applications, especially in the domain of spintronics and advanced electronic devices. The capacity to modulate the electronic structure of Janus-type VSeTe through controlled tensile strain paves the way for the development of materials with bespoke electronic and spintronic characteristics. Such advancements hold the potential to revolutionize material technologies.

Keywords Janus-Type Transition Metal Dichalcogenides (TMDs), VSeTe, Density Functional Theory (DFT), Straintronics, Spin Gapless to Half-Metal Transition.

SUMAK (*Rhus coriaria* L.)'İN ÖNEMİ VE KULLANIM ALANLARI

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Özet

Sumak bitkisinin yaprak ve meyveleri, içerdikleri çeşitli maddelerden dolayı uzun yıllardır ilaç hammaddesi olarak kullanılmaktadır. Sumak yapraklarının antiseptik, ishal ve kan kesici özellikleri ile ateş düşürücü özelliklerinden yararlanılarak enfüzyonu ilaç sanayinde kullanılmaktadır. Hazmı kolaylaştırma ve içeriğinde bulunan tanen ile şeker hastalarındaki şekeri düşürme ve ishali durdurma etkisine sahiptir. Ayrıca sumak boya sanayide kumaş ve derilerin sarı renge boyanmasında değerlendirilmektedir. Baharat olarak meyve ezilerek toz hale getirilir ve yemeklere ekşi bir tat vermesi için kullanılmaktadır. Türün bu geniş kullanım alanları gibi önemli özelliđi de deri, boya, tıp ve gıda endüstrisinde yaygın bir kullanım alanının olmasıdır. Ülkemizde birçok tıbbi ve aromatik bitki doğadan toplanmakta ve bir kısmının da belirli ölçüde tarımı yapılmaktadır. Sumak türünün ormancılıđımızda ve kamuoyunda hak ettiđi konuma ulaştırılması ve beklenen ekonomik, sosyal ve kültürel faydaları yerine getirebilmelerini sağlanması için türün öncelikle ülkemizdeki doğal yayılış alanları, ekolojik istekleri, birlikte bulunduğu türlerle olan ilişkileri ile tohum ve fidan üretim esaslarının daha kapsamlı bilimsel araştırmalarla ortaya konulması gerekmektedir.

Anahtar kelimeler: Sumak, Kullanımı, Kültürü, Yayılışı

THE IMPORTANCE AND USAGE AREAS OF SUMAC (*Rhus coriaria* L.)

Abstract

The leaves and fruits of the sumac plant have been used as pharmaceutical raw materials for many years due to the various substances they contain. The infusion of sumac leaves is used in the pharmaceutical industry, taking advantage of their antiseptic, diarrheal and anticoagulant properties, as well as their antipyretic properties. It facilitates digestion and has the effect of reducing blood sugar and stopping diarrhea in diabetic patients with the tannin it contains. Additionally, sumac dye is used in the industry to dye fabrics and leather in yellow color. As a spice, the fruit is crushed into powder and used to give a sour taste to dishes. An important feature of the species, such as its wide usage areas, is that it is widely used in the leather, dye, medicine and food industries. In our country, many medicinal and aromatic plants are collected from nature and some of them are cultivated to a certain extent. In order to bring the sumac species to the position it deserves in our forestry and in the public opinion, and to ensure that it can fulfill the expected economic, social and cultural benefits, the natural distribution areas of the species in our country, its ecological demands, its relationships with the species it co-occurs with, and the principles of seed and sapling production must be revealed through more comprehensive scientific research.

Keywords: Sumac, Utilization, Culture, Distribution

HEMODİYALİZ TEDAVİSİ ALAN HASTALARDA TEDAVİYE UYUMU ETKİLEYEN FAKTÖRLER

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Özet

Kronik böbrek yetmezliği (KBY), nerdeyse her yaş grubunu etkileyen, ancak en çok genç erişkinleri etkilemekte olan, dünyada ve ülkemizde de en çok karşılaşılan kronik hastalıklar arasındadır. Hastalığın morbidite ve mortalite oranları yüksektir ve yaşamı olumsuz etkilemektedir. Dünyada yetişkin bireylerin %13,4'ünde farklı evrelerde böbrek yetmezliği hastalığının bulunduğu belirtilmektedir. Ülkemizde ise Türk Nefroloji Derneği tarafından erişkinlerin %15,7'sinde KBY bulunduğu açıklanmıştır. Böbrek yetmezliğinde erken tanı, hem hastalığın gerilemesine hem de önlenmesine önemli katkılar sağlamaktadır. Ancak erken tanılanma oranının düşük olması nedeniyle, hastalık geri dönüşü olmayan evreye kadar ilerleyebilmektedir. Bu evreye 'Son Dönem Böbrek Yetmezliği' (SDBY) evresi adı verilir. Bu evrede kişilerde en çok kullanılan tedavi yöntemi hemodiyaliz (HD) tedavisidir. Hemodiyaliz sürecinde olan bireylerde yaşam kalitesini artırmak ve mortaliteyi azaltmak için tedaviye uyum göstermeleri önemlidir. Kronik bir hastalığa uyum gösterirken, hastalığın ve tedavinin özellikleri büyük bir öneme sahiptir. Özellikle birey ve ailesinin yaşam biçiminde değişikliklere, maddi ve manevi kayıplara sebep olan ve bireyi başkalarına bağımlı hale getiren kronik bir hastalığa uyum daha güçtür. Çünkü hastalık; fizyolojik, psikolojik ve sosyal boyutlarda hayatı etkiler ve beden bütünlüğünü tehlikeye sokar. Birey bu dönemde stres, korku, anksiyete, çaresizlik ve yalnızlık gibi olumsuz duygular yaşayabilmektedir. Hemodiyalizin ertelenmesinin veya ara verilmesinin neredeyse imkansız olması, tedavinin süresi, kullanılan ilaçlar, sıvı alımı ve yiyeceklerin kısıtlanması hastaya sürekli hastalığını hatırlatmaktadır. Kronik HD hastasının yaşamında değişiklikler yapması, kendisinin yanı sıra ailesinin de bu düzenlemelere uymasını gerektirmektedir. HD hastalarında uyum, tedavi programında ele alınan alanlara (diyet, sıvı alımı, ilaçlar, atılan/kısıtlanan seanslar) ve kullanılan kriterlere bağlı olarak farklı oranlarda sonuçlar verebilmektedir. Ancak genellikle HD hastalarında tedaviye uyumsuzluğun yaygın bir durum olduğu bilinmektedir. Yapılan çalışmalarda HD tedavi programlarının farklı yönlerine uyumsuzluğun %50 veya daha yüksek oranlara sahip olduğu saptanmıştır. Bununla beraber kronik HD hastalarında tedaviye uyum; sağlık durumu, iyilik hali, yaşam kalitesi ve yaşam süresi yönünden hayati öneme sahiptir. Hastalarda tedaviye uyumsuz olma durumu, sağlık hizmetlerinde maliyeti de arttırmaktadır. Hasta merkezli bir yaklaşım kullanılarak tedaviye uyuma engel teşkil eden faktörler giderilmeli, hasta ile ailesine eğitim verilmeli ve bilişsel davranışsal stratejiler geliştirilmelidir. Gelecekte tedaviye uyumu sağlayan daha etkin girişimlerin geliştirilmesi ile hem hasta hem de sağlık personeli açısından daha faydalı sonuçların elde edileceği düşünülmektedir.

Anahtar Kelimeler: hemodiyaliz, uyum, tedavi

KEMOTERAPİ ALAN MEME KANSERLİ HASTALARDA SEMPTOM KONTROLÜNDE MOBİL UYGULAMALARIN KULLANIMI

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Özet

Meme kanseri dünyada ve ülkemizde kadınlarda görülen mortalitesi ve morbiditesi en yüksek olan kanser türüdür. Dünya Sağlık Örgütü (DSÖ) 2020'de dünya genelinde 2,3 milyon kadına meme kanseri teşhisi konulduğunu ve 685 bin kadının meme kanseri nedeniyle hayatını kaybettiğini belirtmiştir. Erken tanı ve gelişmiş tedavi sayesinde meme kanseri hastalarında hayatta kalma oranı artmaktadır. Meme kanseri hastalarının neredeyse %88'i 5 yıl veya daha uzun süre hayatta kalmaktadır. Meme kanserinin tanısı ve ardından gelen tedavi, hastanın yaşamının tüm yönlerini etkiler, hastanın yaşamını zorlar ve kişinin fiziksel ve zihinsel yeteneğini önemli ölçüde etkiler. Meme kanseri tedavisinde sıklıkla kemoterapi tedavisi kullanılmaktadır. Kemoterapi, tedavi edici etkilerinin yanında birçok istenmeyen semptomla da neden olmaktadır. Bu semptomlar arasında kemik iliği depresyonu, bulantı-kusma, mukozit, diyare, konstipasyon, nefes darlığı, alopesi, uykusuzluk, ağrı, halsizlik, anemi, yorgunluk, nörolojik, üriner, hematolojik, cilt, göz ve cinsellikle ilgili semptomlar yer almaktadır. Hastalar tarafından yaşanan bu semptomların iyi yönetilmesi hastaların tedaviye uyumlarını artırmakta ve tedavinin seyrini olumlu yönde etkilemektedir. Son yıllarda hastaların yaşadığı bu semptomları iyileştirmek için mobil destekli uygulamalar gündeme gelmiştir. Mobil destekli uygulamalar; telefon, tablet ve bilgisayar gibi iletişim araçlarıyla kullanılan ve bilişim alanında hizmet almak isteyen kişilerin ihtiyaçlarına yönelik eğitim ve sağlık gibi birçok alanda kullanılmak üzere geliştirilen yazılımlardır. Bu mobil uygulamalar hastaların yaşadıkları semptomların bildirilmesi ve bu bildirilen semptomların sağlık profesyonellerince değerlendirilmesi sonucu bakım ve tedavi uygulamalarının planlanmasına katkı sağlar. Böylece hastaların daha iyi bir bakım almasını destekler. Aynı zamanda plansız hastaneye yatışların azalmasına, yaşam kalitesinin artmasına yol açar. Hastaların mobil uygulama kullanarak kemoterapinin yan etkilerine ilişkin farkındalıklarının artırılabilceğini, mobil uygulamalar ve telefon danışmanlıkları ile kötüleşen semptomların azaltılabileceğini belirten çalışmalar bulunmaktadır. Mobil teknolojideki bu gelişmeler hemşirelik hizmet sunumunu da etkilemektedir. Hemşireler mobil uygulamaların farkındalığını ve kullanılabilirliğini artırarak hastaların kendi bakımlarını proaktif bir şekilde yönetmelerinde rol oynar. Ayrıca hemşire mobil uygulamalar ile bireyleri eğitebilir, danışmanlık yapabilir ve kronik hastalığı olan hastalarla iletişimi sürdürebilmektedir.

Anahtar Kelimeler: Meme kanseri, kemoterapi, mobil uygulama, semptom kontrolü, hemşire

THE USE OF MOBILE APPLICATIONS IN SYMPTOM CONTROL IN BREAST CANCER PATIENTS UNDERGOING CHEMOTHERAPY

Abstract

Breast cancer is the type of cancer with the highest mortality and morbidity observed in women in the world and in our country. The World Health Organization (WHO) stated that 2.3 million women were diagnosed with breast cancer worldwide in 2020 and 685 thousand women died due to breast cancer. Thanks to early diagnosis and advanced treatment, the survival rate of breast cancer patients is increasing. Almost 88% of breast cancer patients survive for 5 years or longer. The diagnosis of breast cancer and the subsequent treatment affect all aspects of the patient's life, strain the patient's life and significantly affect a person's physical and mental ability. Chemotherapy treatment is often used to treat breast cancer. Chemotherapy, in addition to its therapeutic effects, also causes many undesirable symptoms. These symptoms include bone marrow depression, nausea-vomiting, mucositis, diarrhea, constipation, shortness of breath, alopecia, insomnia, pain, weakness, anemia, fatigue, neurological, urinary, hematological, skin, eye and sexual symptoms. Decapitation is the most common type of symptoms. Good management of these symptoms experienced by patients increases patients' compliance with treatment and positively affects the course of treatment. In recent years, mobile-supported applications have been on the agenda to improve these symptoms experienced by patients. Mobile supported applications are software used with communication tools such as phones, tablets and computers and developed for use in many areas such as education and health for the needs of people who want to receive services in the field of informatics. These mobile applications contribute to the planning of care and treatment practices as a result of reporting the symptoms experienced by patients and evaluating these reported symptoms by health professionals. Thus, it supports patients to receive better care. At the same time, it leads to a decrease in unplanned hospitalizations and an increase in quality of life. There are studies indicating that patients' awareness of the side effects of chemotherapy can be increased by using mobile applications, and worsening symptoms can be reduced by using mobile applications and telephone consultations. These developments in mobile technology also affect the provision of nursing services. Nurses play a role in proactively managing patients' own care by increasing the awareness and availability of mobile applications. In addition, the nurse can train individuals with mobile applications, provide counseling and maintain communication with patients with chronic diseases.

Keywords: Breast cancer, chemotherapy, mobile application, symptom control, nurse

YOĞUN BAKIMDA BASINÇ ÜLSERİ, GÖRÜLME SIKLIĞI VE ÖNLENMESİNDE HEMŞİRELİK BAKIMI

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Abstract

Basınç ülseleri tüm hastalarda ve özellikle yoğun bakım ünitelerinde tedavi gören yatağa bağımlı hastalarda sıklıkla görülen bir sağlık problemidir. Günümüzde gelişen teknoloji ile tedavi ve rehabilitasyonda ilerlemeler yaşanmış, ancak yatağa bağımlılıkta da artış görülmüştür. Bunun sonucunda basınç ülseri görülme sıklığında da artış görülmüştür. Özellikle hareket edemeyen, duyu fonksiyonları azalmış ya da hiç duyu algılaması olmayan bireyler için asıl tedavilerini yanında gelişen bir komplikasyon olan basınç ülselerinin; bakım ve tedavisi güç, uzun ve yüksek maliyetlidir. Basınç ülseri, vücudun özellikle kemik çıkıntılarının bulunduğu bölgelerinde uzun süreli ya da tekrarlanan basınçlara bağlı olarak deri ve deri altı dokularda kapillerin tamamen kapanması ve o bölgedeki dolaşımın tamamen durması sonucu ortaya çıkan ülserasyonlar veya nekroz durumuna denir. Bir başka tanıma göre; Ulusal Basınç Ülseri Danışma Paneli (NPUAP) basınç ülselerini basınç ve/ veya yırtılma sonucu oluşan doku hasarı olarak açıklamaktadır. Hastanede yatan bütün hastalar arasında basınç yarası prevalansı %3.5-29.5 arasında değişmekte; tüm cerrahi hastalarında %66, akut bakımda %10-18, uzun süreli bakımda %23-28, evde bakımda %0-29, yoğun bakımda %20.9-39.5 arasında değişen oranlarda görülmektedir. Basınç yaralarının önlenmesi, hemşirelik bakımının kalitesini ortaya koyan en önemli göstergelerden biridir. Basınç yaralarının önlenmesinde ve yönetiminde hemşirenin rolleri arasında; derinin inspeksiyonu ve risk değerlendirmesi, pozisyon verilmesi, yüzey kontrolü, beslenme ve inkontinans yönetimi gibi uygulamalar yer almaktadır. Yoğun bakım ünitelerinde gerek hastaların klinik özellikleri gerekse üniteye uygulanan bakım ve tedavi girişimleri nedeniyle basınç ülseri gelişme riski diğer yerlere göre daha yüksektir. Bu nedenle Yoğun bakım ünitesindeki özellikle risk grubundaki hastaların belirlenip yakından izlenmesi oldukça önemlidir. Ayrıca hemşirelik bakımının en önemli kalite göstergelerinden biri olduğundan basınç yaralarının önlenmesi tüm hemşirelerin birincil hedefi olmalıdır. Sonuç olarak; hemşireler yoğun bakım ünitelerinde basınç ülselerinin önlenmesinde ve yönetilmesinde kanıta dayalı hemşirelik girişimleri doğrultusunda gerekli girişimleri yapmalıdır.

Anahtar Kelimeler: Basınç ülseri, yoğun bakım, hemşirelik bakımı

NURSING CARE IN PRESSURE ULCER, INCIDENCE AND PREVENTION IN INTENSIVE CARE UNIT

Abstract

Pressure ulcers are a common health problem in all patients, especially in bedridden patients treated in intensive care units. Nowadays, with the developing technology, there have been advances in treatment and rehabilitation, but there has also been an increase in bed dependence. As a result, the incidence of pressure ulcers has increased. Pressure ulcers, which are a complication that develops in addition to their main treatment, especially for individuals who cannot move, have reduced sensory functions, or have no sensory perception; Maintenance and treatment are difficult, long and costly. Pressure ulcer is a condition of ulceration or necrosis that occurs as a result of the complete closure of capillaries in the skin and subcutaneous tissues and the complete cessation of circulation in that area due to long-term or repeated pressures, especially in areas of the body where bone protrusions are located. According to another definition; The National Pressure Ulcer Advisory Panel (NPUAP) defines a pressure ulcer as tissue damage resulting from pressure and/or shear. The prevalence of pressure sores among all hospitalized patients varies between 3.5-29.5%; It is seen in 66% of all surgical patients, 10-18% in acute care, 23-28% in long-term care, 0-29% in home care, and 20.9-39.5% in intensive care. Care of pressure sores is one of the most important indicators of the reliability of certified care. In the protection of pressure sores and the roles of the officer; Applications such as skin inspection and risk assessment, financial relations, surface control, nutrition and incontinence management are included. The risk of pressure increase is stronger than other temperatures due to the care and treatment methods applied in intensive care units and the clinical characteristics of the patients. For this reason, it is very important to share information, especially on risk topics, in the intensive care unit. In addition, the protection of wounds, which is one of the most important quality indicators of Certification care, should be the primary goal of all Certifications. In conclusion; Certificates: In the prevention and continuity of pressure increase in intensive care units, interventions should be made in accordance with the evidence-based Patent identification mark.

Keywords: Pressure ulcer, intensive care, nursing care

KARKAS AĞIRLIĞININ HESAPLANMASINDA BAZI MORFOMETRİK ÖLÇÜMLERİN ETKİSİ

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Özet

Geviş getiren hayvanlarda karkas ve karkas kalitesi, et verimini belirleyen en önemli faktörlerden olup yetiştiriciler ve tüketiciler açısından da önemlidir. Et verimi ve karkas kalitesi arasındaki bu pozitif ilişki, kaliteli karkaslardan kaliteli et ve et ürünlerinin elde edilmesine olanak sağlamaktadır. Karkas ağırlığını tahmin etmek için bazı morfolojik ölçümler ve regresyon analizleri kullanılır. Bu çalışma, Türkiye'deki popüler sığır ve keçi ırklarının genç ve yetişkin bireylerinde ayak bileği kemiklerinin ilk sırasının morfolojik ölçümlerini belirlemek ve bu ölçümlerin karkas ağırlığı, cinsiyet ve yaş arasındaki ilişkiyi ortaya koymak için yapılmıştır. Bu çalışmada, 20 erkek ve 20 dişi yetişkin Simmental ve Angus sığırın, 20 erkek ve 20 dişi genç Simmental ve Angus sığırın, 20 erkek ve 20 dişi yetişkin Kıl Keçisinin, 20 erkek ve 20 dişi genç Saçlı Keçisinin calcaneus ve talus (astragalus) kemikleri kullanılmıştır. Her talus ve calcaneus kemiği için bir indeks ve bir faktör hesaplanmış ve her yaş grubu ve ırk için bir regresyon analizi tasarlanmıştır. Çalışmadan elde edilen veriler IBM SPSS 21 programında incelenmiştir. Sonuçlara göre, calfactor ve talfactor, karkas ağırlığını tahmin etmek için istatistiksel olarak anlamlı bir belirleyicidir. Ancak, calindex ve calfactor, karkas ağırlığını tahmin etmek için istatistiksel olarak anlamlı bir belirleyici değildir. Sonuç olarak, yeni morfometrik ölçümler, indeksler ve faktörler, karkas ağırlığını tahmin etmek için yeni teknikler üretmede faydalı olabilir.

Anahtar Kelimeler: calcaneus, karkas ağırlığı, morfometri, talus

THE EFFECT OF SOME MORPHOMETRIC MEASUREMENTS IN THE CALCULATION OF CARCASS WEIGHT

Abstract

In ruminants, the quality of the carcass is a crucial determinant of the meat yield, making it a significant consideration for both breeders and consumers. The positive correlation between the yield of meat and the quality of the carcass enables the production of high-quality meat and meat products from quality carcasses. In order to predict carcass weight, some morphological measurements and regression analysis are used. This study was conducted to determine the morphological measurements of first row of the ankle bones and the relationship between carcass weight, sex and age in young and adult popular cattle and goat breeds in Turkey. In this study, calcaneus and talus (astragalus) bones of 20 male and 20 female adult Simmental and Angus cattle, 20 male and 20 female young Simmental and Angus cattle, 20 male and 20 female adult Hair Goats, 20 male and 20 female young Hair Goats were used. An index and a factor were calculated for each talus and calcaneus bone to design a regression analysis for each age group and breed. The data obtained from the study were examined in IBM SPSS 21 programme. According to the results, calfactor and talfactor are a statistically significant determinant for predicting carcass weight. However, calindex and calfactor are not a statistically significant determinant for predicting carcass weight. In conclusion, new morphometric measurements, indexes and factors could be a beneficial to produce new techniques to predict carcass weight.

Keywords: calcaneus, carcass weight, morphometry, talus.

DIYABETİK AYAK ÜLSERİ OLAN BİREYLERDE YAŞAM KALİTESİ VE ÖZYÖNETİM İLİŞKİSİNİN BELİRLENMESİ

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Özet

Diyabetik ayak bireylerin yaşam kalitesini olumsuz etkilemekte olup, bu süreçte yaşanan sorunlarla baş etmede öz yönetim davranışlarının artırılması önemlidir. Bu araştırma, diyabetik ayak ülseri olan bireylerde yaşam kalitesi ve öz yönetim düzeylerinin belirlenmesi ve aralarındaki ilişkisinin ortaya koyulması amacıyla yapılmıştır. Araştırmanın örneklemini bir üniversitenin eğitim ve araştırma hastanesi genel cerrahi polikliniğine ve/veya diyabetik ayak servisine başvuran, diyabetik ayak ülseri bulunan, majör amputasyon gerçekleştirilmemiş olan araştırmaya katılmaya onam veren 165 birey oluşturmuştur. Çalışma için araştırma verileri Kişisel Bilgi Formu, Diyabetik Ayak Ülseri Ölçeği Kısa Formu ve Diyabet Öz Yönetim Skalası kullanılarak toplanmıştır. Hastaların yaş ortalaması $64,19 \pm 9$, %35,8'i kadın, %55,8'inin diyabet dışında ek kronik hastalığı bulunmaktadır. Yaşam kalitesi ölçeği toplam puanlarının 58,27, Diyabet öz yönetim ölçeği toplam puanlarının 5,10 olduğu saptanmıştır. Bireylerin yaş ortalamaları $64,19 \pm 9,33$ yıl, diyabet tanı süresi ortalama $12,98 \pm 7,75$ yıldır. Bireylerin %55,8'inde diyabet dışında ek kronik hastalığın bulunduğu, %63,6'sının sağlık düzeyini orta olarak değerlendirdiği saptanmıştır. Bireylerin, %20,6'sının ikinci evrede, %48,5'inin üçüncü evrede diyabetik yarası olduğu, %33,9'una minör ampütasyon yapıldığı saptanmıştır. Diyabetik ayak ülseri ölçeği toplam puanlarının yaş, medeni durum, eğitim durumu, çalışma durumu, diyabet tanı süresi, ek kronik hastalık durumu, diyabet tedavisi, diyabetik ayak evresine göre değişiklik göstermektedir. Diyabetik ayak ölçeği toplam puanlarının glikoz yönetimi, diyet kontrolü, fiziksel aktivite, sağlık hizmetleri kullanımı ve öz yönetim ölçeği toplam puanları ile pozitif yönde, orta derecede anlamlı ilişkisi olduğu saptanmıştır. Diyabetik ayak hastalarının yaşam kalitelerinin çok yönlü etkilendiği ve yaşam kalitesinin öz yönetim davranışları ile ilişkili olduğu saptanmıştır. Diyabetik ayak hastalarında yaşam kalitesini artırmaya yönelik müdahale çalışmalarının yapılması önerilmektedir.

Anahtar Kelimeler: diyabetik ayak, öz yönetim, yaşam kalitesi

DETERMINATION OF QUALITY OF LIFE AND SELF-MANAGEMENT IN INDIVIDUALS WITH DIABETIC FOOT ULCER

Abstract

Diabetic foot adversely affects the life quality of individuals, and it is essential to increase self-management behaviours in coping with the problems experienced in this process. This research was conducted to determine the quality of life and self-management levels of individuals with diabetic foot ulcers and to reveal the relationship between them. The study sample consisted of 165 individuals who applied to the general surgery polyclinic and/or diabetic foot service of a university training and research hospital, had a diabetic foot ulcer, had not undergone significant amputation and consented to participate. For the study research data were collected using the Personal Information Form, Diabetic Foot Ulcer Scale Short Form and Diabetes Self-Management Scale. The average age of the patients was 64.19 ± 9 years, 35.8 of them were women, and 55.8 of them had additional chronic diseases other than diabetes. It was determined that the quality of life scale total score was 58.27, and the Diabetes self-management scale total score was 5.10. The average age of the individuals is 64.19 ± 9.33 years, and the average duration of diabetes diagnosis is 12.98 ± 7.75 years. It was determined that 55.8% of the individuals had an additional chronic disease other than diabetes, and 63.6% evaluated their health level as medium. It was determined that 20.6% of the individuals had diabetic wounds in the second stage, 48.5% had diabetic wounds in the third stage, and 33.9% had minor amputations. Diabetic foot ulcer scale total scores vary according to age, marital status, education level, employment status, duration of diabetes diagnosis, additional chronic disease status, diabetes treatment, and diabetic foot stage. Diabetic foot scale total scores were found to have a positive, moderately significant relationship with glucose management, diet control, physical activity, health services utilisation, and self-management scale total scores. It has been determined that the quality of life of diabetic foot patients is affected in many ways and that the quality of life is related to self-management behaviours. It is recommended that intervention studies be carried out to improve the quality of life in diabetic foot patients.

Keywords: diabetic foot, self-management, quality of life

SHATTERED GROUND, RESILIENT MINDS: PSYCHOSOCIAL IMPACTS AND RECOVERY IN THE WAKE OF THE 2023 KAHRAMANMARAŞ EARTHQUAKES IN TÜRKİYE

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Abstract

In February 2023, two major earthquakes struck Kahramanmaraş, Türkiye, with magnitudes of 7.7 and 7.6, causing unprecedented destruction. This review assesses the aftermath, where the tremors resulted in the collapse of 280,000 buildings, over 50,000 deaths, the displacement of 3 million people, and affected life in 11 cities. The focus is on the extensive psychosocial impacts on survivors, including trauma, the development of PTSD, and the emergence of PTG. The analysis underscores community support as pivotal in the healing process, advocating for sustained psychological care to aid those with PTSD and to nurture PTG. The review illuminates the necessity of such support systems in fostering resilience and enabling recovery. The implications for disaster response and mental health interventions are profound, emphasizing that effective aid is not only immediate but also long-term, addressing the complex emotional and psychological needs that arise from such large-scale natural disasters. The insights offered are critical for shaping policies and practices that ensure comprehensive support for affected populations, aiming to mitigate the psychological toll of such catastrophic events and promote holistic recovery.

Keywords: Earthquakes, Trauma, Resilience, Psychosocial, Recovery

İSMET ÖZEL'İN POLİTİK FELSEFESİNDE BİR VARLIK MİNVALİ OLARAK TOPOS DÜŞÜNCESİ

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Özet

Türk düşüncesinin yaşayan en büyük isimlerinden biri olan İsmet Özel'in şiirleri ya da düzyazıları incelendiğinde görülecektir ki, onun ifade ettiği her şey bir mekanla, bir coğrafyayla ilişkilidir. Onun için somut yaşam pratiği ve bu pratiğin gerçekleştiği yer vazgeçilmezdir. İsmet Özel'in mekân anlayışının cisimleştiği yer ise Türkiye'dir. Hatta İsmet Özel, eserlerinde "ben" diye geçen her şeyin aynı zamanda Türkiye olduğunu söylemektedir. Siyasi bir birlik olan Türklük, İsmet Özel'e göre, Türkiye'de doğmuştur. Bu bakımdan politik fikrin vazgeçilmez unsuru bir mekân olarak Türkiye'dir. Descartes'le başlayan modern düşünce, evrensellik iddiasını taşır. Evrensellik, beraberinde bir ideal olarak insanlık kavrayışını da getirir. Hem evrensel düşüncenin hem de insanlık idealinin spesifik bir zemini yoktur. Mekândan ve coğrafyadan münezzehtir. Bu bakımdan modern düşünce ütöpiktir. Kurgusal ve hayalîdir. İsmet Özel'in politik düşüncesi, modern sistemin karşısında yer alır. Mekânsız bir kozmopolitizm ya da soyut idealleştirmeler yerine somut yaşam dünyasını savunur. Ona göre insan, belli bir toprak parçasını yurt edinen politik bir varlıktır. İsmet Özel'in anladığı şekliyle Türklüğü meydana getiren Türkiye'dir. Bunun sonucu olarak denilebilir ki, "ben kimim?" sorusu, "ben neredeyim?" sorusuyla paraleldir. Kim olduğumuz, nerede olduğumuzda ilişkilidir. Yer'le kurulan bağ talî ya da ikincil değildir; aslî ve varoluşsaldır. Bu çalışmada İsmet Özel'in politik bir mekân olarak Türkiye anlayışı incelenecektir.

Anahtar Kelimeler: İsmet Özel, Türkiye, Türklük, Modernite, Topos.

**THE CONCEPT OF *TOPOS* AS AN EXISTENTIAL BASIS IN İSMET ÖZEL'S
POLITICAL PHILOSOPHY**

Abstract

If we look at the poems or prose of İsmet Özel, one of the greatest figures in Turkish thought, we will see that everything he expresses is related to a place, a geography. For him, the concrete practice of life and the place where this practice takes place are indispensable. The place where İsmet Özel's understanding of space materialises is Türkiye. In fact, İsmet Özel says in his works that everything that is called "I" is also Türkiye. According to İsmet Özel, Turkishness, a political unity, was born in Türkiye. In this sense, the indispensable element of political thought is a place, namely Türkiye. Beginning with Descartes, modern thought has claimed to be universal. Universality brings with it an ideal understanding of humanity. Both universal thought and the ideal of humanity have no specific ground. They are exempt from space and geography. Therefore, modern thought is utopian, fictitious, and imaginary. İsmet Özel's political thought is against the modern system. Instead of a cosmopolitanism without space or abstract idealizations, he defends the concrete living world. According to him, a human being is a political being who makes a certain piece of land his home. In İsmet Özel's understanding, Türkiye constitutes Turkishness. Thus, it can be said that the question of "who am I?" is parallel to the question of "where am I?" Our identity is linked to where we are. The connection established with place is not contingent or secondary; it is essential and existential. This study examines İsmet Özel's understanding of Türkiye as a political space.

Keywords: İsmet Özel, Türkiye, Turkishness, Modernity, Topos.

NOMOS'SUZ DÜNYADA BİR NOMOS ARAYIŞI OLARAK İSMET ÖZEL'İN POLİTİK FELSEFESİ

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Özet

İsmet Özel (1944-), Türkiye'nin önemli şair ve düşünürlerindedir. 1900'lü yılların ikinci yarısında başlayan şiir ve düşünce serüveni, günümüze kadar tüm canlılığıyla devam etmektedir. Özel'in şiirini düşüncesinden, düşüncesini de şiirden ayırmak mümkün değildir. Bu sebeple onu bir şair olarak ele almak, aslında onu bir düşünür olarak ele almayı da gerektirir. Alman düşünür Carl Schmitt (1888-1985), politik felsefesinde "nomos" kavramına özel bir yer verir. Schmitt'e göre nomos, bir topluluğun mekânla kurduğu ilişki temelinde, düzen kurma sürecinin adıdır. Nomos, yasanın da üzerindedir. Zira nomos, yasa gibi soyut bir ölçüt değildir; yasanın temelinde olan tarihsel, kurucu bir edimdir. Nomos, siyasi birliğin ya da topluluğun toprakla ilişki içindeki kuruluşuna gönderme yapar. Nomos, siyasal birliğin diğer topluluklar karşısındaki varlığını mekân ile temellendirmektedir. İsmet Özel'in politik düşüncesinde, politikayla mekân arasında varoluşsal bir ilişki vardır. Zira onun düşüncesinde Türkiye, merkezi konumdadır. Modern felsefenin zeminsiz ve coğrafyasız "insanlık" ve "evrensellik" nosyonlarının karşısında yer alır. İsmet Özel'e göre asıl olan mensubu bulunduğumuz Türk milleti ve Türk milletinin varoluşsal mekânı olarak Türkiye'dir. Bir siyasi birlik olarak Türk milletini Türkiye oluşturmuş; Türkiye'yi de Türk milleti meydana getirmiştir. Bu çalışmada, İsmet Özel'in politik felsefesinde nomos'un belirleyici yönleri tartışılacaktır. İsmet Özel'in politik düşüncesinin merkezi kavramları olan Türklük, Türkiye ve İslamiyet anlayışı incelenecektir.

Anahtar Kelimeler: İsmet Özel, Nomos, Türklük, Türkiye, İslamiyet.

**IN SEARCH OF NOMOS IN A WORLD DEVOID OF NOMOS: THE POLITICAL
PHILOSOPHY OF İSMET ÖZEL**

Abstract

İsmet Özel (1944-) is one of Türkiye's most prominent poets and thinkers. His poetic and intellectual journey, which began in the second half of the 20th century, continues vibrantly to this day. It's impossible to separate Özel's poetry from his thoughts, thus considering him merely as a poet necessitates also considering him as a thinker. German philosopher Carl Schmitt (1888-1985) attributed a particular significance to the concept of 'nomos' in his political philosophy. According to Schmitt, nomos signifies the process of establishing order based on the relationship between a community and space. Nomos is beyond law because it is not an abstract criterion like law; rather, it represents a historical and foundational act underlying legal systems. It denotes the establishment of a political unit or community in terms of territorial relations, which substantiates the existence of a political unit in relation to other communities through space. İsmet Özel's political thought includes an existential correlation between politics and space. From his perspective, Türkiye assumes a pivotal role, standing in opposition to the groundless and geographically detached notions of 'humanity' and 'universality' prevalent in modern philosophy. According to Özel, the essence lies within the Turkish nation to which we belong, and Türkiye embodies the existential space of the Turkish nation. As a political entity, Türkiye has shaped the Turkish nation, and reciprocally, the Turkish nation has shaped Türkiye. This study will explore the defining aspects of nomos in İsmet Özel's political philosophy, by examining the fundamental concepts of Turkishness, Türkiye, and the interpretation of Islam in İsmet Özel's political thought.

Keywords: İsmet Özel, Nomos, Turkishness, Türkiye, Islam.

EVOLUTION OF WEAVING: FROM PRIMITIVE LOOM TO WEAVING MACHINE

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Abstract

Weaving fabric is a well known ancient practice that spans both time and culture of various civilizations throughout the centuries. Weaving is the most common way to create cloth as used for clothing fabrics and items we use today. In the simplest terms, it is the process of interlacing two sets of parallel threads at right angles to each other. This unique technique is capable of producing versatile and functional structures as well as decorative items. It is not certain when the craft of weaving began since ancient textiles are rarely found in archaeological excavations. Being of perishable origin, they are subject to rapid decomposition by microorganisms unless special conditions prohibit their destruction. Moreover, most tools used for the production of ancient textiles were also perishable. What is known is, however, that once weaving became widely known, its use and popularity as a way of creating fabrics has been continuing since then. Early trials were believed to be the intertwining of the branches of trees to form shelters or tree huts. The concept of weaving slowly and surely developed and grew in the mind of man until eventually woven cloth was the result. In this article, the evolution of weaving as the transition from loom into weaving machine is discussed with reference to the progress of weaving machine through industrial evolution of 1.0 to 4.0 is also reviewed as a significant feature. A very simple arrangement of threads stretched between two bars to conduct a weaving operation was pictured on the walls of ancient Egypt. During the Neolithic period, weaving began to develop into the process it resembles today with one of the first iterations of the loom. The basic purpose of a loom which is to hold the warp threads under tension to facilitate the interweaving of the weft threads through separated warp threads. The warp-weighted loom was a simplistic weaving tool in which the warp threads were positioned vertically. The backstrap loom is another early loom version that is still widely used in various cultures around the world. The design of the loom began to advance more rapidly during the Middle Ages, with the invention of treadles. This particular part of the loom facilitates lifting specific healds to create a pattern. This invention was believed to have originated in China. Both horizontal and vertical looms were used during the Middle Ages. For a long time, a shuttle was used to insert the weft thread through the warps. In 1733, British weaver John Kay developed the Flying Shuttle. This mechanical system was a major upgrade as it allowed the shuttle to fly from one side to another and sped up the weaving process. The Flying Shuttle was a universal technique for more than two centuries, until the creation of mechanical looms during the Industrial Revolution. The development of the power loom replaced the mechanical loom, as human intervention was partly eliminated. The domination of automatic shuttle loom continued until the middle of the 20th century when alternative methods of weft insertions named shuttleless weaving were introduced. The principles of weaving remained the same while the speed of the production and quality and diversity of the cloth were gradually increased. Nowadays, modern weaving machines run at the speed of 2000 picks per minute while producing very complicated patterns as well as 3D woven structures.

Keywords: Weaving, weaving loom, weaving machine, ancient weaving, weaving history

EVALUATION OF THE ENVIRONMENTAL IMPACTS OF TEXTILES AND APPAREL THROUGHOUT THE FULL LIFE CYCLE

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Abstract

Textiles and apparel industry with subsidiary industries have a significant impact on the environmental and social footprints on our planet, mainly driven by the depletion of resources and labour intensive practices. The manufacturing and distribution of textiles and apparel products are responsible for generating the largest carbon footprint throughout their value chains. Furthermore, the most of final products, specifically fashion items, are used only a number of times and then disposed of within the first year of use. This take-make-use-dispose model relies on the assumption that there is an endless availability of natural sources. In consideration of the resultant impacts of such a model of production and consumption on the environment and climate change, a global attempt to move towards a more sustainable pattern of development was asserted. In this paper, the current state of textile and apparel production is discussed with reference to the environmental impacts of each phase of the product life cycle. The matter is also reviewed in respect of responsible consumption and production which is the 12th goal of the United Nations Sustainable Development Goals. Both production and consumption of textiles and apparel have significant impacts on the environment and climate change. Environmental impacts in the production phase result from the cultivation and production of natural fibres such as cotton, hemp and linen (e.g. use of land and water, fertilisers and pesticides) and the production of synthetic fibres such as polyester and elastane [8]. Manufacturing textiles requires large amounts of energy and water and uses a variety of chemicals across various production processes. After clothing production, the distribution and retailing of apparel are based on worldwide operations and thus responsible for transport emissions and packaging waste. From the consumer point of view, the use phase of textiles and apparel is also liable for environmental impact due to the consumer care activities. A dramatic increase of fibre production in the last 60 years means also a dramatic increase in global textile waste. Reducing waste at the source, recovering and recycling of materials, and repairing and reusing apparel items appear to be simple actions to restrict possible impacts.

Keywords: Environmental impact, textiles, apparel, sustainability, sustainable fashion.

EFFECT OF ZINC FERTILIZER APPLIED AT DIFFERENT RATES ON THE GROWTH AND NITROGEN UPTAKE OF PEPPER (*Capsicum Annuum* L.) PLANTS IN CALCAREOUS AND ALKALINE SOIL

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Abstract

Micronutrients significantly enhance the healthy growth, yield, and quality of plants. Among micronutrients, zinc, in particular, plays a crucial role in the structure of many mechanisms that regulate the physiological functions of plants. These mechanisms, involving the regulation of functions such as nitrogen's impact on protein, carbohydrate, and energy transfer, make zinc more important as it directly influences both yield and quality. In this study, zinc sulfate ($ZnSO_4$) fertilizer was applied to the soil at different rates to examine its effects on nitrogen uptake and parameters directly influenced by nitrogen in pepper (*Capsicum annuum* L.) plants. The study comprised four treatments, including a control (without $ZnSO_4$ application), and three different rates of $ZnSO_4$ (4 – 8 - 12 kg da⁻¹) applied in 5 kg pots. The results showed that pepper plants grown in soils with different rates of zinc application significantly influenced LAI (Leaf Area Index), canopy, SPAD, leaf NO_3 content, pepper count, and total leaf N content ($P < 0.05$). In the study conducted in a high lime, alkaline soil, zinc application successfully increased both the growth and yield of pepper plants, as indicated by the parameters examined. In summary, this presentation will comprehensively discuss the responses of pepper plants to zinc application in a calcareous and alkaline soil.

Keywords: Zinc, Nitrogen, Pepper, LAI, SPAD

**EFFECT OF POTASSIUM APPLICATION ON THE UPTAKE OF SOME
AGRONOMIC AND MACRO PLANT NUTRIENTS OF THE CORN PLANT (*Zea Mays*
L.)**

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Abstract

Agricultural soils generally have a total potassium content ranging from 10 to 20 g kg⁻¹. Since a significant portion of potassium in the soil (90–98%) is incorporated into the crystal structure, it is not directly available to plants. Insufficient potassium in the soil significantly restricts both the growth and the quality and yield of plants. In our study, potassium application at different rates (0 – 80 – 160 – 240 – 320 mg K kg⁻¹) was conducted on maize plants under field conditions. Our results, based on the total element analysis of leaf tissues of maize plants, indicate that potassium application increased the uptake of both certain agronomic and macro-nutrient elements. The application of 240 mg K kg⁻¹ significantly increased the N and Mg content of the plant (P<0.05). The 80 mg K kg⁻¹ application significantly increased the P and Ca content, as well as the cob weight and stem diameter of the maize plant (P<0.05). The application of 160 mg K kg⁻¹ significantly increased the potassium content of the maize plant (P<0.05). While there were no significant changes in the leaf number and cob length of the maize plant, the application of 80 mg K kg⁻¹ significantly increased the cob weight (P<0.05). In summary, in this presentation, we will comprehensively explore the effects of foliar potassium application on both the agronomic and macro-nutrient element uptake in maize plants.

Keywords: Potassium, macro elements, corn plant, plant nutrition

**USING ELECTRODIALYSIS METHOD FOR RECYCLING TEXTILE
WASTEWATER: ADVANTAGES, CHALLENGES AND INDUSTRIAL
APPLICABILITY**

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Abstract

In recent years, water has become a limited resource and wastewater problems are increasing. For this reason, the textile industry is also going through an important transformation phase. Water saving, wastewater treatment and recycling are hot topics in the sector. In this study, it was aimed to examine the potential of the electro dialysis method for the recovery of textile wastewater. Electro dialysis is a system based on the separation of cations and anions under an electric field and is a technology that can purify wastewater and recover chemical substances. The electro dialysis method is a remarkable method as it not only recovers water but also recovers chemicals. Although the necessary criteria for the discharge of textile wastewater into nature are met with current practices, technologies for its reuse are still in the development stage. There are studies in the literature on subjects such as dye, salt, acid/base, pure water recovery, color removal and electricity production from textile wastewater based on the electro dialysis method, but there are a limited number of studies. The results obtained in these studies are promising. However, there is a need to conduct different and more scientific studies on this subject, especially on real wastewater and integrated processes. From an industrial perspective, the electro dialysis method is an advantageous method in that it allows the recovery of chemicals along with wastewater recycling and provides material and cost savings with its benefits such as electricity generation potential. However, the industrial applicability of electro dialysis faces some challenges. Particularly in large-scale operations, energy consumption and operating costs can be a significant issue. The need for optimization for continuous operation, contamination effects, high initial installation and operating costs, and the handling of complex chemical components in the electro dialysis process are also major challenges. These factors may restrict widespread adoption of the method and limit its use in the industrial field. In conclusion, considering the advantages and challenges in the current situation, further and advanced studies and improvements are required to optimize the method and make the role of electro dialysis in the textile industry more effective.

Keywords: Textile wastewater, electro dialysis, wastewater recycling, wastewater treatment.

**BIOLOGICAL IMMORTALITY AND ETHICAL ISSUES: AN ANALYSIS BASED ON
THE IMMORTAL FAMILY NOVEL**

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Abstract

Death and immortality are universal topics that have been the subject of deep thought and debate throughout human history. Death is often filled with uncertainty for people. There are various beliefs and meanings about death in different cultures, religions, and philosophical systems. The immortality we discuss here is the biological immortality in which people will live forever while preserving their biological integrity. Biological immortality refers to the capacity of organisms to halt or reverse cellular aging processes. Some ethical problems may arise with biological immortality. These include many important issues, such as individuals' right to life, distribution of resources, social order and equality, human relations, existential meaning, and emotional and psychological effects. Because the idea of immortality goes beyond being just a biological issue, it is also related to the fundamental values of humanity. The novel *Immortal Family*, written by Natalie Babbit, is about the life story of a family who unknowingly drinks the water of immortality and the choice of Winnie, a young girl who learns the family's secret: between dying or being immortal. Family members hide the water of immortality from everyone because they fear it will cause ethical problems. We aim to discuss death, immortality, and the ethical problems that immortality may bring in the context of religious philosophy and philosophers' views based on the novel *Immortal Family*. As a result, Winnie, who questions her existential meaning, chooses not to drink the water of immortality and decides to be mortal, which shows that life has no meaning without death. Biological immortality has been criticized through Winnie's decision about mortality and the ethical problems that immortality may bring.

Keywords: Philosophy of religion, death, immortality, ethical issues, immortal family.

GÜNEYDOĞU ANADOLU BÖLGESİ KABA VE KESİF YEM ÜRETİM POTANSİYELİ

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Özet

Ülkemizde çiftlik hayvanlarının yaşam ve üretim payı için gereken kaliteli kaba yem ihtiyacının karşılanamadı ve ortaya çıkan bu açığın düşük kaliteli kaba yemlerle kapatılmaya çalışılması herkes tarafından kabul görülmüştür. Hayvancılığı gelişmiş ülkelerde toplam tarla arazisinin ortalama %25-30 unda yem bitkileri yetiştiriciliği yapılırken ülkemizde bu oran %13,6 dolaylarındadır. Türkiye'de üretilen 29,6 milyon ton kaliteli kaba yem 17,1 milyon hayvan birimi (HB) varlığının yaşam payı ihtiyacının % 37,6'sını karşılamaktadır. Türkiye'de kaba yem açığı yaklaşık 49 milyon ton seviyelerindedir. Dolayısı ile arzu edilen kaliteli kaba yem üretim hedefine ulaşabilmek için; Pazarın talep ettiği miktar ve kalitede üretimi sağlamak, maliyetlerin azaltılması ve fiyat istikrarı, dışa bağımlılığın azaltılması, mevzuatın düzenlenmesi, etkinliği artırılmış destekleme modellerinin uygulanması, sektörel yapının düzenlenmesi ve işletmelerin güçlendirilmesi, mera geliştirme ve mera yönetimi uygulamalarının uygulanması gerekmektedir. Ülkemizde kesif yem üretiminde ; hayvan varlığının artması ve üreticilerin daha fazla bilinçlenmesi nedeni ile yukarı yönlü bir artış görülmektedir. Nitekim 2001 yılında 5,2 milyon ton olara kesif yem üretimi 2019 yılında 24,9 milyon ton seviyelerine ulaşmıştır.

Anahtar Kelimeler: Güneydoğu Anadolu Bölgesi, Kaba yem, Kesif Yem, Yem üretim kapasitesi

**ROUGHAGE AND CONCENTRATE FEED PRODUCTION POTENTIAL OF
SOUTHEASTERN ANATOLIA REGION**

Abstract

In our country, the need for quality roughage required for the life and production share of livestock could not be met and it has been accepted by everyone that this deficit is tried to be closed with low quality roughage. In countries with developed animal husbandry, forage crops are cultivated on an average of 25-30% of the total land area, while this rate is around 13.6% in Turkey. The 29.6 million tons of quality roughage produced in Turkey meets 37.6% of the life share needs of 17.1 million animal units (HB). The roughage deficit in Turkey is approximately 49 million tons. Therefore, in order to reach the desired quality roughage production target; it is necessary to ensure production in the quantity and quality demanded by the market, to reduce costs and price stability, to reduce foreign dependency, to regulate the legislation, to implement support models with increased efficiency, to regulate the sectoral structure and to strengthen the enterprises, to implement pasture development and pasture management practices. In our country, there is an upward increase in concentrate feed production due to the increase in the number of livestock and greater awareness of producers. As a matter of fact, concentrate feed production, which was 5.2 million tons in 2001, reached 24.9 million tons in 2019.

Keywords: Southeastern Anatolia Region, Roughage, Compound Feed, Feed production capacity

IMPROVING ORGANIC POULTRY PRODUCTION: LEGAL REGULATIONS AND CURRENT STATUS

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Abstract

Organic poultry farming appears as a rapidly developing sector, especially in the United States (US) and European Union (EU) countries, because of its great potential for development and to achieve high health and welfare standards. National and international regulations and standards are used for organic poultry farming. In all EU countries, The European Commission Regulation (EC) no 889/2008 regulates the organic farming, although public regulations (BioSwiss, France Regulation) and private standards (Demeter, Naturland, Bioland) may have developed additional, with more restrictions. Other than these, America's National Organic Program 'NOP', Japan's Japanese Agricultural Standards 'JAS' regulations are the most followed regulations. Türkiye is also among the countries that have its own organic agriculture regulation (TR-27676/2010) and this regulation is updated to be equivalent to the EU. Because organic dried fruits, vegetables and olive oil are exported from Türkiye to EU countries and the US. Organic poultry must have access to the outdoors, shelter, exercise areas, fresh air, clean drinking water, shade, and direct sunlight--suitable for the animal's stage of life, climate, and environment. Animals need to express their natural behaviors to maintain good health. The aim of this study is to show the current situation in countries where organic poultry farming is developed and in Turkey. In addition, the legal regulations in organic poultry farming will be discussed under the subheadings of animal selection and conversion period, poultry houses, animal health and welfare, management, feeds and feed additives. Suggestions will be made to adopt the challenges in fulfilling the regulations.

Key words: Organic, poultry, standards, regulations.

AGRICULTURE 4.0 APPLICATIONS IN POULTRY PRODUCTION

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Abstract

Agriculture 4.0 technologies offer a compelling alternative in poultry production, providing more efficient, sustainable, and economically advantages. Soon, all of us will explore how the integration of IoT applications, data analytics, robotics, and automation can revolutionize the poultry farming landscape, mitigating existing challenges and laying the foundation for a more resilient and productive industry in near future. As the demand for poultry products surges globally and concerns regarding sustainability and environmental impact intensify, there is a pressing need for a paradigm shift in poultry farming practices. Conventional methods, while longstanding, face limitations in meeting the burgeoning demand while maintaining ecological balance. Positioned at the intersection of technological innovation and traditional husbandry practices, these applications aspire to mitigate endemic challenges in conventional poultry farming, encompassing disease management, resource allocation inefficiencies, and ecological ramifications. Agriculture 4.0 in poultry production will give more opportunities to poultry producers in new decade.

Keywords: Agriculture 4.0, poultry production, artificial intelligence, robotics.

HAVA ÖRNEKLERİNDEKİ UÇUCU ORGANİK BİLEŞİKLERİN METAL ORGANİK KAFES YAPILAR İLE TAYİNİ

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Özet

Katı faz mikroözütleme tekniği (SPME), uçucu organik bileşiklerin (UOB) analizinde yaygın olarak kullanılan yöntemlerden biridir. Hedeflenen bileşiklere göre SPME fiberinin adsorban malzemeleri değiştirilerek daha duyar sonuçlar elde edilebilir. Ticari fiberlerin sınırlı ömürleri, hedeflenen analitlere karşı düşük seçicilikleri ve yüksek maliyetleri gibi dezavantajları nedeniyle yeni fiberlerin geliştirilmesi çok önemli bir konudur. Bu çalışmada, iç ortamlarda benzen, toluen, etilbenzen ve ksilenlerin (BTEX) tayini için metal organik kafes yapılar ile hazırlanan yeni SPME fiberlerinin geliştirilmesi amaçlanmıştır. MOF kaplı SPME fiberin fiziksel ve kimyasal karakterizasyonu Fourier Dönüşümlü Kızılötesi Spektroskopisi (FTIR), Termogravimetrik Analiz (TGA), X-Işını Kırınım Yöntemi (XRD) ve BET (Brunauer-Emmett-Teller Yöntemi) ile yapılmıştır. MOF kaplı fiber tarafından hava numunelerinde BTEX'in belirlenmesi için yöntem geliştirilmesi çalışmaları gaz kromatografisi-kütle spektroskopisi (GC-MS) ile gerçekleştirildi. Desorpsiyon sıcaklığı ve süresi, adsorpsiyon süresi, adsorpsiyon sıcaklığı ve numune hacmi gibi yöntem parametreleri optimize edildi. Optimum desorpsiyon sıcaklığı ve süresi 250°C ve 3 dakika olarak bulundu. Örnekleme aşamasından önce SPME fiberinin 250°C'de 15 dakika şartlandırılması gerektiği bulunmuştur. Optimum adsorpsiyon süresi ve numune hacmi sırasıyla 10 dakika ve 1 L olarak bulunmuştur. Deneysel sonuçlar, geliştirilen fiber ile BTEX örneklemesinin 15°C ile 35°C arasında yapılabileceğini göstermektedir. Nem, BTEX'in tespit edilmesinde ciddi bir engelleyici etkiye sahiptir ve bu nedenle etkin bir şekilde kontrol edilmelidir. Optimum koşullar altında, hedeflenen bileşiklerin kalibrasyon eğrileri oluşturulmuş ve saptama limiti (LOD), lineer aralık, gün içi ve günler arası tekrarlanabilirlik ve ayrıca fiberden fibere tekrarlanabilirlik gibi validasyon parametreleri 12,4 - 48,3 µg/m³, 41,3-17660 µg/m³, %2,66-4,05, %3,77-6,34 ve %7,51-11,17 olarak bulunmuştur. Geliştirilen yöntemle iç ortam havasında BTEX analizi kabul edilebilir geri kazanım değerleri ile başarıyla gerçekleştirilmiştir.

Anahtar kelimeler: Metal organik kafes yapılar, BTEX, katı faza mikroözütleme fiberi, iç ortam hava analizi

DETERMINATION OF VOLATILE ORGANIC COMPOUNDS IN AIR SAMPLES BY METAL ORGANIC FRAMEWORKS

Abstract

The solid phase microextraction technique (SPME) is one of the widely used methods in analyzing of volatile organic compounds (VOC). According to targeted compounds, more sensitive results can be obtained by changing the adsorbent materials of the SPME fiber. Therefore, the development of new fibers is a very important issue, due to the disadvantages of commercial ones such as their limited lifetime, low selectivity to targeted analytes and also high cost. This study aimed to the development of new SPME fibers prepared with metal-organic frameworks for determining benzene, toluene, ethylbenzene and xylenes in the indoor environment. Physical and chemical characterization of metal organic frameworks coated SPME fiber were performed by Fourier Transform Infrared Spectroscopy (FTIR), Thermogravimetric Analysis (TGA), X-Ray Diffraction Method (XRD) and BET (Brunauer-Emmett-Teller Method) methods. The development of a method for the determination of BTEX in air samples by MOF-based fiber was performed by gas chromatography-mass spectroscopy (GC-MS). Method parameters such as desorption temperature and time, adsorption time, adsorption temperature and sample volume were optimized. The optimum desorption temperature and time were found as 250°C for 3 min. It was found that the SPME fiber should be conditioned for 15 minutes at 250°C before the sampling step. The optimum adsorption time and sample volume were found as 10 min and 1 L, respectively. Experimental results show that the sampling of BTEX by developed fiber can be performed between 15°C and 35°C. Humidity has a serious interfering effect on the determination of BTEX and so it should be controlled effectively. Under optimum conditions, calibration curves of targeted compounds were performed and validation parameters such as limit of detection (LOD), linear range, intraday and interday repeatability, and also fiber-to-fiber reproducibility were found as 12.4 µg/m³ to 48.3 µg/m³, 41.3-17660 µg/m³, 2.66-4.05%, 3.77-6.34% and 7.51-11.17%. The analysis of BTEX in indoor air was successfully carried out with the developed method with acceptable recovery values.

Keywords: Metal organic frameworks, BTEX, solid phase microextraction fiber, indoor air analysis

INFLUENCE OF WEB-BASED INSTRUCTIONAL SOFTWARE ON SECONDARY SCHOOL STUDENTS ATTITUDES TOWARDS BIOLOGY IN KATSINA ZONAL QUALITY ASSURANCE, KATSINA STATE.

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Abstract

This study examined the impact of web-based instructional software on the attitudes of secondary school students toward the subject of biology in the Katsina Zonal Quality Assurance region. The research was guided by two key research questions and a corresponding null hypothesis. To conduct this investigation, a survey research design was employed. The study encompassed all senior secondary school students within the Katsina Zonal Quality Assurance region, totaling 15,420. For the research, a sample size of 375 students was selected using a combination of cluster and simple random sampling techniques respectively. Data was collected using a questionnaire named the "Biology Student Attitude Questionnaire (BSAQ)," which consisted of two sections: demographic information and response sections. The content validity of the instrument was ensured and its reliability was assessed through a pilot test in a secondary school outside the sample. The instrument demonstrated good reliability, with a Cronbach's Alpha Reliability Coefficient of 0.79. Data was analyzed using descriptive statistics, specifically mean and standard deviation, to address the research questions. To test the null hypothesis, a Mann-Whitney Independent test was employed. The study's results revealed that gender significantly influences students' attitudes towards web-based instructional software when learning biological concepts. Consequently, the null hypothesis was rejected. The study's findings contribute to our understanding of the influence of web-based instructional software on students' attitudes toward biology. It is recommended that biology teachers in all secondary schools within the Katsina Zonal Quality Assurance region consider integrating web-based instructional software to positively impact students' attitudes towards biological concepts.

Keywords: Web-based Instruction, Students attitude and Biology.

**CROSS-SECTIONAL STUDY, ANALYSIS OF ANTIBIOTIC RESISTANCE TESTS
FROM NASOPHARYNGEAL SWABS AMONG BROILER PRODUCTION WORKERS
IN AZERBAIJAN, 2023**

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Abstract

Salmonella is an important food safety issue. Many researchers have shown that antibiotic-resistant Salmonella strains were detected in poultry production. This increase in the resistance of Salmonella to antibiotics is a major threat to human health.[6-7]A publication from Brazil “indicated that Salmonella ser. Minnesota is the second most common serotype in poultry carcasses in Brazil, in both 2014 and 2017, accounting for 11.6% (17/146) and 23.3% (38/163) of isolates, respectively.” Of the 204 biochemically identified Salmonella isolates, 152 were molecularly confirmed as Salmonella through PCR detection of the invA marker gene [8]. Another study conducted on 200 frozen chicken carcasses in Egypt showed that almost all of the 11 Salmonella species detected were resistant to antibiotics and classified as pan-drug resistant, extensively drug-resistant (XDR), or multi-drug resistant (MDR). [9] Chicken livers were contaminated with MDR S. Anatum and included serovars that could be extremely dangerous to human health, according to a study conducted in small-scale poultry processing plants in Cairo and Giza governorates, Egypt[10].The widespread use of ARB in production and the damage to the environment once again emphasizes that this issue is a global problem.[14] When looking for alternative treatments to reduce the use of antibiotics in poultry, additional scientific articles show that flora-introducing factors that affect gut flora's health may reduce the need for antibiotics. Material and Methods The samples (2355) were collected from 19 small and large commercial farms persons between September-October 2023. The samples were processed in the bacteriology laboratory of the Azerbaijan Poultry Company. Different mediums (TSB, TSA, Mueller-Hinton Agar, and MacConkey Agar) were used for isolation and counting the number of colonies.2355 nasopharyngeal swabs were taken from the broiler production workers and bacteriological research was carried out.Cefotaxime, Ceftriaxone, Cefapim, Rifampicin, Vankomicin, Levofloksacin, Oflaksacin, Levofloksacin, Erytromycin, Oleandomycin, Arithromycin, Claritromycin, Chloramphenicol, Clindamicin, Tetracycline, Benzilpenicillin, Ampicillin antibiotic discs were used for identification to AMR ability to isolated Staphylococcus aureus. and E.coli.Results The acquired results showed that 558 (13%) personnel were found to have E.coli, 732 (17%) personnel were found to have Staphylococcus aureus. The results of the antiprogram tests are as follows: sensitivity to 1-2 antibiotics (10-12%) from 16 antibiotic groups, and resistance to others (88-90%) was observed.During the survey, it was found that the use of antibiotic groups with resistance was at a non-existent level, but more than 3-4 times chicken meat was used in the diet per week.

Conclusion Antibiotics used in chicken production not only created persistent outbreaks of *Salmonella* spp and other microorganisms in chickens, but also created resistance to a wide range of antibiotics in humans, causing a serious impact on health.

I would call it "The Silent Weapon against Humanity".

Key words: salmonella, serotype, pan-drug resistant, extensively drug-resistant (XDR)

ESSENTIAL AND POTENTIALLY TOXIC METALS IN TRADITIONAL SWEETS IN PAKISTAN: EXPOSURE ASSESSMENT AND HUMAN HEALTH IMPLICATIONS

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Abstract

In recent years, there has been a growing concern about the negative impact of unforeseen contaminants like metals in commonly consumed food items, posing a threat to human well-being. The goal of the current research is to determine the levels of essential (EMs: Mg, Ca, Mn, Fe, Co, Cu, Zn) and potentially toxic metals (PTMs: Al, Cr, Ni, As, Cd and Pb) in various brands of wheat-based sweets. Also, the current study was to investigate the distribution, correlation and multivariate analysis of 13 metals (Mg, Ca, Mn, Fe, Co, Cu, Zn, Al, Cr, Ni, As, Cd, and Pb). Hierarchical cluster analysis (HCA) and principal component analysis (PCA) were used to interpret the metals association. The concentration (mg/kg) range of EMs were in order Mg (12.70-65.67), Ca (24.02-209.12), Mn (1.32-9.61), Fe (4.55-111.23), Co (0.32-8.94), Cu (2.12-8.61), and Zn (2.60-19.36). While, the concentration (mg/kg) range of PTMs were in order Al (0.32-0.87), Cr (0.17-5.74), Ni (0.36-1.54), Cd (0.16-0.56), and Pb (0.14-0.92), whereas As was not detected in any sample under investigation. The HCA data revealed that the Co, Al and Ni form the cluster with other metals. Tolerable dietary intake (TDI) values for Ni was higher than the value established by European Food Safety Authority (EFSA). The CR value found for the Ni and Cr at threshold level of cancer risk if used an amount of 25 g throughout the life time period. In nutshell, this study highlights the monitoring of EMs and PTMs levels in wheat-based sweets and from food safety perspective, the study is important for users of wheat-based sweets.

Keywords: Food safety, Metal toxicity, Chemometric approach, Daily intake, Human health risk

**THE PRODUCTION OF THE GASOLINE WITH HIGH QUALITY WITH HIGH
OCTANE NUMBER BY THE USE OF THE BIFUNCTIONAL CATALYST Pt / Re IN
THE CATALYTIC REFORMING PROCESS.**

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Abstract

The original function of the process of platforming is to develop heavy naphtha (HSRN), coming from the atmospheric unit of distillation with a weak octane number (NO = 44), to obtain a mixture of fuels whose octane number is raised by catalytically supporting specific groups of chemical reactions. The installation is divided into two sections: Section hydrobon. Section platforming. The raffinate coming from the bottom of column 12C2 to feed the section platforming, is divided into two parts whose flows are controlled and mixed with gas rich in hydrogen. Bottom of the column, we obtain stabilized reformat which is aspirated by a pump to ensure the heating of the column whereas a part is sent towards storage after being cooled by the air cooler and the condenser. In catalytic reforming, there is voluntarily associated a hydrogenating function - dehydrogenating, brought by platinum deposited, with an acid function brought by the alumina support (Al₂O₃). The mechanism of action of this bifunctional catalyst depends on the severity of the operation, of the quality of the load and the type of catalyst. The catalyst used in the catalytic process of reforming is a very elaborate bifunctional catalyst whose performances are constantly improved thanks to the experimental research supported on an increasingly large comprehension of the phenomena. The American company Universal Oil petroleum (UOP) marketed several series of bimetallic catalysts such as R16, R20, R30 and R62 consisted of Platinum / Rhenium on an acid support consisting of the alumina added with a halogenous compound (chlorine).

Keywords: Platforming, Amelioration, Octane Number, Catalyst.

**THE POLLUTION OF THE SEA WATER BY THE WASTE FROM THE L.N.G. PLANT
ARZEW-ALGERIA AND THE WASTE WATER PURIFYING SYSTEM**

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Abstract

Generally, the pollution makes a lot of problems for the environment. The natural gas (N.G.) is a compound of the light hydrocarbons, methane, ethane, propane, butane and other trace elements, like Helium, Nitrogen, Carbon Dioxide and others. After the different zones of the natural gas treatment, a problem of pollution of water is appeared. In this plant there are eight zones, six units of process, one for the energy production and another for the storage. It exists a system to treat all the effluents contamination coming from these zones. The treatment of this waste water consists in the separation of the oil and the sludge to satisfy the standard environmental protection. There are six separators, pools of concrete are connected with a collector for supply which is connected with each separator by three conduits. A diffusion apparatus is put in front of every nozzle of entry in the separator, and this is for a suitable distribution of the liquid in the separator. In reason of the decrease speed of the liquid when it passes through the separator, the particles carried, deposit in the bottom of the separator. The suspended matters are collected by a chain collector. The float matters up the liquid of the separators, mainly oils, are removed through the creaming tubs.

Keywords: Pollution, waste water, oils, separator.

THE STUDY OF THE WATER POLLUTION IN THE WEST OF ALGERIA

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Abstract

One of the objectives of a modern society is the improvement of the living conditions of the Man. If one goes up the course of the centuries, the history teaches us that the water pollution accompanied all civilizations and that it was always a concern for the legislator until the beginning of the century. Nature, thanks to its intrinsic capacities of regeneration managed to overcome the misdeeds of the man. The pollution developed because of the concentration of the population and the development of her industrial activities. Another time, the pollution water was primarily of organic nature biodegradable never not exceeding the purifying capacities car of the rivers, but the industrial evolution contributed to the marketing . Molecules polluting, that micro the organizations cannot always metabolize and of which some constitute a danger to the Man and his environment. An awakening of an alarming situation as regards quality of water dates from the Seventies. All the types of water were concerned, the subsoil waters, until there with the shelter, are also reached and from now on, one does not cease speaking about nitrates, micro mineral and organic pollutants. Vis-a-vis with this very critical situation at the same time for the health of the man and the environment, the resources water; a vast program of prevention and fight launched out to Algeria in the Seventies/80 and which aimed, the construction of several stations of purification in the most important cities, generally of a size higher than 20. 10' living Following an assessment of this effort of investment established in 1989, it appears clearly that objectif stations of purification was unfortunately not reached but on the contrary the situations developed well , then it appears very important to us to draw up through this modest work, a point of topicality on the state of the quality of water in our area of West of Algeria, with an analysis of the causes of the pollution and the search for the solutions to decrease by its impact.

Keywords: Water Resources , Pollution Sources , Protection , Purifying .

**PGPR-PRESS MUD APPLICATION TO IMPROVE OKRA GROWTH AND
DEVELOPMENT IN CHROMIUM CONTAMINATED SOIL**

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Abstract

Chromium is classified as a dangerous heavy metal. Elevated quantities of chromium have been found to disrupt metabolic processes in plants, animals, and humans. Plant Growth-Promoting Rhizobacteria (PGPR) play a significant role in various aspects of plant biology, including seed germination, enhancement of growth, facilitation of metabolic activities, and involvement in numerous physiological processes within plants. The inclusion of press mud in soil serves as a substrate for microbial organisms. Plant growth-promoting rhizobacteria (PGPR) have the ability to transform the highly poisonous hexavalent chromium (Cr (VI)) into a less harmful trivalent chromium (Cr (III)). The purpose of this investigation was to determine the reducing potential of pre-isolated rhizobacteria and their impact on enhancing plant development and physiological characteristics. Prior to sowing, the soil obtained from the designated research location was artificially contaminated with a concentration of 20 mg kg⁻¹ of hexavalent chromium (Cr (VI)). This contamination was achieved by introducing potassium dichromate (K₂Cr₂O₇) salt into the soil. The findings of the study indicate that the presence of Cr (VI) had a strong inhibitory effect on the shoot length, root length, and photosynthetic rate of okra, resulting in reductions of up to 19%, 37%, and 31% correspondingly. Nevertheless, the process of inoculation has been seen to result in a reduction in the absorption of Chromium (VI) in both the root and shoot by approximately 37% and 31% respectively. Similarly, the application of press mud has been found to lower the uptake of Chromium (VI) in the root and shoot by approximately 33% and 20% respectively. The simultaneous utilization of inoculation and press mud effectively mitigated the adverse effects of chromium, resulting in plant development that was comparable to the polluted treatment without inoculation.

Keywords: Metal contamination; Rhizobacteria; Eco-Friendly; soil health

**STUDY OF CERTAIN PHYSIOLOGICAL-BIOCHEMICAL PROCESSES IN BARLEY
SPROUTS ETIOLATED AND KEPT IN DAYLIGHT AT DIFFERENT TIME
INTERVALS**

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Abstract

Certain physiological-biochemical processes were comprehensively studied in the etiolated barley sprouts grown in water culture under daylight conditions at different time intervals. The amount of photosynthetic pigments (Xla, Xlb, carotenoids) in 7-day-old barley sprouts grown in water culture under daylight conditions (1-3-6-12-18-24 hours) is found by the spectrometric method to be sharply increased. During the transition of plant sprouts from heterotrophic nutrition to phototrophic nutrition, the amount of oxygen in the root system of sprouts was determined by the polarographic method in order to study the dependence of the respiration rate on the amount of carbohydrates. It was found that as the duration of daylight increases, the absorption of oxygen in the root system of sprouts increases along a straight line compared to etiolated sprouts. This can be attributed to the activation of the alternative respiration pattern after daylight. The rate of oxidation processes in the cell is limited among other factors by the amount of the substrate - reduced products. It was found by photocolometric method that the reduction activity in the root system of sprouts increases dramatically as the daylight duration increases. In order to clarify the nature of respiration rate in plant roots under the impact of external environmental factors, the activity of alternative enzymes of the respiratory cycle - peroxidase and catalase was determined by spectrophotometric method. It is known that the activity of peroxidase in the root system of sprouts increases as the period of daylight increases. A positive correlation was found between the increase in the amount of photosynthetic pigments and the respiration rate, reduction activity and peroxidase activity of the sprouts. The activity of catalase weakened as the daylight duration increased. This can be attributed to the peroxidase function of catalase.

Key words: daylight, photosynthetic pigments, reduction activity, peroxidase, catalase.

**EFFECT OF LIPID-BASED MULTIPLE MICRONUTRIENTS SUPPLEMENTATION
IN UNDERWEIGHT PRIMIGRAVIDA PRE-ECLAMPTIC WOMEN ON MATERNAL
AND PREGNANCY OUTCOMES: RANDOMIZED CLINICAL TRIAL**

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Abstract

Background and Objectives: In pre-eclampsia, restricted blood supply due to the lack of trophoblastic cell invasion and spiral artery remodeling is responsible for adverse pregnancies and maternal outcomes, which is added to by maternal under nutrition. This study was designed to investigate the effects of lipid-based supplements (LNS-PLW) on pregnancy and maternal outcomes in underweight primigravida pre-eclamptic women. **Materials and Methods:** A total of 60 pre-eclamptic, underweight primigravida women from the antenatal units of tertiary care hospitals in the Khyber Pakhtunkhwa Province, Pakistan, were randomly divided into two groups (Group 1 and Group 2). The participants of both groups were receiving routine treatment for pre-eclampsia: iron (60 mgs) and folic acid (400 ug) IFA daily. Group 2 was given an additional sachet of 75 gm LNS-PLW daily till delivery. The pregnancy outcomes of both groups were recorded. The clinical parameters, hemoglobin, platelet count, and proteinuria were measured at recruitment. **Results:** The percentage of live births in Group 2 was 93% compared to 92% in Group 1. There were more normal vaginal deliveries (NVDs) in Group 2 compared to Group 1 (Group 2, 78% NVD; group 1, 69% NVD). In Group 1, 4% of the participants developed eclampsia. The frequency of cesarean sections was 8/26 (31%) in Group 1 and 6/28 (22%) in Group 2. The number of intrauterine deaths (IUDs) was only 1/28 (4%) in Group 2, while it was 2/26 (8%) in Group 1. The gestational age at delivery significantly improved with LNS-PLW supplementation (Group 2, 38.64 ± 0.78 weeks; Group 1, 36.88 ± 1.55 weeks, p-value 0.006). The Apgar score (Group 2, 9.3;

Group 1, 8.4) and the birth weight of the babies improved with maternal supplementation with LNS-PLW (Group 2, 38.64 ± 0.78 weeks; Group 1, 36.88 ± 1.55 ; p-value 0.003). There was no significant difference in systolic blood pressure, while diastolic blood pressure (Group 2, 89.57 ± 2.08 mmHg; Group 1, 92.17 ± 5.18 mmHg, p-value 0.025) showed significant improvement with LNS-PLW supplementation. The hemoglobin concentration increased with the LNS-PLW supplement consumed in Group 2 (Group 2, 12.15 ± 0.78 g/dL; Group 1, 11.39 ± 0.48 g/dL, p-value < 0.001). However, no significant difference among the platelet counts of the two groups was observed. Conclusions: The pregnancy and maternal outcomes of underweight pre-eclamptic women can be improved by the prenatal daily supplementation of LNS-PLW during pregnancy, along with IFA and regular antenatal care and follow-up. Registration: ISRCTN15485068, April 2018:<https://doi.org/10.1186/ISRCTN15485068>.

Keywords: pre-eclampsia; lipid-based nutritional supplements; pregnancy outcome; maternal outcome; Khyber Pakhtunkhwa Province of Pakistan

**EFFECT OF DURATION OF USE OF COMBINED ORAL CONTRACEPTIVES ON
SERUM LIPID PROFILES, FASTING BLOOD SUGAR, BLOOD PRESSURE AND BMI
IN CHILD BEARING AGE WOMEN**

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Abstract

Combined Oral Contraceptives Pills (COCs) are effective and widely used method for contraception. There is a positive relationship between COCs and lipid and carbohydrate metabolism in previous studies. We have seen the effect of duration of COCs (0.3mg norgestrel and 0.03mg ethinyl estradiol) used in tertiary care hospitals of Peshawar Khyber Pukhtunkhawa Pakistan on the lipid and carbohydrate metabolism in women taking combined oral contraceptives. Study Design: This cross sectional analytical study included 100 participants women of child bearing age 14-49yrs using COCs divided in three groups according to the duration of use group A at least 6 month COCs users, group B were 1 year COCs users , group C more than 1 year COCs users. Serum Total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C), fasting blood sugar(FBS) were determined by using standard colorimetric techniques BMI and BP were also measured in all subjects. Results: we estimated the effect of duration of use of combined oral contraceptives on the levels of different biochemical parameters. Their levels were found gradually increasing from 6months to those who are using it for 1 year and more than 1 year. The results showed significant elevation of cholesterol (p-0.0003), HDL-C (p-0.0229), LDL-C (p-0.0271), VLDL-C (p- 0.0004), Triglycerides (p- 0.0006) levels in the group of more than 1 year users females when compared with 6 months users. Conclusion: The levels of cholesterol, HDL, LDL, VLDL and Triglyceride levels were found to be increased with the duration of use in the women of child bearing age of KP province of Pakistan.

Keywords: Combined Oral Contraceptives Pills, lipid profile, BMI, Contraceptives

**A PLAYFUL APPROACH TO THE ASSESSMENT OF PUBLIC TRANSPORTATION
IN SIDI ABDELLAH**

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Abstract

Public transportation is a system with multidimensional challenges, and traditional evaluation methods may fall short in capturing the diverse experiences of its users, limiting thereby the understanding of the full depth of its complexity. It is conceivable that the generated knowledge and solutions based on those methods may not adequately address the problems of public transportation. Therefore, our research introduces a new instrument designed not only to collect data but also to create an interactive and enjoyable experience for the participants. This is an attempt to explore more viable evaluation methods capable of producing a better understanding of the complexity of public transportation. The methodological foundation of this study is based on the analysis of various documents and cartographic data about the new city of Sidi Abdellah (in Algeria) and leading interviews with various stakeholders. This process allowed us to design and implement a comprehensive playful survey instrument. By incorporating a playful approach in the design of this survey, we aim to enhance participants involvement and acquire elicited responses to the nuanced complexities of public transportation. The analysis of the data currently collected will enable the identification of primary focus areas for the development of public transportation in the new city of Sidi Abdellah, ultimately improving the quality of life for 60% of its citizens who use public transportation for daily commuting. Furthermore, this study contributes to enhancing knowledge related to the impact of playfulness on the development of public transportation and urban planning in general, enabling a more holistic understanding of urban systems complexities.

Keywords: Playful survey, Sidi Abdellah, Public Transportation.

**THE MOST COMMON COLEOPTERS FROM THE SCARABIDA FAMILY WHICH
ARE TRANSITIONAL HOSTS OF MACRACANTARCHYNCHOSIS**

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Abstract

Macracanthorhynchosis is a parasitosis caused by the acanthocephalus *Macracanthorhynchus hirudinaceus*. Parasites are 10-30cm long and 4-10mm wide (depending on sex). They parasitize in the small intestines of pigs and can infect many species of mammals, including humans. Females lay oval eggs, 60-100 micrometers long and 50-56 micrometers wide, which reach the external environment through feces. They contain an embryo surrounded by four membranes and armed with several small hooks. Their further development takes place in transitional hosts - coleopterans from the Scarabaeidae family. These are most often the beetles *Melolontha melolontha* and *Melolontha vulgaris*, the rose beetle - *Cetonia aurata*, the marble beetle - *Polyphylla fullo*, the may beetle - *Anomala vitis*, the rolling *Scarabeus (Ateuchus) sacer*, the rue beetle - *Tropinota (Epicometis) hirta* Poda, the wheat beetle - *Anisoplia segetum*, *Amphimallon solstitialis*, *Phyllophaga vehemens* and others. Coleoptera infection occurs in the larval stage. Scarabidae larvae have mouthparts adapted for nibbling that are basically the same as adults. When the scarab larvae eat the eggs of the *macracanthorhynchus*, which have reached the soil with the excrement of the pigs, larvae (acanthor) are released from them in the digestive tract, which soon attach themselves to the wall of the intestine with their hooks. The acanthor fully develops in 5-20 days, becoming the developmental form known as the acanthella. In this form it becomes a parasite of scarab larvae feeding and growing and developing to the cystacanth stage which is infective to the true hosts. They remain in that stage throughout the entire metamorphosis of the coleoptera. Pigs are most often infected by larval forms of Scarabaeids. The larvae live in the ground at a depth of 12-15 cm, and pigs come to them while digging in search of food. Pigs can also become infected with scarab adults during their unhygienic or grazing diet.

Keywords: Coleoptera, Scarabaeidae, *Macracanthorhynchus hirudinaceus*, .

**ASSESSING THE USE OF ICT AMONG HIGH SCHOOL TEACHERS IN THE 21ST
CENTURY**

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Abstract

The unprecedented changes experienced in the fields of education are signs brought by the evolving trends of information and communication technology (ICT). These dynamic innovations have immensely impacted vivid developments in school system but are yet to take firm footholds on Teacher Education. Despite all of the foregoing, findings have revealed that many Teachers were unable to use these Technologies to impact knowledge within the four walls of the classroom and other teaching and learning environments. This paper is a content review of the use of ICT among High School Teachers as it applies to the 21st Century Teaching and learning Structure. Questionnaires were drafted and given to 60 respondents using online Google form questionnaire instrument. The responses were collated and subjected to reliability analysis. Conclusively, recommendations were made to Government, School Administrators and other stake holders in educational sectors.

Keywords: Competency, ICT, Technology, Teacher, 21st Century

STUDY OF THE EFFECTS OF EMOTIONAL STRESS ON SIMPLE SENSORIMOTOR RESPONSE TIME

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Abstract

The examination period is a very strong psychoemotional stress factor for applicants, and the functional state of the body changes under the influence of this stress. Currently, final exams are held by the State Test Center through the common testing system. Unfortunately these exams are not held in the school where applicants study, which creates an additional stress situation. The tension is created not just by the upcoming final exams, but also with preparation to pass the exams for higher education schools, and test exams. So all of these are strong stress factors for applicants. Taking into account all of these, the purpose of our research was the development of emotional tension and to study simple sensorimotor reaction time for the applicants in the process of preparing for the general test exams to be held in the final 11th grade of secondary schools and also passing exams for admission to higher education schools. As a result, we investigated the effect of the exam preparation process on the students' emotional state, as well as the effect of emotional stress on the simple sensorimotor response time and obtained statistically reliable results. Simple sensorimotor response time was determined by computer method along with sound signal. The emotional state evaluation methodology was developed by A. Wesman and D. Ricks. Our research was conducted based on this methodology, and it was determined that at the beginning of the academic year, the level of emotional individual indicators of applicants is higher, which means their level of emotional tension is lower. The main goal of the research was to investigate the effect of emotional stress on reaction time. The results showed that due to the effect of emotional stress, the average value of the students' response time is increased. During the first measurement conducted at the beginning of the academic year, the statistical average value of the sensorimotor response times of the applicants was 165.8 ms. , and at the end of the academic year, before the final exam, as well as in a period when the test exams for universities were held, the simple sensorimotor response time of the applicants was 197.6 seconds. Thus emotional stress lengthened the latent period of response time and increased variability. The sensorimotor response time of the applicants was directly proportional to the level of emotional tension, that is, as the emotional tension increased, the response time increased.

Keywords: emotional stress, response time, exam stress, applicants

**CAN HIGHER ECONOMICS COMPLEXITY IMPROVE PUBLIC ADMINISTRATION
EFFICIENCY?**

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Abstract

Being able to produce and serve based on high knowledge, skills and technology allows countries to keep up with the requirements of the age in many areas such as eliminating income injustice, having a market power in international trade, financial and economic development, digitalization in their management to an effective and efficient management system in line with the interests of citizens. Having a capability in terms of produce and serve based on high knowledge and skills can also make an important contribution to the improvement of public administration. It is seen that the countries that are at the top of the Economic Complexity Index (ECI) are able to produce and serve high-tech products. Based on the literature review, this study aims to reveal its effects on public administration, based on the idea that being able to provide high-tech services contributes to the economic development of countries, and that they can achieve an effective and efficient management system in line with the interests of their citizens. In the study carried out for this purpose, it was concluded that producing and providing services based on high technology have a positive effect on the economic development of countries and contribute to the effective and efficient functioning of public administration. In addition, the impact of economic complexity on public administration will help the public to adopt a more efficient and technology-based management style based on knowledge and skills. This research paper will be pointed out this important issue.

Keywords: Economic complexity, public administration, economic development,

ANTIMICROBIAL PEPTIDES: SYNTHESIS, CHARACTERIZATION AND APPLICATIONS

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Abstract

In light of contemporary sociocultural dynamics and the attendant augmentation in life expectancy, an imperious need arises to confront various medical difficulties, encompassing cancer, neurological disorders, and microbial infections, thereby underscoring the exigency for efficacious therapeutic modalities [1,2]. Antimicrobial peptides (AMPs), constituting peptides endowed with the inherent capability to eliminate microorganisms, represent a promising avenue for therapeutic interventions across a spectrum of pathologies, ranging from neoplastic conditions and genetic disorders to cardiovascular afflictions, infectious diseases, and inflammatory pathophysiology. This investigative endeavor comprised the synthesis of six novel derivatives of buforine, realized through the judicious application of solid-phase peptide synthesis (SPPS) and the strategic utilization of the labile fluorenylmethyloxycarbonyl group (Fmoc chemistry). The resultant peptides underwent rigorous scrutiny via Matrix-Assisted Laser Desorption/Ionization Time-of-

Flight Mass Spectrometry (MALDI-TOF-MS), with their purity meticulously evaluated through high-performance liquid chromatography (HPLC). Subsequent determination of antimicrobial activity was conducted by determination of minimum inhibitory concentration (MIC) utilizing the broth microdilution method. Observations revealed commendable efficacy against a spectrum of microbes, including *Staphylococcus aureus* and *Klebsiella pneumoniae*. Furthermore, assessments employing microscopy and Alamar Blue assays were undertaken to gauge cytotoxicity, cellular proliferation, and metabolic activity of the peptides, explicated in the context of MDA-MB-231 and MCF-7 breast cancer cells alongside mesenchymal stem cells. In the broader context of expediting the evolution of peptide-centric pharmaceutical paradigms, the strategic design imperatives encompass the orchestration of peptides characterized by multifaceted attributes, including the adept traversing of cellular membranes or biological barriers, protracted circulatory persistence, and intrinsic non-toxicity and non-immunogenicity vis-à-vis the intricate milieu of the human physiological landscape. Acknowledgment: This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS - UEFISCDI, project number PN-III-P4-PCE-2021-0639, within PNCDI III.

Keywords: antimicrobial agents, peptides, solid-phase peptide synthesis, mass spectrometry, cancer.

**THE INFLUENCE OF ELEVATED CARBON DIOXIDE LEVELS IN COMBINATION
WITH THE PRESENCE OF EURYDEMA VENTRALIS ON BRASSICA OLERACEA
VAR. BOTRYTIS PLANTS**

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Abstract

In the Earth's atmospheric dynamics, carbon dioxide naturally participates as a vital component of the planet's carbon cycle. The advantages bestowed upon plants by elevated levels of CO₂ are significant, fostering enhanced photosynthetic carbon fixation and a consequent increase in biomass production. However, this atmospheric boon is not without its ecological nuances, as the rise in carbon dioxide concentrations often coincides with the unwelcome presence of insects, introducing a complex interplay that profoundly influences plant growth parameters and the synthesis of secondary metabolites. Within the spectrum of the highly polymorphic *Brassica oleracea* species, encompassing varieties such as brussels sprouts, cabbage, kale, broccoli, cauliflower, and kohlrabi, lies a vital source of vegetable plants crucial for both human sustenance and animal feed. In the pursuit of understanding plant responses to the dual influences of elevated carbon dioxide levels and the feeding activities of *Eurydema ventralis*, this study aims to unravel the intricacies of plant signaling. The focal points of investigation include changes in

photosynthetic parameters, volatile organic compound emissions, chlorophyll levels, and concentrations of polyphenols and flavonoids. For the experimental framework, *Brassica oleracea* var. *botrytis* was cultivated under varying concentrations of carbon dioxide (400, 800, and 1200 ppmv). Subsequently, these meticulously cultivated plants underwent a four-day infestation period by *Eurydema ventralis* bugs, introducing a controlled biotic stress scenario to mimic real-world ecological dynamics. Results of the study revealed that the intrusion of cabbage bugs had a discernible and adverse impact on cauliflower plants. Photosynthetic parameters, including chlorophyll *a* and *b* content, zeaxanthin, and β -carotene levels, were notably affected. Intriguingly, the study observed a significant increase in the emissions of monoterpenes, sesquiterpenes, and 2-hexenyl acetate, along with heightened concentrations of polyphenols and flavonoids across all plants subjected to the cabbage bug infestation. This indicates a noteworthy disruption in the secondary metabolite cycle, suggesting that plants grown in environments with elevated carbon dioxide levels become more vulnerable to the detrimental effects of biotic stresses. In essence, this comprehensive investigation sheds light on the intricate ecological relationships unfolding in response to rising atmospheric carbon dioxide levels and the complex interplay with insect-induced stress. The findings underscore the vulnerability of plants, particularly those within the *Brassica oleracea* family, to disruptions in their physiological processes and secondary metabolite production under the dual influence of heightened CO₂ and insect infestation. As we unravel these intricacies, we gain valuable insights into the potential challenges that plant ecosystems may face in the ongoing context of climate change. Acknowledgment: This work was supported by a grant from the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-III-P4-ID-PCE-2020-0410.

Keywords: elevated carbon dioxide, Brassicaceae family, *Eurydema ventralis*, secondary metabolites.

**THE INFLUENCE OF ELEVATED CARBON DIOXIDE ON THE GROWTH OF
RAPHANUS SATIVUS PLANTS UNDER HIGH-TEMPERATURE CONDITIONS**

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Abstract

The undeniable reality of human-induced global warming has manifested in a remarkable temperature increase of approximately 1 degree Celsius, surpassing the range of 0.8 to 1.2 °C above preindustrial levels by the year 2017. As of 2022, our planet's global mean temperature has surged to an alarming 0.86 degrees Celsius above the 20th-century average of 13.9 °C. In tandem with this climatic shift, atmospheric carbon dioxide levels have experienced an unprecedented escalation, surging from 385 ppmv in 2010 to a concerning 416 ppmv by December 2022, signifying a substantial 47 percent increase since the dawn of the Industrial Age. This research delves into the intricate relationship between elevated carbon dioxide concentrations (400, 800, and 1200 ppmv) and plants belonging to the *Brassicaceae* family, specifically *Raphanus sativus* varieties (Johanna, Helga, Rozaria). The primary objective is to unravel the combined impact of elevated CO₂ and heat stress on crucial physiological parameters, terpene emission patterns, and biochemical characteristics within these plant species. To scrutinize these interactions, plants were meticulously cultivated under varying carbon dioxide concentrations (400 ppmv, 800 ppmv, 1200 ppmv) and

subsequently exposed to a controlled regimen of heat stress, lasting 5 minutes and spanning temperatures from 25 to 60 °C. The intricate nuances of plant response were explored using state-of-the-art techniques. Gas-exchange systems were employed to measure essential photosynthetic parameters, including net assimilation rate and stomatal conductance to water vapor, for both control and treated plants. Furthermore, gas chromatography-mass spectrometry was utilized to analyze volatile organic compound emissions, specifically monoterpene profiles. In addition, comprehensive assessments were conducted to quantify the total phenolic compounds, total flavonoid concentrations, and the abundance of photosynthetic pigments within the plant specimens. The study uncovered a noteworthy decline in key photosynthetic parameters—such as assimilation rates and stomatal conductance to water vapor—in plants cultivated under elevated CO₂ conditions. Additionally, the concentration of primary and secondary metabolites in plant leaves exhibited a diminishing trend with escalating heat stress levels. Intriguingly, volatile organic compound emissions decreased post-heat stress. The assessment of total phenols, total flavonoids, and photosynthetic pigments indicated a substantial decrease following a brief period of exposure to elevated temperatures. Through this comprehensive investigation, we have provided empirical evidence that heightened carbon dioxide levels can detrimentally impact plant physiology, diminishing their capacity to withstand heat stress. The intricate interplay observed among photosynthetic parameters, biochemical characteristics, and volatile organic compound emissions underscores the complexity of the challenges plants face in an environment marked by elevated CO₂ and increasing temperatures. These findings contribute valuable insights into the intricate dynamics shaping the responses of plant life to the dual stressors of elevated CO₂ and heat stress, highlighting potential vulnerabilities in the face of ongoing climate change. Acknowledgment: This work was supported by a grant from the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-III-P4-ID-PCE-2020-0410.

Keywords: elevated carbon dioxide, photosynthesis, secondary metabolites, heat stress.

DOĞAL KAYNAKLARIN ÇEVRESEL YÖNLERİ VE VERİMLİ KULLANIMI

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Özet

Doğal kaynakların ekolojik boyutları da dikkate alarak verimli kullanımı sürdürülebilir kalkınma için oldukça önemlidir. Doğal kaynaklar; su, ormanlar, biyolojik çeşitlilik, mineraller ve enerji kaynakları gibi birçok unsuru içerir. Bunların verimli kullanımı, gelecek nesillerin kendi ihtiyaçlarını karşılama kabiliyetinden ödün vermeden, mevcut ihtiyaçları karşılayacak şekilde yönetilmesini içerir. Su kaynaklarının korunması ve verimli kullanılması önemlidir. Sürdürülebilir su yönetimi, su kaybının azaltılmasını, tarımda verimli sulama tekniklerinin uygulanmasını, su kaynaklarının kirlilikten korunmasını ve tasarruf tedbirlerinin teşvik edilmesini içermektedir. Minerallerin ve enerji kaynaklarının çıkarılması ve kullanılmasının çevre üzerinde önemli bir etkisi vardır. Verimlilik, yenilenebilir enerji kaynaklarına yatırım yapmayı, daha temiz üretim teknolojilerini benimsemeyi, fosil yakıt kullanımından kaynaklanan emisyonları azaltmayı ve enerji verimliliği önlemlerini teşvik etmeyi içerir. İklim değişikliğinin çözümü, sera gazı emisyonlarının azaltılmasını gerektirir. Buna düşük karbon teknolojilerine geçiş, ağaçlandırmanın teşvik edilmesi ve karbon azaltımını teşvik eden politikaların uygulanması da dahildir. Doğal kaynakların verimli ve sürdürülebilir kullanımı ekonomik, sosyal ve çevresel hususları bütünleştiren entegre bir yaklaşımı içerir. Kaynak verimliliğini ve çevre yönetimini teşvik eden politikaların, düzenlemelerin ve uygulamaların benimsenmesi, mevcut ve gelecek nesiller için daha sağlıklı ve daha sürdürülebilir bir gezegen sağlamak açısından çok önemlidir.

Anahtar kelimeler: Enerji elde etme, su kullanımı, temizlik, iklim, su depolama

**STUDY THE EFFECT OF DOPING WITH SILVER NANOPARTICLES ON THE
PROPERTIES OF ZIRCONIUM DIOXIDE MEMBRANES AND THEIR EFFECT ON IT
AS A GAS SENSOR**

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Abstract

In this research, zirconium dioxide ZrO_2 thin films were prepared by pulsed laser deposition method. The deposition process was carried out on glass bases at a temperature of 300°C and a vacuum pressure of 10^{-3} mbar. The structural, optical and sensitive properties of the prepared films were studied. The structural properties were studied using X-ray diffraction and finding structural parameters. It was found that the prepared films were of a quaternary phase. It was also found that the process of adding impurities led to improving the crystalline structure of the prepared films. When calculating the structural parameters such as lattice constants and crystal size, it was observed that there was an increase in the grain size from (30 – 100 nm) after adding impurities (nano-silver), also it was found that the preferred plane for crystal growth is (011). The surface topography was also studied through the results of the scanning electron microscope, where the results showed that the surfaces of all the membranes were uniform, homogeneous, and free of cracks, in addition to the presence of spherical-shaped grains on the surface, and that the doping process led to an increase in the surface roughness. The results of the atomic force microscope showed that the doping process led to an increase in the surface roughness rate. The optical measurements showed that the transmittance value of the membranes reached 95% and decreased when increases the impurities ratio to 15% at a doping percentage of 9%. There was also an increase in optical absorbance when doping percentages increased. After studying the optical energy gap, it was found that its 4.31 eV for pure films and it was decreased when impurities were added to reach (2.9 eV) at a doping rate of 9%. gas sensor for NH_3 gas was prepared from pure and doped (ZrO_2) films, and the sensitivity of the films was studied and found that the maximum sensitivity for pure films was (20 %) and the maximum sensitivity of the ZrO_2 impregnated films was (56 %) at an operating temperature of 250°C when the film was 9% impregnated.

Keywords: zirconium dioxide, X-ray

**USING WHATSAPP APPLICATION AFFECTING KNOWLEDGE OF LEARNING
PHRASAL VERBS**

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Abstract

For EFL learners, PVs become as crucially important part of English lexicon in every day of language of English speakers. This study seeks to prove the difference knowledge of learning phrasal verbs. To achieve the purpose of this study, 120 students were selected from Andishesazan language institute in Ahvaz. To homogenize the participants, interchange placement test (Richards, 2008) was administered that divided them into four groups. Two groups were selected as experimental group and the others as control group (both separable and inseparable) randomly. At the beginning of the study, a separable and inseparable phrasal verbs test as pre-test was given to students. Then during the study, the experimental groups received treatment that was teaching PVs selected from textbook '*making sense of phrasal verbs*' (Shovel, 1992) via WhatsApp. But control groups received no treatment and they were taught by traditional approach. After five weeks, a post-test was administered to the groups. By comparing the pre- and post-tests of each group separately and also four groups with each other, it was revealed that the difference between the post-test of experimental and control (separable) groups is significant. Results showed using WhatsApp application for learning of separable phrasal verbs was effective in improving students' knowledge of them. The finding of this study may inspire teachers to use mobile application and also course developers to modify and improve not only the curriculum, but also the methodology of the vocabulary learning.

Keywords: vocabulary learning, WhatsApp, phrasal verbs

**STATE OF THE HALAL ECONOMY AND HALAL CERTIFICATION IN
AZERBAIJAN**

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Abstract

The Global Islamic economy is gaining momentum with the empowerment of Muslim consumers. According to the latest statistics, the value of the global Islamic economy reached US\$2 trillion excluding the Islamic finance sector which is worth \$3.6 trillion. A surge in the Global Islamic Economy triggers countries to create a favorable ecosystem for the Islamic economy. Availability of a robust Halal certification system is a number one priority for the establishment of a favorable ecosystem for the development of the Islamic Economy in the country. Although Azerbaijan is a Muslim-majority country with more than 90% of the residents practicing Islam, the country lags behind most Muslim-majority countries when it comes to the availability of a favorable ecosystem for the development of the Islamic Economy in the country. According to the Global Islamic Economy, Azerbaijan only captures a seventh place in the halal tourism sector and is not represented in other sectors. However, as a Muslim-majority country, local consumers are very sensitive towards consuming halal products, especially halal foods. Also, there is huge potential, both natural, financial, and human, for the transformation of the local economy to one of the leading Hub for the Islamic economy. Serious problems with the halal certification process in the country are the main culprit and serious impediment to the creation of a favorable ecosystem and infrastructure. The primary target of the chapter will be an analysis of the current halal certification procedures, primary impediments to the establishment of the robust certification process as well as a discussion of the possible policy directions for the development of the Islamic Economy in Azerbaijan.

Keywords: Islamic Economics. Halal. Halal products, Halal certification

SIMULATION AND OPTIMIZATION OF AMIN MIXTURES IN ABSORPTION OF CARBON DIOXIDE AND HYDROGEN SULFIDE FOR NATURAL GAS SWEETENING BY ASPEN HYSYS SOFTWARE

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Abstract

Natural gas contains impurities, the most important of which are carbon dioxide and hydrogen sulfide. These corrosive impurities, known as acid gases, must be removed from natural gas. Their removal is motivated by operational, economic, and environmental factors. Various technologies have been developed to remove acid gases, including absorption using physical and chemical solvents, adsorption, membrane processes, etc. The method used in this research for sweetening sour natural gas is chemical absorption using ternary mixtures of amines. Previous studies have mainly focused on single- and binary-component absorbents, and the role of component percentages in an absorbent of ternary mixtures has not been investigated and optimized. Therefore, in this thesis, for the first time, the natural gas sweetening process using two ternary mixtures of amines, including monoethanolamine/ diethanolamine/methyldiethanolamine (MEA/DEA/MDEA) and sulfolane/piperazine/ methyldiethanolamine (Sul/PZ/MDEA), was simulated using Aspen Hysys software. Initially, simulation results were validated by comparing them with the experimental data from an industrial unit. To optimize the component percentages in these ternary blends, a mixture design of experiment was conducted. Statistical models for six response variables, including the mole fraction of H₂S and CO₂ in the absorber outlet, and the reboiler and condenser duty and solvent price and corrosion rate, were developed for both blends with a high coefficient of determination (R²) close to one. For the first time, a multi-objective function was defined to simultaneously minimize all six response variables. The optimization results showed that the optimal composition for the MEA/DEA/MDEA blend is 60 and 40 mass percent of MEA and MDEA, respectively. Also, in the Sul/PZ/MDEA blend, the optimal composition is 2, 11, and 12 mass percent of sulfolane, piperazine, and MDEA, respectively. For both optimal blends, the absorber flow rate was varied between 300 and 1500 Sm³/h, and it was found that after a flow rate of 900 and 1100 Sm³/h for the MEA/DEA/MDEA and Sul/PZ/MDEA blends, respectively, the mole fraction of H₂S and CO₂ in the absorber outlet reached approximately ppm and increasing the flow rate had no significant effect on H₂S and CO₂ absorption, but increased the duty of the reboiler and condenser.

Keywords: Natural gas sweetening, Absorption process simulation, Mixture design of experiment, Multi-objective optimization, Ternary amine mixtures.

INVESTIGATING THE SYNERGISTIC EFFECT OF THE COMBINATION OF SCRAP TYRE AND CIGARETTE FILTERS ON THE AMOUNT AND QUALITY OF BIO-OIL IN THE SLOW PYROLYSIS PROCESS

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Abstract

Utilizing thermochemical methods for converting biomass and waste tires offers a hopeful solution to address the challenges of energy security and environmental problems. Initially, the impact of temperature, the weight ratio of rubber to cigarette filters, and the heating rate on the co-pyrolysis of these two materials was investigated. The experimental results showed that all three variables studied had a significant effect on the product yield. The optimal conditions were found to be a temperature of 577°C, a weight ratio of 0.32 for rubber to cigarette filters, and a heating rate of 21°C/min, resulting in the highest biodiesel yield of 60.68%. The thermal decomposition of the waste tyre and cigarette filters with mass blend ratios of 1:0, 0.32:0.68, and 0:1 was investigated using thermogravimetric analysis. Co-pyrolysis of cigarette filters and waste tyre showed positively synergetic effect in terms of (1) increasing bio-oil yeild and heating value; (2) improving product yields and composition. Next, under the obtained optimal conditions, the co-pyrolysis of these two materials was repeated using pre-treatment and the HZSM-5 catalyst. The results obtained from gas chromatography-mass spectrometry for the pyrolysis of each feedstock individually, co-pyrolysis under optimal conditions, and catalytic co-pyrolysis showed positive effects. Firstly, the amount of bio-oil produced increased, and its heating value also increased. Additionally, using a potassium persulfate solution and hydrogen peroxide in the pre-treatment process for rubber in co-pyrolysis improved the product yield. Furthermore, the results from catalytic co-pyrolysis showed a decrease in product yield when using the catalyst, which could be compensated by using pre-treated rubber. Moreover, the heating value of the bio-oil increased to 4/28in catalytic pyrolysis. Oxygen-containing compounds in the bio-oil were significantly reduced, resulting in reduced pollution compared to the individual pyrolysis of cigarette filters. These findings suggest that the simultaneous co-pyrolysis of rubber and cigarette filters can have positive effects, including increased bio-oil production and heating value, as well as reduced pollution. Pre-treatment and the use of catalysts can further enhance the efficiency of this process.

Keywords: Cigarette butts, Scrap tire, Co-pyrolysis, Bio-oil, Optimization, HZSM-5.

RECOVERY OF VANADIUM FROM CS-PROMOTED CATALYST OF SO₂ OXIDATION REACTION

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Abstract

V₂O₅ catalysts, enhanced with Cs, are gaining momentum for reducing pollution in expanding sulfuric acid production plants. However, systematic research on this specific type of Cs-promoted catalyst has not been conducted. The disposal of unused V₂O₅ catalysts poses a serious environmental threat, and its recycling not only brings economic benefits but also prevents environmental damage. Approximately, one hundred tons of unused V₂O₅ catalyst annually require recovery in the country, but it is either stored or improperly disposed of with no utility. In this study, the recycled industrial V₂O₅ catalyst, promoted with Cs, obtained from a sulfuric acid production plant, was characterized using XRD, XRF, BET, SEM, TEM, ATR-FTIR, and EDX mapping. The response surface method was employed to investigate the effects of concentration, solid-to-liquid ratio, and time on the efficiency of solid-liquid extraction with sulfuric acid. The results indicated that a second-degree model with R²=0.98 was the best statistical model for predicting efficiency concerning these factors, all of which had a significant impact. Solid-liquid extraction for the binary mixture of tartaric acid and phosphoric acid was performed using the Mixture method (one of the design of experiment (DOE) methods), revealing that tartaric acid outperforms phosphoric acid and their mixture. The solid-liquid extraction with a three-component system of nitric acid, hydrochloric acid, and citric acid was also evaluated through the Mixture method demonstrating that the mixture of nitric acid with hydrochloric acid and citric acid performs better than pure nitric acid and hydrochloric acid. Vanadium pentoxide purification with sodium sulfate at various ratios was investigated using TGA-DSC, with the optimal ratio identified as 1:1. Finally, sulfuric acid, a common factor in vanadium solid-liquid extraction with acceptable efficiency, was employed as a suitable extraction agent. Coupled with additional purification, precipitation, oxidation, purification, and multiple filtration steps, a vanadium pentoxide precipitate with 99% purity and 47% yield was obtained.

Keywords: Recycling of used catalysts, Vanadium Pentoxide catalyst, Cesium promoter, Solid-liquid extraction, Response surface method, Mixture design of experiment.

DIFFERENCES IN THE RESPONSES OF BIOCHEMICAL CHARACTERISTICS AND RELATED CAT, MAPK6 AND P5SC GENES EXPRESSION BETWEEN IRAQI WHEAT GENOTYPES TO SINGLE AND COMBINED DROUGHT AND SALINITY STRESSES

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Abstract

In economically significant crop plants, such as wheat (*Triticum aestivum* L.), abiotic stresses like drought and salinity are among the most significant environmental stressors. These stresses result in the generation of reactive oxygen species (ROS), which in turn triggers molecular and biochemical reactions that are crucial in determining the degree of plant tolerance to stresses. Two wheat genotypes, Latifya and Iba99 were used to examine the responses of gene expression of *CAT*, *MAPK6* and *P5CR* genes, root, shoot and plant dry weights, antioxidant enzymes (*CAT*, *SOD* and *POD*) and proline content traits to combined drought (simulated by polyethylene glycol (PEG) 6000 solutions) and salinity (simulated by NaCl solutions) stress with 0, -0.05, -0.1, -0.15, and -0.2 MPa osmotic potentials, in addition to single stresses of drought(-0.6)Mpa and salinity(-0.6)Mpa. The genotypes were planted in a randomized complete block design (RCBD) with three replicates. The findings demonstrated that the initial plant response to stress resulted in notable changes in the expression of *MAPK6*, *CAT* and *P5CS* genes. They also demonstrated that root, shoot, and whole plant dry masses decreased with the decrease of the osmotic potential. With the osmotic potential dropping, the *CAT*, *POD*, and *SOD* activities as well as the proline content in seedlings increased. Iba99 had considerably higher *SOD*, *POD*, and *CAT* activities with values of 60.22 unit.ml⁻¹, 145.5 unit.g⁻¹, and 52.92 unit.g⁻¹, respectively, nonetheless, shown less impressive growth features than Latifya at -2.0Mpa. While Latifya had higher *CAT* gene expression and more dry biomass at -2.0Mpa. In wheat plants, the proline content and activity of *SOD*, *POD*, and *CAT* were significant strategies for maintaining stress tolerance. Due to the regularity and concordance between the accumulation of dry matter and other observed features, dry weight can be a reliable indicator of plant growth.

Keywords: Combined stress(D+S), Gene expression, Antioxidant enzymes, Proline, Dry weight

MARKETING TOOLS IN THE PROMOTION OF HOTELS IN HERITAGE OBJECTS

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Abstract

Research background: Marketing and its importance is visible in many spheres of our society. There is no exception in tourism services either. Companies that want to progress must first of all provide quality services, be able to present them well to the public, and then not forget their continuous innovation, without which many companies have already lost their competitive advantage in the past. Purpose of the research: The interest of the study was to find out more detailed information about marketing tools that are used in present at the example of tourism companies. In concrete, the main aim of the paper is to evaluate the current situation of the use of modern marketing tools on the example of heritage objects in the tourism industry and their accommodation services. Methods: Primary data was obtained by using author's questionnaire method and self-collection of information by addressing respondents in a personal way. The research sample consisted of heritage object providing accommodation services beyond the services of their standard cultural portfolio (exhibitions, events, guided tours, etc.). The results of the survey based on interviews were statistically recorded and evaluated in the program MS Excel. The obtained primary data were subsequently evaluated in Statistica software program. Findings & Value added: From the results of conducted survey it can be possible to conclude, that heritage object also perceive innovations in marketing as their inevitable part of future operation. Especially after pandemics they rely on digital tools of current rich market. Scientific research grant FPPV-37-2023 "Innovation Management in Historic Hotels" UCM Trnava. VEGA 1/0474/23 Diagnostický audit v manažmente heritage objektov na pozadí spoločenských a ekonomických procesov (Diagnostic audit in the management of heritage objects at the background of social and economic processes). UCM Trnava.GAMA/23/1, Výskum manažérskych inovácií v cestovnom ruchu v postpandemickom období" (Research on managerial innovations in tourism in the post-pandemic period). Grant agency of Faculty of Management and Business, University of Prešov in Prešov.

Keywords: Marketing Innovations. Heritage objects hospitality, Heritage Object Management. The paper is a part of the outputs of the projects:

IMPORTANCE OF HOSPITALITY INNOVATIONS IN HERITAGE OBJECTS

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Abstract

Research background: Innovation Heritage object play an important role in tourism and its attractiveness. They provide a wide scale of option how to combine the tourism services with historical potential. On the other hand, although they are related to the ancient potential they must not forget to advance hand in hand with the modern trends of the present time. Purpose of the research: The paper aims to find out, evaluate and describe in more detail the perception of the importance of innovation application in accommodation objects, operating in historical buildings, listed as heritage objects in Slovak conditions. Methods: To find out the perception of tourism participants the questionnaire method was used. The questionnaire was prepared as an author's questionnaire having in total 25 question with concentrated attention to the accommodation services in heritage object and their quality. The selection of the research sample was done by random sampling at the Slovak respondents. The results of the research were evaluated and verified by selected statistical methods. The primary data obtained were subsequently processed in Statistica statistical software program. Findings & Value added: Based on the results obtained from questionnaire research it follows that tourism participant expect the implementation of new, modern digital tools in their operation while using their services. They expect, that also those heritage building need to „catch” the digitalization wave while respecting that the condition of operating services often in protected object is more technically demanding. The paper is a part of the outputs of the projects: Scientific research grant FPPV-37-2023 “Innovation Management in Historic Hotels” UCM Trnava. VEGA 1/0474/23 Diagnostický audit v manažmente heritage objektov na pozadí spoločenských a ekonomických procesov (Diagnostic audit in the management of heritage objects at the background of social and economic processes). UCM Trnava. GAMA/23/1 „Výskum manažérskych inovácií v cestovnom ruchu v postpandemickom období” (Research on managerial innovations in tourism in the post-pandemic period). Grant agency of Faculty of Management and Business, University of Prešov in Prešov.
Keywords: Heritage objects, Hospitality Innovations, Innovation Tools. Tourism digitalization.

THE ROLE OF MANAGERIAL DECISION-MAKING IN COMPANY PERFORMANCE

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Abstract

Seeing the importance that companies have in the growth and economic development of our country as the main goal of the paper of this topic is to emphasize once again the importance of managerial decision making which is also the main key to the success of a company. Successful leadership is a challenge at all levels of management in institutions, especially in large companies such as our case study at the Elkos Group Company. In this way successful leadership means successful decision making, which is impossible to achieve without applying standard procedures for collecting, processing, analyzing and interpreting results. Managing a project may seem like an unmanageable task, which requires a lot of experience, knowledge and work practice. Often, this task may seem difficult to understand, followed successfully and successfully completed. In everyday life, in one way or another, everybody is, at all times, a project manager. The decision-making process is a sequence of activities in a logical way to obtain reliable and valuable information for decision-making. The decision-making process is modeled as a phased process, which provides high security and reliability for solving certain problems. The main purpose of this paper is to show the role and importance of managerial decision-making in the performance of a company. Where and as we know that these decisions are very important and in most cases are vital for the successful future of the company, where case study in this paper we took managerial decision-making in the Elkos Group Company. The main objective and purpose of this paper will be to determine the role and importance of managerial decision-making in the performance of the company, where case study in this paper i have obtained data on managerial decision-making in Elkos group company, and how this decision-making affects performance of compensation.

Keywords: managerial decision-making, management, company, management practices.

**WICKING AND AIR PERMEABILITY PROPERTIES OF COTTON / BANANA
BLENDED WOVEN FABRIC**

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Abstract

Wicking property gives the information about the transport properties and water absorbency. Air permeability tells about the insulation of the fabric Both the properties predict the comfort properties of the fabric. In this study four different fabric of cotton and banana blend are produced with a constant blend proportion of 70 : 30 to analyse the wicking and air-permeability of the fabric. The results showed that the canvas fabric with 2ply yarn (20s Ne) showed more wicking rate than the single ply yarn plain (40s Ne) and twill weave (30s Ne) fabric. The air permeability of the twill weave showed the maximum value followed by canvas weave and plain weave. The results gave an idea that the cotton/banana blended fabrics have good wicking and air-permeability properties and suitable for sportswear application.

Keywords: air-permeability, banana, cotton, insulation, wicking rate.

**SOCIOECONOMIC GLOBALIZATION, DIGITALIZATION, AND ECONOMIC
DEVELOPMENT: EVIDENCE FROM SAUDI ARABIA**

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Abstract

Policymakers in developing and recently industrialized countries have hurdles in attaining sustainable development as a result of the international system's issues in different environmental, financial, technical, economic, and social domains in the context of globalization. The importance of digitization in harnessing economic and social globalization to promote and accelerate the economic growth of developing nations has not been sufficiently addressed in theoretical and applied economic research. This study examines the effects of economic and social reliance, as well as the significance of digital technology and its role in supporting economic and social transformation policies that promote growth and long-term development. As a result, the purpose of this research is to investigate the causative and cointegration relationships between digitalization, socioeconomic globalization, and economic growth. The study also wants to know how globalization and digitization have affected GDP per capita. Our research analyzes actual data from the Saudi economy as an example of a developing country undergoing large structural alterations and fast economic and social growth. The purpose of this research is to look into the causal relationship and shared integration of socioeconomic globalization and digitalization, as well as their impact on economic growth. Take Saudi Arabia as an example of a remarkable global economic transformation strategy from 1990 to 2022. During this period, Saudi Arabia implemented various economic reforms, such as the Vision 2030 plan, which aimed to diversify the economy and reduce its dependence on oil. These reforms included initiatives to attract foreign investment, develop non-oil sectors like tourism and entertainment, and enhance digital infrastructure. As a result, Saudi Arabia experienced significant economic growth and an increase in GDP per capita.

Keywords: Policymakers, GDP, Arabia

**SIMULATION OF BUILDING WALLS WITH PHASE CHANGE MATERIALS USING
EFFECTIVE HEAT CAPACITY MODEL BY RECENT NUMERICAL METHODS**

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Abstract

The purpose of this paper is to see the impact of cultural heritage on the development of tourism in different regions, and in our topic the mountains of Sharr in the region of Ferizaj, Prizren and Kaçanik. The purpose of this paper is to present a summary of knowledge on cultural heritage and its impact on the development of tourism in the territory of Kosovo, with a special focus on the Prizren region, given the great importance of these industries in economic development. We know that methods in the social sciences are indispensable research tools that enable us to achieve new results and knowledge, or to correct existing ones. In this article we have applied almost all methods little by little, but we will single out: the historical method which consists of techniques and guidelines with which historians use primary sources and other data, such as: archaeological data, to made studies on past stories for cultural heritage. This paper offers a theoretical approach to cultural heritage and tourism, as well as the impact of effective and efficient management in increasing the number of tourists and visitors and increasing the use of cultural heritage capacities in Kosovo, in the mountains of Sharri in the region of Ferizaj, Kaçanik. and Prizren. Based on the cultural heritage data in the country, such as various historical monuments built centuries ago, which local and foreign tourists show special interest in visiting, through which the development of tourism in the country is enabled, Investment in the further development and promotion of these tourist products, it would be of particular importance, as it would inform the public about the monuments of historical importance and heritage of our country, which should be visited in Kosovo. Based on this, based on the available data on the topic in question, we can conclude that the development of tourism depends on the promotion of products, therefore our recommendation is that local institutions pay great attention to the strict implementation of the long-term development strategy of tourism, thus investing in preserving the rich cultural heritage that our country has and promoting it through various cultural and artistic activities, as well as informing the general population.

Keywords: Cultural heritage, promotion, tourism, mountains.

**NAVIGATING THE CHATGPT FRONTIER: BALANCING INNOVATION AND
TRADITION IN EDUCATION**

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Abstract

Chat-GPT, an AI chatbot, is transforming the way we engage with technology. Its capacity for human-like conversations, essay generation, and various tasks has prompted inquiries into its implications for education. Some educators posit that integrating Chat-GPT into classrooms could offer valuable personalized tutoring and aid for students in their assignments. Conversely, there are reservations about the potential misuse of Chat-GPT for cheating or plagiarism, raising concerns about a potential decline in critical thinking skills. Preliminary assessments indicate that Chat-GPT can surpass many students in English assignments. Additionally, the bot can produce high-quality content, including cover letters and literary summaries. It's crucial to acknowledge that Chat-GPT is an evolving technology, still in development with constantly advancing capabilities. The integration of AI in education is a swiftly progressing domain, necessitating educators to stay abreast of the latest advancements. This article delves into the prospective influence of Chat-GPT on education, advocating for responsible use of the tool. In essence, the impact of Chat-GPT on education remains uncertain, yet it is evident that the technology holds the potential to both benefit and pose risks to students. Educators must exercise responsible use of Chat-GPT and be cognizant of potential drawbacks.

Keywords: Artificial Intelligence (AI), Chatbot, Chat-GPT, OpenAI.

**REVIEWING THE ACADEMIC LANDSCAPE: THE IMPLEMENTATION OF
ELEARNING INITIATIVES IN HIGHER EDUCATION**

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Abstract

This paper explores the challenges tied to infrastructure, pedagogical considerations, and the effective integration of technology to enrich the learning experience. Technology integration is viewed as a means to augment learning, not as a replacement for educators. Both educators and students grapple with the ramifications of eLearning. Universities face increasing demands for quality and flexibility to cater to diverse student needs, necessitating tailored course designs to align with varied educational requirements. Educators must adapt their teaching styles to accommodate changing student learning preferences, which can result in heavier workloads necessitating proactive management. Furthermore, eLearning poses a potential challenge to the traditional university structure. As institutions confront pressure to depart from traditional facilities and lecture-centric teaching methods, they must carefully navigate this transition. While the benefits of eLearning are eagerly anticipated, thoughtful assessment of the implications of eLearning program implementation is imperative. In the UK, many universities are embracing technology for eLearning solutions, yet some costly implementations fall short in terms of engaging learners and promoting active participation. These implementations often function as content repositories, lacking robust pedagogical practices. When institutions adopt eLearning without a strong pedagogical foundation, activities may prioritize technology over student progress and engagement.

Keywords: eLearning, Higher Education, Quality Assurance, Teaching and Learning Styles.

FORMATION OF SOCIO-ECONOMIC AND ENERGY SECURITY OF UKRAINE

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Abstract

Globalization of the economy and European integration processes provide for a number of changes in the field of the fuel and energy complex. The agreement on the accession of Ukraine to the Energy Community was signed in 2005, which provides for the unification of European energy systems and the formation of a single market for electricity and gas, the achievement of information support, and the openness of energy resource markets (coal, gas, electricity, utility services); creation of conditions for fair competition; ensuring effective control at the state and regional levels. Taking into account the fact that excessive consumption of fuel and energy resources increases risks in the spheres of socio-economic activity, energy security, energy, and trade balances, it is advisable to monitor energy costs, prices, and tariffs. Therefore, according to the results of the survey of the structure of expenses of Ukrainian households (according to the methodology of the International Labor Organization), over the past 12 years, the share of expenses on food products has decreased from 55% to 48.9% and non-consumer expenses (savings, charity, helping relatives, housing construction, etc.) from 10.1% to 8.7%. This indicates the low standard of living of the average Ukrainian, since according to the criterion of the EU countries, poor people spend more than 30% on food in the general structure of expenses for a household. At the same time, the share of expenses for fuel and energy, housing and communal services, and transport services of the Ukrainian household increased significantly from 12.9% in 2010 to 20% in 2022. This happened primarily due to price and tariff increases, which were significantly ahead of the growth rate of inflation in Ukraine. The state and local authorities constantly regulate and coordinate the formation and approval of prices and tariffs for fuel, housing and communal services, and transport public services. The State Agency for Energy Efficiency and Energy Saving of Ukraine publishes approved weighted average tariffs for thermal energy produced using natural gas for population needs; institutions and organizations financed from the state or local budget, as well as tariffs for transportation and supply of thermal energy. In practically all regions of Ukraine, tariffs for heat from natural gas for budgetary institutions and organizations are one and a half times higher than tariffs for the population. However, natural gas prices for enterprises and businesses exceed the approved prices for the population by 4.3 times in 2021, 5.3 times in 2022, and 2.2 times in 2023. Regionally, tariffs differ by 2.5 times. High prices for fuel and energy resources negatively affect the payment obligations of both the population, especially in wartime, and enterprises. In addition, economic risks are growing for business: they increase the level of cost price, worsen the price competitiveness of the products of Ukrainian producers, and reduce their volumes and assortment. The share of the transport component in the structure of the cost of production of Ukrainian enterprises is marked by intensive dynamic growth (up to 20%), primarily due to a significant increase in fuel prices, which are mainly imported; restrictions on the activities of water and air transport because of the war; devaluation of the hryvnia in relation to the freely convertible

currency; a steady trend of growth in world prices for fuel and energy resources. Ukraine's integration into the European Community and its strategic guidelines for strengthening socio-economic and energy security in wartime conditions provide for increased transparency and reliability of data on the movement of material, technical, energy and relevant financial flows in the state. The state and local self-government bodies are obliged to stimulate the transition to alternative sources of energy in local territories, to regulate the prices of fuel and energy resources, communal and transport services through taxes (excise duty, value added tax), trade allowances (markups), to ensure the stability of the exchange rate of freely convertible currencies, etc.

Keywords: fuel and energy resources, energy costs, prices, tariffs, alternative energy sources.

CHARACTERIZATION OF ION EMISSION IN A MATHER PLASMA FOCUS DEVICE 20 KJ

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Abstract

In this research, the ion emission of the Mather type plasma focus device 20kJ has studied. According to the functional parameters of pressure, voltage and the gas composition used, at first, by performing numerous tests, the optimal pressure and voltage of the device have been determined and then the emission of ions and hard X-rays has been evaluated in the optimal conditions. In order to record the current and derivative of the current signal a Rogowski coil detector and for recording the ion signals, a plastic scintillator and a Faraday cup were used. Examination of the graphs and data analysis show that the strongest pinch, and ion signals were obtained with neon gas at a voltage of 14 kV and a pressure of 6 Torr. The maximum of energy of the emitted ion is 420 kJ. These types of ions have their own applications as layer forming ions in layering processes. In addition, the high energy of ions makes them a suitable source for destructive testing of materials.

Figure 1 shows the image of the plasma focus device 20kJ.



Fig 1. A view of the plasma focus
device 20kJ

**BENZOTRIAZOLE AND ITS DERIVATIVES AS CORROSION INHIBITORS FOR
COPPER ARTIFACTS: A COMPREHENSIVE REVIEW**

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Abstract

This review explores how Benzotriazole (BTA) and its derivatives protect copper artifacts and excavated objects treasures from corrosion. It looks at how these substances react to copper and create shields that stop corrosion. We check different ways to put these shields on ancient copper artifacts & excavated objects, like soaking and using special methods. We will be observed the parameters like as pH, conductivity, temperature etc affects the copper artifacts and excavated objects & how the protective shield develops around the surfaces. The review ends by talking about new ideas and what still needs figuring out. It will be concluded after entire course of work that BTA & its derivatives can be use to develop a protective layer for protection of ancient copper artifacts and excavated objects.

Keywords: Copper Artifacts, Copper excavated objects, Corrosion inhibitor, Preservation, Benzotriazole and its derivatives.

**ECONOMETRICS ANALYSIS OF INDUSTRIAL SECTOR AND ECONOMIC
GROWTH IN NIGERIA**

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Abstract

The industrial sector remains one of the key sectors of any economy, be it developed or developing nations. This however makes it necessary to examine the effect of this sector on economic growth by most nations, in view of several challenges faced by the sector which might have limited its potential contribution to the national development. The study revealed that some of the sub-sectors has a positive and significant effect on economic growth within the time frame examined (1981 - 2022). Likewise, the study indicated that the industrial sector provides employment opportunities, thereby contributing to the country's growth. The study recommended that the government should provide an enabling environment for this sector to thrive by investing more in infrastructure, providing access to finance and improving of human security. The private sector should also be encouraged to invest in this sector to enhance more productivity and competitiveness. The study therefore emphasizes the importance of this sector in driving economic growth in Nigeria with implementation of policies and investments. Thus, the prosperity of this nation to a large extent is seen to be dependent on the development and sustenance of the industrial sub-sector in this study.

Keyword: Industrial Sector, Economic Growth, Autoregressive Distribute Lag, Nigeria

**INCLUDING INCLUSIVE TEACHING PRACTICES FOR PEOPLE WITH
DISABILITIES IN THE DEVELOPMENT, ORGANIZATION, AND
IMPLEMENTATION OF SCIENCE LABORATORY LESSONS**

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Abstract

Integrating inclusive teaching strategies for differently abled persons into laboratory lessons is not only important, but it is also crucial for creating an accessible and inclusive learning environment. When designing, planning, and executing lessons, it is imperative to consider the diverse needs of students and provide necessary accommodations and assistive technologies. By doing so, educators can ensure that all students, regardless of their abilities, have equal opportunities to learn and succeed in the laboratory setting. Additionally, inclusive teaching strategies promote a sense of belonging and foster a supportive and collaborative learning environment for all students. This approach not only benefits differently abled persons but also enhances the overall educational experience for everyone involved. Therefore, it is of utmost importance for educators to prioritize inclusivity and actively integrate inclusive teaching strategies into their laboratory lessons.

Keywords: Accessible, Differently abled, Inclusive, Laboratory lessons.

**CONSUMER BEHAVIOR IN KOSOVO: UNDERSTANDING FACTORS
INFLUENCING WATER SELECTION AND SUSTAINABLE PRACTICES**

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Abstract

The consumer decision-making process is intricate and influenced by various factors when selecting a product. Product quality stands out as a pivotal aspect, often holding the power to sway decisions. Consumers gravitate towards high-quality products that not only meet but exceed their needs. Their motivation, driven by factors such as quality, brand, price, reputation, and personal experience, contributes significantly to shaping well-informed decisions tailored to their preferences. This study concentrates on the pivotal factors that influence water selection, analyzing their significance in consumer decision-making. Leveraging the Fishbein model aids in identifying and assessing the dominant factors that impact consumers' choices of water and brands. Moreover, the research offers recommendations aimed at enhancing water usage policies, emphasizing the imperative of sustainable and efficient utilization of these key factors to ensure future sustainability. This research holds the potential to advance water processing strategies, facilitating more effective and sustainable use of the factors that influence consumers' choices and evaluations regarding water.

Keywords: Consumer decision-making, Factors, Fishbein Model, Consumers.

**SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF SOME NEW
SUBSTITUTED CHALCONE DERIVATES STARTING FROM 4-
NITROACETOPHENONE**

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Abstract

Chalcones are chemical compounds belonging to the flavonoid group. They are characterized by their structure composed of two aromatic rings linked by three carbon α and β -unsaturated carbonyl system. These compounds are known for their diverse biological activities and are commonly found in various plants. The purpose of this study was to synthesis some new substituted chalcones derivates starting from 4-nitroacetophenone as the main substance. The synthesis is based on the aldol reaction to obtain aromatic ketones or substituted aromatic ketones with benzaldehydes or substituted benzaldehydes. The synthesis compounds was then subjected to filtration, recrystallization and physical parameters such as melting point, thin layer chromatography (TLC), and followed by spectroscopic analysis. Melting points values ranged from 136.4⁰C to 188.6⁰C, while the retention factor ranged from 0.37 to 0.58. By interpreting IR spectra we were able to confirm the presence of some functional groups such as: NO₂ and OCH₃.

Keywords: chalcone, aldol condensation, 4-nitroacetophenone, thin layer chromatography.

**SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF SOME NEW
SUBSTITUTED CHALCONE DERIVATIVES STARTING FROM 3,4-
DIMETHOXYACETOPHENONE**

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Abstract

Chalcones (1,3-diaryl-2-propen-1-ones) are a collective group of flavonoids found in fruits and vegetables, which display several pharmacological activities that are very important. They can be used as an initial compound for synthesis of many compounds. Therefore, many researchers have synthesized these compounds and evaluated their biological activities. On this study we synthesized some new substituted chalcones derivate starting from 3,4-dimethoxyacetophenone, and putting in reaction with different compounds such as benzaldehyde and substituted benzaldehydes. The obtained compounds were subjected to several processes such as filtration, recrystallization, determination of the melting point, thin layer chromatography (TLC) and spectroscopic analysis. Melting points values ranged from 114,5°C to 149.8°C , while the retention factor ranged from 0.2 to 0.66. Based on the measurements made in the infrared spectrophotometer we identified the presence of functional groups like: -NO₂, -OCH₃.

Keywords: chalcone, 3,4-dimethoxyacetophenone, thin layer chromatography.

**PARASITOLOGICAL, MOLECULAR, AND EPIDEMIOLOGICAL INVESTIGATION
OF TRYPANOSOMA EVANSI INFECTION AMONG DROMEDARY CAMELS
IN BALUCHISTAN PROVINCE**

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Abstract

Trypanosomiasis “Surra” is a zoonotic disease caused by *Trypanosoma evansi* (*T. evansi*), affects a wide variety of animals globally. The disease has a severe impact on the productivity, health, and working capacity of camels. Surra causes mortality and extensive economic losses if not diagnosed early. This is the first comprehensive report on the prevalence of *T. evansi* infection in dromedaries in Baluchistan province. In the present study, 393 blood samples (indigenous, n = 240; imported, n=153) were collected from one-humped camels (*Camelus dromedarius*) and were tested by molecular methods to estimate the prevalence in three districts (Pishin, Nushki, and Lasbella) of Baluchistan province. The overall prevalence of *T. evansi* among examined camel samples was 28.24% (95% confidence interval (CI): 24.02–32.89%). The risk of *T. evansi* infection in adult camels (> 10 years) is higher than that in young ones (odd-ratio (OR) = 2.7; 95% CI: 1.3357–5.3164%). Moreover, male camels were six times more likely to get an infection than female camels. The detection of infection in camels sampled in summer and spring was 3.12- and 5.10-fold higher, respectively, than in camels sampled in winter. In conclusion, recent findings exhibited a high rate of *T. evansi* infection in camels from the three districts. Current study emphasizes the need for a strict surveillance program and risk assessment studies as prerequisites for control measures.

Keywords: Surra, *Trypanosoma evansi*, *Camelus dromedarius*

**LEVEL OF PROFICIENCY OF JUNIOR HIGH SCHOOL STUDENTS IN
FILIPINO LANGUAGE AND LITERATURE**

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Abstract

The level of proficiency of Junior High School students in Filipino language and literature was assessed in this study. A descriptive method of research was used to gather primary data. Respondents consist of grade seven students of Don Mariano Marcos Memorial State University-South La Union Campus Laboratory High School, Agoo, La Union, Philippines. Salient findings reveal that most of the learners had a basic level of proficiency in Filipino language and literature. Basic level of proficiency was identified in comprehension, application, analysis, synthesis, and evaluation while advanced under knowledge. There is no significant relationship between the students' age, sex, average family monthly income, and parents' highest educational attainment as to the level of proficiency of Junior High School students in Filipino language and literature.

Keywords: level of proficiency, junior high school students, Filipino language and literature

ISITMASIZ TOPRAKLI SERA ŞARTLARINDA BİTKİ ANTİFİRİZİ KULLANIMININ MARUL YETİŞTİRİCİLİĞİNE ETKİLERİ

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Özet

Salata grubu sebzeler içerisinde yer alan marul, dünyada en çok tüketilen sebzeler arasındadır. Vejetasyon süresinin kısa olmasından dolayı marul yılda 2-3 kez yetiştirilebilmekte ve ekonomik anlamda katkı sağlamaktadır. Güneydoğu Anadolu bölgesinde yer alan Diyarbakır ili gibi karasal iklime sahip bir yörede marul yetiştiriciliğinin yılda 2 veya 3 kez yapılabilmesi için alternatiflerden biride olumsuz iklim koşullarından korumak gelmektedir. Bu koşulların başında sonbahar erken donları ve ilkbahar geç donları marul bitkileri açısından risk oluşturmaktadır. Bitkilerin, soğuk ve dona karşı dirençlerini ve verimlerini arttırdığı bildirilen ve içeriğinde bakteri grubu, mineral madde ile pirüvik asit, okzaloasetik asit ve rüstisiyanin içeren bitki antifirizinin (Cropaid NPA) marul yetiştiriciliğinde özellikle düşük sıcaklığın başladığı dönemlerde uygulanmasının etkisi araştırılmıştır. Bu çalışma 2010 yılında Dicle Üniversitesi Ziraat Fakültesi Bahçe Bitkilerine ait ısıtmasız polikarbon topraklı sera bölmesinde sonbahar döneminde yürütülmüştür. Yedikule marul bitkileri kullanılarak kontrol ve bitki antifirizinin 4 dozu olmak üzere toplam 5 uygulama yapılmıştır. Çalışma tesadüf blokları deneme desenine göre 3 tekerrürlü olarak ve her tekerrürde 40 bitki olacak şekilde kurulmuş olup, her uygulamada 120 bitki, toplam 600 bitki kullanılarak yürütülmüştür. Sonuç olarak bitki antifirizi uygulanan marul bitkilerinde bitki boyu, göbek çapı, bitki çapı ve bitki ağırlığında artış meydana gelmiş ve bunun neticesinde kontrol grubuna göre antifiriz uygulanan bitkilerde verim artışı meydana gelmiştir. Çalışma sonucunda, bitki antifirizinin faydalı olabileceği ve ekonomik anlamda marul yetiştiriciliğinin sonbaharda yaygınlaştırılmasının mümkün olabileceği görülmüştür.

Anahtar Kelimeler: Lactuca sativa, Yedikule, Cropaid NPA, Örtüaltı, Verim

EFFECTS OF PLANT ANTIFREEZE ON LETTUCE (*Lactuca sativa* L. var *longifolia*) GROWING IN UNHEATED GREENHOUSE CONDITIONS

Abstract

Lettuce, which is among the salad group vegetables, is among the most consumed vegetables in the world. Due to the short vegetation period, lettuce can be grown 2-3 times a year and contributes economically. One of the measures taken for lettuce cultivation 2 or 3 times a year in a region with continental climate such as Diyarbakır in Southeastern Anatolia Region is to protect it from adverse climatic conditions. Among these conditions, early autumn and late spring frosts are important risk for lettuce plants. In this study, it is aimed to investigate the effect of natural plant antifreeze, which is reported that it increases the resistance and yield of plants against cold and frost, in lettuce cultivation during the low temperature period. This study was carried out in the autumn season of 2010 in unheated soil part of polycarbonate greenhouse in Horticulture Department of Agriculture Department in Dicle University. Five applications including control and 4 doses of plant antifreeze, were applied to Yedikule lettuce plants. In the study, measurements were taken such as plant height, root length, plant diameter, head circumference, plant weight, number of leaves, amount of water soluble dry material and pH. The study was conducted according to the randomized block experiment design with 3 replications and 40 plants in each application, using 200 plants in each replications, with a total of 600 plants used in experiment. As a result, the data obtained in lettuce plants applied with plant antifreeze were statistically insignificant, a slight increase were observed in parameters. As a result of the study, it is thought to test the plant antifreeze in open field conditions and may contribute to the expansion of autumn lettuce growing in the region.

Keywords: *Lactuca sativa*, plant antifreeze, cropaid NPA, greenhouse, cultivation.

**IMAGING OF FLOWER POLLINATION ALGORITHM FOR OPTIMAL POWER
EXTRACTION FROM SOLAR PHOTOVOLTAIC SYSTEM**

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Abstract

The economic literature offers a wide range of theoretical and empirical approaches according to which entrepreneurship and private initiative constitute the foundation of the economic growth. Moreover, many studies consider that religion has a direct influence on the economic growth, because it promotes values with a great adherence among population. However, when discussing the impact of the different religions on the intention to become an entrepreneur, the opinions are divided. On one hand, there are some studies which certify that the Christianity and the Islam from India favour these intentions, while the Hinduism does not. On the other hand, others found that the Buddhists and the Christians are more inclined to develop the entrepreneurial activities, while the Muslims do not have this preoccupation. The explanation is related to the fact that, when a religious doctrine encourages initiative, self-reliance, risk sharing or philanthropy, there is a higher probability of developing entrepreneurial attitudes. Starting from the assumption that the religious beliefs may influence the individuals' attitude towards work and business, the present paper intends to analyse the impact that religion has on the entrepreneurial intentions of the Romanian students. In order to reach this purpose, the study involved both an extensive investigation of the specialized literature and an empirical research, conducted on a sample of 347 Romanian students.

Keywords: religion, entrepreneurship, economic growth, Romania.

**THE POTENTIAL OF USING MATERIALS OF NATURAL AND BIO ORIGIN FOR
THERMAL INSULATION OF BUILDINGS**

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Abstract

The presentation will focus on the possibility of using insulations based on natural materials in constructions. The aim of the presentation is to show an alternative to energy-demand production of synthetic insulations. I will focus on the hygrothermal properties of the materials examined in our laboratories and present examples of houses insulated with these materials.

Keywords: energy-demand production, natural, hygrothermal

BIOACTIVE PROFILE OF LOCAL BERRIES LIPOPHILIC EXTRACTS

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Abstract

High quality foods are obtained through complex processes, that both negatively and positively influence the finished product, which would lead to changes in their quality. The major cause of food spoilage is oxidation. The oxidation of lipids in food is a complex process that is influenced by various factors such as: the chemical structure of the food; physical condition; the quantity and quality of substances with an antioxidant role in food; how the food is processed, packaged and stored. One of the current strategies used in the food industry to inhibit the oxidation of lipids is the use of antioxidants. Berries are rich in antioxidants, vitamins and minerals. In this research was studied sea buckthorn, hawthorn and rosehips, which represent a natural concentrate of vitamins, carotenoids, folic acid etc. The content of chlorophyll α and β , β -carotene, lycopene and zeaxanthin in the lipophilic extracts of rosehip (ELM), sea buckthorn (ELC), hawthorn (ELP) was determined spectrophotometrically. The results obtained show that the lipophilic extracts are characterized by a rich carotenoid content. ELM contains an essential amount of β -carotene (17.04 mg/L), while ELP contains 1.6 times less and ELC 2.6 times less. After 3 months storage, the β -carotene content decreased for ELM by 15%, ELC by 5% and ELP by 30%. It can be observed that the amount of carotenoids changed non-essential due to storage conditions. Quantitative changes in carotenoids can occur due to oxidative processes that occur along the way, but are slowed down if the extracts are stored in airtight containers to exclude access to oxygen, at low temperatures and in dark spaces. Local berries extracts are characterized by a rich complex of bioactive compounds, the use of which in obtaining functional food products will slow down oxidative processes and ensure food products with a longer shelf life. Acknowledgements: The authors would like to thank the Research Project "Valorisation de composés bioactifs issus de déchets agro-industriels par encapsulation lysosomale – ENcap-LYPOSOM", AUF-ECO-2023.

Keywords: berries, antioxidants, lipophilic extracts, oxidation

GREEN MICROBIOLOGY: SYMBIOTIC SOLUTIONS FOR A CHANGING PLANET

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Abstract

Green Microbiology harnesses the power of microorganisms to address environmental and sustainability challenges. It focuses on understanding and utilizing the beneficial roles of microorganisms in promoting ecological balance, mitigating climate change, and fostering sustainable practices. This approach explores various microbial strategies, such as carbon sequestration, enhancing plant-microbe interactions for agriculture, and utilizing engineered microbial consortia for applications like bio-fertilization. Green Microbiology seeks to uncover the potential of microorganisms to contribute to sustainable development and to develop innovative solutions that align human activities with the natural world, thus promoting environmental harmony. As our planet grapples with the complex challenges of climate change and environmental degradation, the role of microorganisms as allies in fostering sustainable solutions becomes increasingly evident. This exploration endeavors to unravel the potential of "Green Microbiology," a holistic and symbiotic approach that harnesses the power of microorganisms to mitigate and adapt to the consequences of a changing climate. Our exploration investigates the intricate symbiotic relationships between microorganisms and their host environments, emphasizing the role of these partnerships in promoting ecological balance. Significant intentions include identifying microbial strains adept at sequestering greenhouse gases, exploring their interactions with plant systems to enhance carbon capture in soils, and deciphering the underlying mechanisms of microbial-mediated

climate resilience. We probe into the potential of engineered microbial consortia to act as bio-fertilizers, promoting sustainable agriculture practices that simultaneously increase crop yields and reduce environmental impact. Furthermore, this study emphasizes the importance of microbial diversity in maintaining ecosystem stability. By elucidating the genomic and functional diversity of environmentally beneficial microorganisms, we aim to uncover untapped resources for sustainable development. Preliminary findings showcase successful field applications of Green Microbiology interventions, indicating promising results in terms of carbon sequestration, soil health improvement, and crop yield enhancement. This review addresses the considerations of scalability, ethical implications, and community engagement in deploying Green Microbiology solutions. It also aims to provide a comprehensive exploration of Green Microbiology as a paradigm shift in environmental science. By elucidating the symbiotic relationships between microorganisms and the changing planet, we strive to pave the way for innovative, sustainable solutions that harmonize human activities with the natural world.

Keywords: Green Microbiology, carbon sequestration

**GAC BY-PRODUCT AND ITS POTENTIAL USE FOR DEVELOPMENT OF EDIBLE
FILM**

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Abstract

Gac (*Momordica cochinchinensis*), belonging to the Cucurbitaceae family, is a tropical fruit that is known to contain the highest carotenoids in the whole plant kingdom. This fruit is commercially used for production of oil and a major by-product from oil production is the pulp which accounts for approximately 40-50% of fruit weight. This by-product is typically ending up in landfill, thus valorisation of this by-product not only tackles the waste problem, but also adds value for the industry. This study was conducted to analysis the basic composition of gac pulp and further develop edible films from this by-product. The results showed that gac pulp has low protein and total fat content, but contains high level of pectin (nearly 50%). The results further indicated that gac pulp is a potential ingredient for development of edible film. Gac pulp (4%) in combination with sodium alginate 1.03%, kappa-carrageenan 0.65%, and glycerol 0.85% (w/v), can produce film with high mechanical properties, low water vapour permeability and acceptable physical properties. In concussions, gac pulp is a rich source of pectin and is suitable for development of edible film for further applications in food.

Keywords: Gac pulp; edible film; seaweed hydrocolloids.

**ARTIFICIAL INTELLIGENCE IN BUSINESS TRANSFORMATION:
STRATEGIES FOR COMPETITIVE ADVANTAGE**

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Abstract

This research investigates the substantial impact of Artificial Intelligence (AI) on corporate transformation strategies, specifically emphasising its critical role in competitive advantages in a dynamic business landscape. This study employs a comprehensive and interdisciplinary methodology to investigate the multifaceted effects of Artificial Intelligence (AI) on several areas of business operations. The aforementioned factors encompass process optimisation, consumer involvement, decision-making and creativity. In the rapidly evolving and information-driven environment of modern business, the incorporation of Artificial Intelligence (AI) has emerged as a catalyst for significant transformation. This integration presents organisations with unprecedented opportunities to reevaluate their operational strategies, enhance their decision-making processes and gain a competitive edge. Within the dynamic landscape of contemporary business, the strategic utilisation of Artificial Intelligence (AI) assumes a crucial function in safeguarding an organisation's competitive position within the market. This research proposal aims to provide a complete analysis of the multifaceted and intricate role of Artificial Intelligence (AI) in facilitating business transformation, together with identify and analyse strategies that businesses might employ to achieve and sustain a competitive advantage. The transformative capacity of Artificial Intelligence surpasses the boundaries of mere automation. Artificial intelligence (AI) systems, which leverage machine learning and deep learning methodologies, have the capacity to offer predictive analytics, personalised customer experiences and data-driven insights that facilitate the advancement of innovation. The aim of this proposal is to examine the strategic implementation of Artificial Intelligence (AI) with the goal of enhancing operational efficiency and revolutionising the core practises of organisational business operations.

Keywords: Artificial Intelligence, dynamic business landscape

**HOW TO INTEGRATE THE CONCEPT OF HUMAN RESOURCE EMPOWERMENT
IN PROFESSIONAL SPORT ORGANIZATIONS AND SPORT CLUBS.**

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Abstract

In order to keep up with the continuous changes in the social, political and economic environment, modern organizations and businesses adopt people-centered methods of management. Total Quality Management is a prodigious example of continuous improvement in terms of business excellence. In the context of Total Quality Management, human resources are considered a key factor to success, more specific the empowerment of human resources is the enabler that leads to increased productivity, performance and well-being, especially in times of excessive work and employees' burnout. The purpose of this research is to provide sport clubs and organizations with a path of "Human Resource Empowerment" (HRE) integration into their processes, strategies and overall management method. The research highlights the importance of HRE in professional sport organizations' and sport clubs' overall performance. The analysis of each step towards the integration of HRE concept into the organizations' processes includes techniques, tools, practices and strategies.

Keywords: Human Resource Empowerment, Professional Sport Organizations, Professional Sport Clubs, Total Quality Management, Business Transformation

**SPEED OF PROCESSING THROUGH STROOP EFFECT, READING SKILLS,
ARITHMETIC PERFORMANCE AND BEHAVIORAL ISSUES IN SCHOOL
CHILDREN**

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Abstract

Objective: To assess the speed of processing through stroop effect, reading skills, arithmetic performance and behavioral issues in school children. **Methods:** This cross-sectional study was carried out from September 2021 to September 2022. The sample consisted of 200 students of both gender with ages 7-9 years from different government schools of city Lahore, Pakistan, through stratified sampling technique. Children were assessed using local norm-based Stroop Test, Urdu Reading Test, Functional Cognitive Scale, and Psycho/social Behavioral Issues Scale along with demographic sheet. **Results:** The psychometric properties of local norm-based Stroop Test were found to be .83. Moreover, correlational analysis showed significant negative correlation of speed of processing, reading skills and arithmetic performance, with behavioral issues. However, boys scored higher on behavioral issues as compared to girls. Furthermore, mediation analysis confirmed the mediating role of arithmetic performance through indirect effect, as students with better mathematics skills would have sharp cognitive abilities and experience less behavioral issues. **Conclusion:** Speed of processing constitutes different cognitive structures that help in performing day-to-day tasks. Thus, deficit in speed of processing may not only affect the intellectual development of children but also lead to different behavioral issues such as low attendance, school dropout, involvement into fights, abusive language and poor school performance.

Keywords: Stroop Effect, Speed of Processing, Behavioral Issues

**GERIATRIC NUTRITION IMPROVEMENT
THROUGH THE DEVELOPMENT OF AMARANTH FOODS**

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Abstract

The world population is in a constant process of aging. The percentage of people aged 65 and older was about 9% in 2020 and is estimated to increase to 16% by 2050. Nutrition plays a preventive role and is considered a key component of the quality of life. The nutrition peculiarities of older persons of the age group include: eating strictly at the same time and limiting the amount of food intake, while the consumed food should be nourishing, easily digestible, and rich in vitamins and minerals. The aging of the body is accompanied by a gradual decrease in the intensity of metabolism, for this reason, a reduction in the number of calories consumed is required. For elderly consumers (60+) it is necessary to ensure special nutritional conditions, a complete diet with easily digestible foods and high biological value. Fermented milk products are among the most popular geriatric products, as they have a beneficial effect on the gastrointestinal tract of older people, have a low lactose content, and contain easily digestible proteins. Thus, lactic acid products are of interest in terms of optimizing their composition and widening the assortment of foods intended for geriatrics. In order to obtain a fermented dairy product with increased biological value without reducing its amino acid potential, it was proposed to create a hybrid cheese based on proteins of both animal and plant origin. Amaranth grains (*Amaranthus L.*) were chosen as the source of vegetable proteins, which have a high protein content (16–19%) with easily digestible essential amino acids (up to 85%), vitamins (A, B, C, D, E), microelements (iron, magnesium, calcium, phosphorus, potassium, copper, zinc, sodium), rare antioxidant squalene, which in turn has fungicidal, anticancer and antimicrobial properties. The amaranth-based hybrid cheese, compared to the standard product (cow milk cheese), contains less dry matter, but the total amount of protein in its composition is increased by 30...35%. The acidity level is higher in samples where the proportion of amaranth is higher but does not exceed the standard limit for fermented milk products. Thus, the basis for obtaining geriatric dairy products with increased biological potential has been developed. Acknowledgment: The research was funded by State Project 20.80009.5107.09 “Improving of food quality and safety through biotechnology and food engineering”, running at the Technical University of Moldova.

Keywords: the elderly population, geriatric products, fermented milk products, dairy foods

APPLICATIONS OF PUMPKIN POWDER AS NOVEL INGREDIENT IN BISCUITS

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Abstract

The problem of food with functional ingredients, characterized by low energy intake and a variety of phytonutrients with biological activity, is one of the concerns of the population. The objectives of this study were to investigate the effect of pumpkin powder and its bioactive components on the quality, color and textural properties of shortbread cookies. The fresh and dried pumpkin was analysed in respect to physicochemical indicators, color parameters, and antioxidant activity. Pumpkin powder has been proven in studies to be a source of carotene, water-soluble vitamins and amino acids, presented a rich source of antioxidants and vitamins, the range of values of lipophilic substances as carotenoids present in pumpkin can contribute significantly to the uptake of provitamin A and especially lutein, a carotenoid with special physiological functions. Also, the antimicrobial activity of pumpkin powder against Gram-positive, Gram-negative bacteria and high antifungal activity were attested. The sensory, physicochemical, texture parameters (consistency) and color indicators of shortbread cookies with yellow pumpkin powder added in a proportion of 5–20% were analyzed. The optimal score was given to the sample of 15% YPP. The use of 15–20% YPP contributed to improved consistency due to the formation of complexes between starch and protein. Also, it contributed to firmer cookie consistency the attributed to amylose and amylopectin recrystallization, the formation of complexes between starch and proteins, and to redistribution of water between the components of the product, as well as other events that may occur in this type of cookie. The use of yellow pumpkin powder provided a pronounced nutty flavor and odor of cookies. The resulting shortbread cookies have a particular orange yellow color, which is typical of the substitute ingredient, which is yellow pumpkin powder. Overall, the addition of yellow pumpkin powder in an amount not exceeding 15% improves the overall consumer experience and has practical applications in the development of a better and more presentable product. Acknowledgment: Francophone University Agency (AUF) ECO 2023 DRECO-7859, project “Extraction ‘verte’, stabilisation et valorisation des composants bioactifs de Ribes nidrigolaria et Cucurbita maxima”.

Keywords: pumpkin powder; shortbread cookies; texture; sensory quality; physicochemical quality.

BUSINESS ORGANIZATIONS AND ETHICAL BEHAVIOUR

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Abstract

What is the relevance of ethical behavior to organizations and their managers? How would you inculcate the significance of being ethical as well as profitable among your employees? What ethical principles would you enunciate to guide individuals and organizations? This is a sticky domain. All of us are aware of the financial and moral misconduct by senior executives at some of the top companies across the globe. This may force you to conclude that organizations are not ethical. This, however, is not the case, but managers in all types of organizations face ethical issues and predicaments. Is it ethical for a steel producer to buy iron ore at a much discounted rate from sources who do illegal mining by bribing government officials? Is it ethical to claim inflated bills against your entitlements? Individuals who are deficient of a strong moral sense are less likely to act unethically if they are restrained by rules, policies, job descriptions, or strong cultural norms which disprove of such wrong behaviours. On the contrary, people having high moral values can be soiled by an organizational structure and culture that subscribes to unethical behaviours. Ethical behavior refers to the standards, values, and notions which constitute appropriate and inappropriate behavior and decisions by organizations and their managers. Organizational culture is one strong dimension which affects ethical behavior in business organizations. When faced with an ethical issue, if an individual behaves ethically or unethically depends on several factors. Those factors that influence ethical and unethical behavior constitute an employee's stage of moral development, personal characteristics, issue intensity and structural variables. Besides, one of the most significant factors affecting the determination of employees to act ethical or unethical is the behavior of senior managers and leaders in the organization. We will also investigate if ethical standards are universal! We will explore as to what are the international ramifications of ethical behavior and standards. Next, what can managers potentially do if they are sincere about promoting ethical standards and behaviours? In this paper, we will elaborate on the factors that lead to ethical and unethical behaviours. We will also talk about the management's role in encouraging ethical behavior. Besides, we will also dwell upon some of the contemporary ethical issues.

Keywords: Ethical behavior, ethical issues and dilemmas, organizational culture, stage of moral development, personal characteristics, issue intensity, structural variables, universal ethical issues, contemporary ethical issues.

**ANALYSIS OF THE TECHNICAL EFFICIENCY OF UPLAND FARMING IN
TASIKMALAYA REGENCY**

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Abstract

The drought disaster is one of the causes of scarce food stocks. Scarcity of food stocks, especially rice, is a crucial problem. One solution to food scarcity when a drought occurs is through the development of upland rice farming. This research aims to analyze technical efficiency and sources of technical inefficiency in upland rice farming in Tasikmalaya. The stochastic frontier analysis approach was used for data analysis. The urgency of this research is expected to provide a comprehensive picture of the technical side of implementing upland rice farming and whether it is efficient. The research results show that upland rice farming in Tasikmalaya Regency is technically efficient, with an average efficiency level of 0.795. The socio-economic factors that are the source of the high technical inefficiency of upland rice farming in Tasikmalaya Regency are: the number of family dependents, while the main type of work, and participation in upland rice cultivation training are sources that reduce the technical inefficiency of farmers in Tasikmalaya Regency.

Keywords: Upland Rice, Technical Efficiency, Frontier

**EDIATED-MODERATION THROUGH RESILIENCE AND SOCIAL SUPPORT
BETWEEN OCCUPATIONAL STRESS AND MENTAL HEALTH ISSUES AMONG
RESCUE WORKERS**

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Abstract

The study's objective was to investigate the mediated-moderation of resilience and social support between the relationship of occupational stress and mental health issues among rescue workers. Depression, generalized anxiety disorder, and PTSD symptoms were measured as mental health problems. Data were collected from 356 male respondents with age range from 20 to 60 years on The effort Reward Imbalance Questionnaire, GAD-7, Beck Depression Inventory II, PTSD Checklist-Civilian Version, Multidimensional Perceived Social Support Scale, and Brief Resilience Scale. Analysis of mediation-moderation using the Hayes Process Macro Model 5 on SPSS-21 revealed that social support had a substantial influence as a mediator for depression and post-traumatic stress disorder (PTSD), whereas resilience had no significant impact as a moderator between occupational stress and mental health disorders. The findings of this study have significant ramifications for the field of mental health, and they can be applied to health programs to enhance the standards of care and attention to the wellbeing of rescue personnel.

Keywords: Mental Health, Occupational Stress, Resilience, Social Support, Rescue Workers

**DEVELOPMENT OF ANTIMICROBIAL PROPERTIES OF COTTON FABRIC
TREATED WITH ZINC MONOHYDRATE AND ZINC SULPHATE HEPTAHYDRATE**

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Abstract

This study aimed to develop antimicrobial properties in cotton fabric by treating it with zinc monohydrate and zinc sulphate heptahydrate. The fabric samples were treated with varying concentrations of the two solutions using a pad-dry-cure method. The treated fabric samples were then tested for their antimicrobial properties against two types of bacteria, namely *Staphylococcus aureus* and *Escherichia coli*. The results showed that both zinc chloride and zinc nitrate treatments exhibited antimicrobial activity against the two bacteria strains. However, the zinc chloride treatment was found to be more effective than the zinc nitrate treatment in inhibiting bacterial growth. The study concluded that treating cotton fabric with zinc chloride can be an effective method to develop antimicrobial properties in textile products, which can be useful in various applications, such as medical textiles, protective clothing, and other high-risk environments.

Keywords: Cotton fabric, Zinc monohydrate, Zinc sulfate heptahydrate, Antimicrobial properties, Treatment

CRIME DATA AND INFORMATION MANAGEMENT SYSTEM

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This project paper aims to systematise the existing criminal records of the Nigeria police. The essence was to produce robust criminal records and avoidable loss of criminal records. Structural database management system (DBMS) was used in its development in other to remove redundancy in the compilation, its friendliness in responding to the user exhibits and also its reliability and efficiency in tracking down criminals. Another important feature of this Crime Information Management System is that it provides user with the facilities for having the hard copies or print out of any relevant document as well as the facilities to communication with the system. Tracking is the observing of persons or objects on the move and supplying a timely ordered sequence of respective location data to a model e.g. capable to serve for depicting the motion on a display capability. The traditional and age-old system of criminal record and file processing has failed to live up to the requirements of the existing crime scenario. Manual processes neither provide accurate, reliable and comprehensive data round the clock nor does it help in trend prediction and decision support.

Keywords: System, Crime, Management, Database.

NEWS/EVENTS AUTOMATION SYSTEM

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Abstract

News and event system is a platform developed in order to alleviate the problems faced by numerous organizations that use the notice boards method to pass information. The software tackle problems associated with the use of notice boards which include; information not reaching the target audience in real time, loss of important files, and news or information been tempered with during the process of transmission. The project was conduct so as to develop a software that will be able to take care of all the processes that are involved in automating the notice board method of conveying news and events, this includes; to effectively and efficiently disseminate information about real time news and upcoming events, to provide a reliable source of information, and to bridge the gap between heads of organizations and their staff. The software is designed to carter for the needs of activities document news and events system through the automation of the existing manual system. HTML and XPSS as used to design the GUI, PHP my admin was used to design the database and XAMP server was used to preview the work on browser.

Keywords: System, News, Event, Database.

SURGICAL MANAGEMENT OF TEAT LACERATION IN A COW

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Abstract

Laceration is a kind of tear-like wound caused by a blunt impact to soft tissue. It is an injury in the form of a cut owing to separation of connective tissues. A six-year-old female cross bred jersey cow was presented to vcc, RIVER with a history of a day-old teat wound on the left fore teat. On clinical examination a vertical wound from the base to teat tip was observed with intact teat canal and teat orifice. All the physiological parameters were within normal range and milk was negative for California mastitis test. The animal was restrained on standing sedation using inj. Xylazine 4mg administered intravenously and local analgesia using 2% lignocaine hcl administered by ring block. 10 ml blood in EDTA was collected for PRP preparation. The teat canal patency was maintained by placing an infant feeding tube size 10 in-situ by stay suture at the teat tip. The wound was flushed with 5 % povidone iodine diluted in normal saline and debridement of the wound edges were done. The muscle layer was apposed by simple continuous suture using vicryl 2-0 and prepared PRP was injected s/c around the surgical site. The skin was apposed with disposable stainless steel skin staples. The surgical site was protected by povidone iodine gauze and dynafix bandage. Postoperatively inj. Streptopenicillin @ 10 mg /kg body weight intramuscular for 5 days and inj. Meloxicam @ 0.2mg /kg body weight administered intramuscular for 3 days postoperatively. Inj.gentamicin 5 ml with metronidazole was administered intramammary for 5 days. Wound dressing was done once in 3 days. On 10th postoperative day skin staples were removed and wound healing was noticed with normal hand milking. The animal made an uneventful recovery.

Keywords: Teat wound, PRP, Skin staples, cow

PHARMACOLOGICAL ACTIVITY OF NARINGIN: PRECLINICAL EVIDENCES

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Abstract

Over the past few decades, a great deal of research has been conducted to provide a complete description of thousands of phytochemicals that have been identified and their biological functions. These phytochemicals have the potential to be used for a wide range of medical reasons. These phytochemicals are mostly polyphenols, followed by terpenoids and alkaloids, and are pharmacologically significant for clinical usage. In order to guarantee their high production at a reasonable cost, efforts are currently being conducted to synthesize pharmacologically diverse active flavonoids from scratch, such as naringin from *Escherichia coli*. Numerous studies that have been published highlight the key function that phytochemicals play in treating a variety of illnesses. But only few phytochemicals show promise as medicines, and not all of them have strong biological effects. Citrus fruits contain a flavanone called naringin, which has been shown to enhance immunity, repair DNA damage, and scavenge free radicals. Naringin has a very poor bioavailability, yet it is recognized to have a number of intriguing biological qualities that are important for medicine, such as antioxidant and anti-inflammatory effects. Additionally, a number of pharmacological actions of naringin have been explored, including effects on pulmonary disorders, neuroprotection, cardioprotection, and hepatoprotection.

Keywords: Naringin; pharmacology; natural medicine; polyphenols.

**HARNESSING AFRICAN INDIGENOUS KNOWLEDGE SYSTEMS FOR
KNOWLEDGE PRODUCTION: A RE-DEFINITION OF A CULTURE-CENTRIC
EPISTEMOLOGY**

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Abstract

Evolving an appropriate theoretical model which has the capability of exploiting the wealth in African indigenous culture-centric knowledge systems towards the production of relevant knowledge amidst the reality of present day's practice of globalization of knowledge production, is the great challenge that necessitates this research. This study therefore aims to undertake a re-examination of our conception of culture in order to provide a domesticated and interpretative criteria for understanding the foundational role it plays in the determination of the nature, scope and sources of Knowledge indigenous Africans appreciate and pursue which are exploitable for effective knowledge production. This African traditional culture-centric worldview is in contradistinction to the western epistemic nuances and skewed interpretation of the African reality. In the quest to clarify this interpretative criteria, the researcher among other purposes, identifies the indigenous values which yield pertinent knowledge that has historically kept Africa stable prior to the advent of slave trade, colonization and even partially amidst present day's globalist agendas hence, the author projects the same for universal beneficence. Nevertheless, this paper observes that the habitual reliance on Western interpretations and meanings of African realities is a gap created by Africans themselves by their over dependence and overemphasis on foreign epistemological structures with its' strictures and warns that a continued subjection of African culture to the dichotomization and compartmentalization in Western epistemology will perpetually limit African epistemologies to mere logic-chopping and emasculate her knowledge production potentials. Consequently, this paper suggests that Africa re-interprets her reality through a rereading of her history, ideological dissemination and the subsequent application of her knowledge systems through the lenses of her cultural uniqueness. The researcher adopts the content analysis and hermeneutical methods of enquiry for this study

Keywords: Harnessing, Indigenous knowledge, Knowledge production, Epistemology, Culture.

**RECENT APPLICATIONS OF MUKAIYAMA ALDOL REACTION TOWARDS THE
STEREOSELECTIVE SYNTHESIS OF NATURAL PRODUCTS**

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Abstract

Mukaiyama Aldol reaction was first envisaged in 1973 by Mukaiyama, to afford the β -hydroxy substituted carbonyl compounds in an enantioselective manner. It involves the treatment of silyl enol ether with ketone or aldehyde via Lewis-acid mediated cross-aldol reaction. The resulting Mukaiyama aldol adducts have been found to process multiple implementations to accomplish the total synthesis of numerous natural products, having significant medicinal profiles. Here, the recent utilizations (2020-2023) of Muakiyama aldol reaction as a key step to access the enantioselective synthesis of several classes of natural products (i.e., macrolides, polyketides, terpenoids, metabolites and alkaloids etc.) have been highlighted.

Keywords: Mukaiyama Aldol Reaction; Natural Products; Stereoselective Synthesis.

**A QUALITATIVE QUANTITATIVE MIXED METHODS STUDY OF DOMESTIC
VIOLENCE AGAINST WOMEN: A CASE STUDY OF SHIKARPUR-SINDH-
PAKISTAN**

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Abstract

A qualitative quantitative mixed methods study of domestic violence against women. Data were collected from 400 women in various Taluka Tangwani District Kandhkot Sindh- Pakistan. This study was conducted as mixed research (cross-sectional descriptive and phenomenological qualitative methods) to investigate domestic violence against women, and some related factors (quantitative) and experiences of such violence (qualitative) simultaneously in Semnan. In quantitative study, cluster sampling was conducted based on the areas covered by health centers from married women living in Semnan since January 2022 to November 2023 using Domestic Violence Questionnaire. A structural questionnaire was developed for the reliability and validity of Data Shikarpur and Nausheroferoze. It was revealed that 1200 cases of domestic violence were reported in the Sindh. most of the cases increased because of the lockdown period March to 2nd July, 2022. It was further revealed that 200 women were brunt and 31 women were dead during this COVID-19 pandemic. Most of the women during this lockdown have negative impact on their metal health and 20 were reported metal disorder during this COVID-19 lockdown. Government should think about women who is already living a miserable life in Rural Sindh. It was further revealed that In qualitative study, seven themes were found including “Facilitators”, “Role failure”, “Repressors”, “Efforts to preserve the family”, “Inappropriate solving of family conflicts”, “Consequences”, and “Inefficient supportive systems”. In quantitative study, the variables of age, age difference and number of years of marriage had a positive and significant relationship, and the variable of the number of children had a negative and significant relationship with the total score and all fields of the questionnaire ($p < 0.05$). Also, increasing the level of female education and income both independently showed a significant relationship with increasing the score of violence.

Keywords: Qualitative and Quantitative, DOMESTIC, VIOLENCE, WOMEN, PAKISTAN

**THE IMPACT OF THE INVESTOR AND THE INVESTEE NIGERIA-CHINA
RELATIONSHIP IN A MULTI-RELIGIOUS NIGERIA**

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Abstract

This article examines China's loans and their impact on infrastructural and human capital development in Nigeria. Nigeria is a country that is reckoned as being religious; however, other countries expect to see the dividends that the Nigerian government usually collects from other countries. This study focuses on China's aid in terms of loans and assesses its impact. This study made use of twelve (12) purposively selected informants and also data from relevant academic literature. Content analysis was adopted. Emerged themes include: i) the normative practice of corruption; ii) the attitude of Nigerians; iii) falsifying figures for contracts; and iv) increasing poverty. Nigerians perceive the large borrowings of the Nigerian government from China as having little or no effect on the growth and development of the country. Contemporary, the government of Nigeria seems undisturbed by the increasing loans from China, because, they may not be in power when there is a default in the repayment of the loan. As a wise counsel, there is the need to diversify the economy from a petroleum based economy to other sectors based economies such as agriculture, among others.

Keywords: Africa, Chinese loans, Nigeria Bilateral Relations, Corruption, Poverty, Debt

**REFLECTIONS OF A CREATIVE CATALYST ON ‘SEX FOR GRADES’ IN NIGERIAN
TERTIARY INSTITUTIONS: CONSEQUENCES AND WAYS FORWARD**

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Abstract

This study delves into the deeply entrenched issue of sex for grade within tertiary education, particularly its harrowing impact on both academic excellence and broader societal advancement. Female students bear the brunt of this unethical practice, which has seeped into the very fabric of academic institutions, posing a grave threat to educational integrity and the competence of the workforce it produces. Drawing on the foundations of social responsibility theory, this research embarks on a comprehensive analysis, viewing the problem through the lens of artistic creativity. It proposes a forward-thinking and inventive solution, termed the Incognito Mechanism, designed to tackle this issue head-on. By gathering and chronicling the experiences and insights of a creative catalyst, the author, whose artistic discipline exhudes basically a pragmatic approach to resolving critical socio-economic challenges, this study illuminates the distressing consequences of such exploitation on the socioeconomic landscape and employment rates within Nigeria. Employing a qualitative context, the findings underscore the critical and immediate necessity of implementing the Incognito Mechanism. Furthermore, this study advocates for proactive education among students, imparting knowledge about the mechanism’s potential efficacy in eradicating this reprehensible practice. By doing so, it aims to catalyze meaningful change and restore the sanctity and equality of education in tertiary institutions. Relevance of the Study to the United Nations SDGs This study on Sex for Grades in Nigerian tertiary institutions, rooted in social responsibility theory, aligns with UN SDGs 4, 5, 8, 10, and 16. It addresses quality education, gender equality, reduced inequalities, and just institutions. By proposing the Incognito Mechanism, it aims to eradicate exploitative practices and contribute to a more equitable and inclusive educational landscape, emphasizing the significance of ethical learning environments and fair opportunities for all students.

Keywords: Creative Catalysts, Girl Child, Sex for Grade, Social Responsibility Theory, Tertiary Education

SUSTAINABLE DEVELOPMENT GOALS



**ANTIFUNGAL PROPERTIES AND CHEMICAL COMPOSITION OF IRANIAN
FENNEL ESSENTIAL OIL: A STUDY ON ITS EFFECT ON *CANDIDA TROPICALIS*
BIOFILMS**

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Abstract

The objective of this study was to investigate the chemical composition and antifungal properties of fennel (*Foeniculum vulgare*) essential oil against *Candida tropicalis* biofilms. The oil was extracted from the seeds using hydrodistillation and analyzed using gas chromatography-mass spectrometry (GC-MS). A total of twenty-three compounds, accounting for 99.96% of the oil's composition, were identified. The main constituents were anethole (88.18%), p-allylanisole (11.72%), dl-limonene (10.35%), and fenchone (4.69%). The oil exhibited a high concentration of phenylpropanoids, with anethole and p-allylanisole being the most abundant. To assess its antifungal activity, the fennel essential oil was tested against *Candida tropicalis* biofilms on polystyrene plates. The results demonstrated a significant inhibitory effect on biofilm formation, with a reduction in biofilm mass of 71-91% at concentrations of 3000-5000 mg/ml. The minimum inhibitory concentration (MIC) of the oil ranged from 500 to 1500 mg/ml, while the minimum fungicidal concentration (MFC) ranged from 2000 to 2500 mg/ml. Further examination using scanning electron microscopy (SEM) revealed that the fennel essential oil caused cellular damage, disrupted the biofilm structure, and induced membrane shrinkage in sessile cells at sub-MIC concentrations. These findings suggest that fennel essential oil has the potential to serve as a natural antifungal agent and flavoring additive, making it a promising option for combating *Candida tropicalis* biofilms.

Keywords: *Foeniculum vulgare*, Gas Chromatography-Mass Spectrometry (GC-MS), *Candida tropicalis*, Biofilms, Scanning Electron Microscopy (SEM).

**ASSESSMENT OF OROPHARYNGEAL CANDIDIASIS AND ANTIFUNGAL
SUSCEPTIBILITY OF *CANDIDA GLABRATA* IN HIV-INFECTED PATIENTS**

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Abstract

The objective of this study was to determine the prevalence of oral mycoflora in individuals who are HIV-positive and evaluate the susceptibility of *Candida glabrata* (*C. glabrata*) isolates to standard antifungal medications. The study included a total of 100 HIV-infected patients with oropharyngeal candidiasis (OPC). The susceptibility of *C. glabrata* isolates to antifungal drugs was assessed using the disc diffusion method. A total of 254 yeasts were isolated from the patients, with angular cheilitis being the most common clinical variant observed in 40% of the patients. *Candida* species (94.4%) were the most frequently identified genera, followed by *Saccharomyces* (2.4%), *Kluyveromyces*, and *Cryptococcus* (1.6%) species. Among the *Candida* species, *C. albicans* (37.2%) was the most commonly isolated species from HIV-positive patients with OPC, and its frequency was significantly higher compared to other *Candida* species. Among the non-*C. albicans* species, *C. glabrata* was the most frequent. The study found that *C. glabrata* isolates exhibited the highest sensitivity to polyene drugs such as nystatin and amphotericin B. Additionally, it was observed that oral isolates of *C. glabrata* were most sensitive to polyene drugs and least sensitive to fluconazole. Overall, this study revealed a wide diversity of *Candida* species in HIV-positive patients with OPC.

Keywords: Oral cavity, candidiasis, *Candida glabrata*, HIV infection, nystatin, amphotericin B

**THE IMPACT OF PHILOSOPHY ON SOCIAL CHANGE DYNAMICS OF SOCIAL
CONSCIOUSNESS IN NIGERIA**

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Abstract

This paper examines the links between the process of modernization and identity politics of philosophy in social change dynamics of the independent era in Nigeria. A general look at the history of Philosophy shows that the scope of philosophy is very wide and has been contemplative in nature. It has played and continued to play a fundamental role in the history of mankind. Philosophy stands as a hallmark in achieving good human relation in any given society. It is generally seen as a discipline with social consciousness for the transformation of the society into different developmental paradigms. The definition of philosophy varies in line with the challenges of the periods in history of man's evolution. It is quite interesting to understand that in all the phases, it is the human wisdom that it is being sought as an organ of social change in the realm of particularistic forms social consciousness. The findings of the study support the thesis that philosophy plays a very important role in the development of human kind, by spreading of ideas and values that strengthen the thoughts and life of a people. So this paper therefore examines the place of philosophy in the dynamic of social change in the context of its relevance and implications for growth among the masses in Nigeria. The concept of qualitative methodology is adopted in examining several factors closely related in this research.

Keywords: Paradigm, Social change, Philosophy, Social consciousness.

ESZTER (ESTHER) OJTOZI, THE HEROIC SCHOLAR IN THE FIELD OF OLD PRINTED BOOKS, WHO CREATED INTERNATIONALLY RECOGNIZED SCIENTIFIC RESULTS, DESPITE STRANGE HARSH CONDITIONS

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Abstract

Eszter (Esther) Ojtozi, the Heroic Scholar in the Field of Old Printed Books, Who Created Internationally Recognized Scientific Results, Despite Strange Harsh Conditions. In Hungary, research on Ukrainian cultural heritage was conducted on the international level especially on old printed Cyrillic books of Ukrainian origin, by Esther Ojtozi in the 1970s-90s, who was much evaluated also by Isaievych, a Ukrainian academic and Harvard professor, too. She reconstructed the shifted libraries as the book collection of Basilian Order in Máriapócs [East Hungary], and others; she made annotations and descriptions of books at the modern international level; collaborated with Ukrainian academician Isayevich and others; and came to the conclusion that 80% of old printed books were brought from Ukrainian printing houses. On the other hand, Isayevich also wrote that Serbs bought books from the Lviv Brotherhood, and even more so, even gave books free of charge to Serbs from the Brotherhood. But Ojtozi hasn't worked with the Serbs yet. Her significant result was the evidence that almost eighty percent of the liturgical books printed in Cyrillic letters came from Ukrainian printing houses of the Polish-Lithuanian Commonwealth, but not from "Muscovy", contrary to the previously falsely spread views of A. Hodinka. (The name "Muscovy" is at Hodinka). Ojtozi first published about it in her book about the Library of Basilian in Máriapócs. (Ojtozi, 1982) Then she strengthened it in papers published in Ukrainian, too. (Ojtozi, 1982) Esther Ojtozi did not limit herself to studying Slavic books. She processed a monograph on the owners and origin (possessors and proveniences) of foreign old printed books of the University Library in Debrecen. (Ojtozi, 1994-1996) Eszter Ojtozi worked all her life in the "Egyptian" conditions, despite her "official" work, she continued the scientific activity only in her spare time. Despite all the harsh conditions, she became a well-known specialist in the field of reconstruction of destroyed church book collections, completing an inventory of old printed liturgical books, identifying rare and defective copies, and international cooperation in order to complete a "Consolidated Catalog" (Nemirovsky) as well as a catalog of books printed on the territory of Ukraine and the eastern half of the Rzeczpospolita of Poland (Isayevich). It is worthy to devote a separate publication to the life and activity of such a heroic scholar, thus in this paper we introduce her work and scientific results, as well.

Keywords: Book_history, Hungary, Ukraine, Cyrillic_printing, Book_migration, Early_Modern_Age

**UTILIZING GRAPHIC DESIGN FOR SOCIOECONOMIC ADVANCEMENT:
EXPLORING MOBIGRAPHY AND EXPERIMENTAL OUTCOMES OF A PHOTO
FRAMING TECHNIQUE**

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Abstract

In the ever-evolving landscape of 21st-century society and the economy, Graphic Design has emerged as a potent driver of socio-economic transformation. This research embarks on a profound journey to explore and unveil the vast potential held by Graphic Design. Our specific emphasis is on Mobigraphy, a portmanteau of “mobile” and “photography,” signifying the increasing role of mobile devices in shaping the contemporary photography landscape. Simultaneously, this study delves into pioneering discoveries within the realm of photo framing experimentation, bringing a fresh perspective to this facet of Graphic Design. This research is firmly rooted in pragmatism theory, which is a philosophical perspective that asserts the truth of an ideology or proposition is determined by its satisfactory practical outcomes, and the meaning of a proposition is derived from the practical consequences of embracing it. In this view, impractical ideas are to be discarded. To uncover insights and empirical evidence, we maximised a comprehensive experimental study approach, integrating a range of qualitative and quantitative data collection methods. These include the experiment’s results, in-depth case studies of Graphic Design projects, and personal observations. The preliminary findings shed light on the significant influence Graphic Design exerts on socio-economic change, particularly in the context of Mobigraphy and innovative photo framing experiments. Our thorough discussion not only identifies the challenges that the Graphic Design field faces but also highlights the myriad opportunities it offers in propelling societal and economic advancement. In conclusion, this research underscores the pivotal role of Graphic Design in the ongoing facilitation of socio-economic transformation. We strongly advocate for the creation of an enabling environment that nurtures innovative Graphic Design practices and encourages the development of experimental photo framing techniques to further harness the socio-economic potential of this field.

Keywords: Entrepreneurship, Experimental Research, Graphics Design, Mobigraphy, Photo Frame, Socio-economic Development

**A PHENOMENOLOGICAL STUDY ON EXPERIENCES OF DEPRESSIVE OLDER
PEOPLE IN INDIA**

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Abstract

A Phenomenological Study on Experiences of Depressive Older People in India Background of the study: An old man is the gold mine of wisdom. He is capable of giving a right guidance to family, society or a nation. Agedness is a divine gift of nature to man. Depression is a most common psychosocial problem among older people. Identification of depression is the major task of the health care professionals because older people may have different symptoms than younger people. Most of them are looking sad and not interested to do any social activities. They are not willing to share their feelings and concerns. Objective: This phenomenological study aimed to explore the experiences of depressive older people in India Methods: Phenomenological Study design was used in this study. In-depth interview were conducted with a purposive sample of twenty older people with the problem of depression for the period of six months to one year. The data were analyzed by using Hermeneutical approach to identify underlying themes. Results:hree main themes emerged:1. Types of Old age Depression (Mild, Moderate and Severe types of depression present in older people)2. Experiences of depressive Older People (Clinical manifestations present among the depressive older person) 3. Coping Strategies (Approaches used by the depressive older person to overcome from depression).Conclusion: Majority of older people are experiencing the problem of depression. This study was to explore the types of depression and their experiences during the period of depression. This study was mainly focused to identify how they are handling their problems and how they are using their coping strategies to overcome the problems of depression. The impact of depression is mainly depends upon the severity of the problem. Most of them are experiencing moderate to severe forms of depression. Majority of them are experiencing the problems of loneliness, separation from their children, death of spouse and financial problems. This study also highlights to provide compassionate loving care to our beloved older people and strengthen to provide socio-economic support to them.

Keywords: Phenomenology, Experiences, Depression, Older People, Coping strategies

**SYNTHETIC APPLICATION OF FURUKAWA-MODIFIED SIMMONS-SMITH
CYCLOPROPANATION**

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Abstract

Furukawa-modified Simmons-Smith cyclopropanation (an impressive synthetic protocol) gains significant importance in medicinal chemistry as it is widely utilized to build structurally complex natural products such as terpenoids, alkaloids, amino acids, drugs etc. This is a highly stereospecific reaction which utilizes diethyl zinc and diiodomethane for the conversion of olefins into

cyclopropane. Here, the synthetic importance of Furukawa-modified Simmons-Smith cyclopropanation (for the synthesis of various natural products) has been presented.

Keywords: Furukawa-modified Simmons-Smith cyclopropanation, diethyl zinc, natural products.

**CROSSROADS OF CULTURES: EXAMINING HUMAN RIGHTS PRACTICES IN THE
CONTEXT OF MIGRATION AND MULTICULTURALISM**

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Abstract

This research paper aims to explore the dynamic interplay between migration and human rights practices within multicultural societies. The primary focus is to understand how the influx of migrants influences the application and perception of human rights, both by the host society and the migrants themselves. This inquiry is significant in the current global context, where migration is increasingly shaping cultural and social landscapes. The research will adopt a comparative analysis approach, examining different national and regional policies related to migrant rights and integration. Special attention will be given to the cultural elements that dictate these policies and their implementation. This approach helps in identifying both the commonalities and the disparities in how different societies manage the challenges and opportunities posed by migration. A crucial aspect of this study is to identify gaps in the existing legal frameworks and societal practices concerning migrant rights. These gaps are indicative of the areas where human rights are either inadequately protected or misunderstood in the context of cultural diversity. The methodology involves qualitative analysis, primarily through the examination of case studies, legal documents, and interviews with key stakeholders, including policymakers, human rights activists, and migrants themselves. This methodology ensures a comprehensive understanding of the complexities involved. The findings of this research will provide insights into how cultural understanding and sensitivity can enhance the protection and respect for human rights in a multicultural setting. It will also suggest ways to bridge the identified gaps, offering recommendations for policy and legal reforms that are sensitive to the needs of a diverse population. The ultimate aim is to contribute to the development of a more inclusive and human-rights-focused approach to migration and multiculturalism.

Keywords: Human Rights, Regional Policies, Inadequately, Multicultural.

**5G MOBILE NETWORKS: THE GROWING DYNAMICS OF
TELECOMMUNICATION TECHNOLOGY**

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Abstract

The shift and developments experienced in telecommunication industry in recent years are unprecedentedly remarkable. Over past few decades, the world has enjoyed second-generation (2G), third-generation (3G) and fourth-generation (4G) mobile networks respectively as a result of the unique innovations that took place in telecommunication industry. Studies have shown that this spectrum is taking a lead amongst other paradigms of technology in terms of infrastructure and utility utilization. In order to maintain this frontier pace, telecommunication industry deployed fifth-generation (5G) network to meet-up with the growing demands of data from consumers and industrial users. According to Cherry (2004), 5G network has the capacity that provides faster and higher transmissions of massive amount of data required by consumers and that industrial users. This paper discussion is focused on the technology behind 5G mobile networks. The significant of 5G networks was discussed in the paper. The paper also highlighted some of the benefits of 5G networks in the write-up. In order to gather useful data for the paper work, online Google form questionnaire instrument was used to collect vital information from respondents. The gathered data were collated and subjected to reliability analysis. Conclusively, the paper inferred that 5G networks have the potentials that could support Internet of Things (IoT) device markers to develop new IoT systems and also help create new streams for telecommunication industry.

Keywords: Fifth Generation, 5G Networks, Mobile, Telecommunication, Technology.

ORDER OF GROWTH OF THE SOLUTIONS OF DIFFERENTIAL EQUATIONS

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Abstract

We study the standard notations of the Nevanlinna value distribution theory of meromorphic function on the complex plane and in the unit disc. In addition, for the n -iterated order of meromorphic function in is defined by

$$\sigma_n(f) = \limsup_{r \rightarrow 1^-} \frac{\log_n^+ T(r, f)}{-\log(1-r)},$$

where and is the Nevanlinna characteristic function of. For an analytic function in we have also

$$\sigma_{M,n}(f) = \limsup_{r \rightarrow 1^-} \frac{\log_{n+1}^+ M(r, f)}{-\log(1-r)},$$

where. If f is analytic in, Tsuji [[tsu], p.205] gives that

For example, the function satisfies and $\sigma_{M,1}(f) = \mu$.

Obviously, we have

The inequalities (00) are the best possible in the sense that there are analytic functions and h such that and. However, it follows by Proposition 2.2.2 in [lain] that for. The type of a meromorphic function in with is defined by

$$\tau_n(f) = \limsup_{r \rightarrow 1^-} (1-r)^{\sigma_n} \log_{n-1}^+ T(r, f);$$

and if f is an analytic function in with we have also

$$\tau_{M,n}(f) = \limsup_{r \rightarrow 1^-} (1-r)^{\sigma_n} \log_n^+ M(r, f).$$

We signal that also by Proposition 2.2.2 in [lain], we have for .

Definition meromorphic function in the unit disc is called admissible if

$$\limsup_{r \rightarrow 1^-} \frac{T(r, f)}{-\log(1-r)} = \infty$$

and nonadmissible if

$$\limsup_{r \rightarrow 1^-} \frac{T(r, f)}{-\log(1-r)} < \infty.$$

The growth index of the iterated order of a meromorphic function in is defined by

We will use the notation to denote the n -iterated exponent of convergence of the zero-sequence of meromorphic function and to denote the n -iterated exponent of convergence of distinct zero-sequence of , which are defined as the following:

$$\lambda_n(f) = \limsup_{r \rightarrow 1^-} \frac{\log N(r, \frac{1}{f})}{-\log(1-r)} \quad \text{and} \quad \bar{\lambda}_n(f) = \limsup_{r \rightarrow 1^-} \frac{\log \bar{N}(r, \frac{1}{f})}{-\log(1-r)}.$$

Keywords: Linear differential equations, exponent of convergence, growth of solutions, unit disc.

SUSTAINABLE DEVELOPMENT GOALS: A GLOBAL CHALLENGE

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Abstract

In September 2015, governments worldwide adopted a sustainable development program structured around 17 sustainable development goals that must be achieved by 2030. The goals are noble and very ambitious: eradicate all forms of poverty, tackle inequality, tackle climate change and ensure no one is left behind. There is inherently a duty towards oneself and the international community to play a leading role in implementing the Sustainable Development Goals. There are a multitude of issues and topics that need to be addressed. To highlight one example, the importance of forests in achieving these goals cannot be underestimated. These should not be seen as purely environmental problems; protecting forests and the communities that depend on them is as much about eradicating poverty as food security, climate change, social justice, and sustainable consumption and production patterns. This research investigates and highlights the challenges facing meeting the 17 Sustainable Development Goals. Keywords: Sustainable Development Goals, Sustainable Development, Environment, Global Governance, United Nations, Sürdürülebilir Kalkınma Hedefleri: Küresel Bir Mücadele Özet Eylül 2015'te Birleşmiş Milletler'e üye olan hükümetler, 2030 yılına kadar ulaşılması gereken 17 sürdürülebilir kalkınma hedefi etrafında yapılandırılmış bir sürdürülebilir kalkınma programını kabul ettiler. Hedefleri asil ve oldukça iddialı: her türlü yoksulluğu ortadan kaldırmak, eşitsizlikle mücadele etmek, iklim değişikliğiyle mücadele etmek ve kimsenin geride kalmamasını sağlamak. Sürdürülebilir Kalkınma Hedeflerinin hayata geçirilmesinde öncü rol oynamak hem kendilerine hem de uluslararası topluma karşı doğası gereği bir görev olarak görülmekte. Ele alınması gereken birçok konular var. Bir örneği vurgulamak gerekirse, bu hedeflere ulaşmada ormanların önemi göz ardı edilemez. Bunlar salt çevresel sorunlar olarak görülmemelidir; Ormanları ve onlara bağımlı olan toplulukları korumak, gıda güvenliği, iklim değişikliği, sosyal adalet ve sürdürülebilir tüketim ve üretim kalıpları kadar yoksulluğun ortadan kaldırılmasıyla da ilgilidir. Bu araştırma, 17 Sürdürülebilir Kalkınma Hedefine ulaşmada karşılaşılan zorlukları araştırıyor ve vurguluyor.

Anahtar Kelimeler: Sürdürülebilir Kalkınma Hedefleri, Sürdürülebilir Kalkınma, Çevre, Küresel Yönetişim, Birleşmiş Milletler,

**EFFECT OF LIPID-BASED MULTIPLE MICRONUTRIENTS SUPPLEMENTATION
IN UNDERWEIGHT PRIMIGRAVIDA PRE-ECLAMPTIC WOMEN ON MATERNAL
AND PREGNANCY OUTCOMES: RANDOMIZED CLINICAL TRIAL**

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Abstract

Background and Objectives: In pre-eclampsia, restricted blood supply due to the lack of trophoblastic cell invasion and spiral artery remodeling is responsible for adverse pregnancies and maternal outcomes, which is added to by maternal under nutrition. This study was designed to investigate the effects of lipid-based supplements (LNS-PLW) on pregnancy and maternal outcomes in underweight primigravida pre-eclamptic women. **Materials and Methods:** A total of 60 pre-eclamptic, underweight primigravida women from the antenatal units of tertiary care hospitals in the Khyber Pakhtunkhwa Province, Pakistan, were randomly divided into two groups (Group 1 and Group 2). The participants of both groups were receiving routine treatment for pre-eclampsia: iron (60 mgs) and folic acid (400 ug) IFA daily. Group 2 was given an additional sachet of 75 gm LNS-PLW daily till delivery. The pregnancy outcomes of both groups were recorded. The clinical parameters, hemoglobin, platelet count, and proteinuria were measured at recruitment. **Results:** The percentage of live births in Group 2 was 93% compared to 92% in Group 1. There were more normal vaginal deliveries (NVDs) in Group 2 compared to Group 1 (Group 2, 78% NVD; group 1, 69% NVD). In Group 1, 4% of the participants developed eclampsia. The frequency of cesarean sections was 8/26 (31%) in Group 1 and 6/28 (22%) in Group 2. The number of intrauterine deaths (IUDs) was only 1/28 (4%) in Group 2, while it was 2/26 (8%) in Group 1. The gestational age at delivery significantly improved with LNS-PLW supplementation (Group 2, 38.64 ± 0.78 weeks; Group 1, 36.88 ± 1.55 weeks, p-value 0.006). The Apgar score (Group 2, 9.3; Group 1, 8.4) and

the birth weight of the babies improved with maternal supplementation with LNS-PLW (Group 2, 38.64 ± 0.78 weeks; Group 1, 36.88 ± 1.55 ; p-value 0.003). There was no significant difference in systolic blood pressure, while diastolic blood pressure (Group 2, 89.57 ± 2.08 mmHg; Group 1, 92.17 ± 5.18 mmHg, p-value 0.025) showed significant improvement with LNS-PLW supplementation. The hemoglobin concentration increased with the LNS-PLW supplement consumed in Group 2 (Group 2, 12.15 ± 0.78 g/dL; Group 1, 11.39 ± 0.48 g/dL, p-value < 0.001). However, no significant difference among the platelet counts of the two groups was observed. **Conclusions:** The pregnancy and maternal outcomes of underweight pre-eclamptic women can be improved by the prenatal daily supplementation of LNS-PLW during pregnancy, along with IFA and regular antenatal care and follow-up. **Registration:** ISRCTN15485068, April 2018: <https://doi.org/10.1186/ISRCTN15485068>.

Keywords: pre-eclampsia; lipid-based nutritional supplements; pregnancy outcome; maternal outcome; Khyber Pakhtunkhwa Province of Pakistan

OPTIMIZATION OF BIOGAS PRODUCTION AND COMPRESSION FROM CO-DIGESTION OF ANIMAL DUNGS

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Abstract:

Biogas has been generally accepted as an alternative energy source but its commercial use has never been realized due to challenges in its storage and transportation. This research presents the study on the production, scrubbing, compression, and storage of biogas. It was found that scrubbing of biogas to remove major impurities i.e. carbon dioxide, hydrogen sulfide, and water must be carried out before compression and storage of biogas to improve its versatility. Chemical scrubbing of carbon dioxide was done with sodium hydroxide (NaOH). Hydrogen sulfide was scrubbed using iron fillings while water vapour was scrubbed using silica gel crystals. The result shows that after biogas production from co-digestion of cow dung and camel dung, methane content has improved from 62 % before scrubbing to 92 % after scrubbing, while carbon IV oxide has reduced from 37 % to 6 % after scrubbing. H₂S shows no traces after purification. Compression of biogas (CBG) was carried out by a 3hp two-stage air compressor and bottled into a 12.5kg LNG cylinder. The compressed biogas had an average volume of 0.233 m³, a total mass of 0.10 kg, and a mean density of 2.216 kg/m³. While 0.40 MJ was utilized for compression, the CBG in the cylinder has an energy content of 5.25 MJ. The compressor produces 2.52 MJ of heat energy and 1.63 MJ of electrical energy. Raw biogas was compressed to an absolute pressure of 6 bar during the course of an average compression duration of 2.57 minutes. Using the water boiling test and the food cooking

test, it was also discovered that the CBG's methane content was higher than that of raw biogas.
Keywords: Biogas, scrubbing, compression, cylinder

**THE EFFECTIVENESS OF A PASSIVE COMBINED SYSTEM (FPS-LRB) FOR THE
REDUCTION OF THE DYNAMIC RESPONSE OF A MID-RISE BUILDING**

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Abstract

In response to the significant human and material devastation caused by seismic events, it is crucial to develop new design approaches to mitigate the impact of this natural phenomenon. Seismic insulation techniques present an attractive solution to this challenge. The objective of this paper is to enhance the performance of structural elements by introducing a combined passive system (LRB-FPS) capable of effectively absorbing high levels of seismic energy. Each of these systems offers distinct advantages. The LRB system exhibits a damping rate exceeding 30%, utilizing elastomeric layers for flexibility and restoring force, while the lead core serves as an additional energy dissipation mechanism, reducing lateral displacement. On the other hand, the FPS system utilizes a sliding interface in the form of a bowl, which dissipates seismic energy through friction, providing the structure with pendulum-like movement characterized by highly nonlinear behaviour. A methodology based on the American IBC 2000 regulations has been employed to design both systems, enabling the determination of optimal parameters. To achieve this, an extensive parametric study was conducted, considering various isolator placement configurations. Nonlinear dynamic analysis was performed, revealing the effectiveness of integrating these artificial systems in reducing structural response, particularly in terms of quasi-rigid displacement, top floor displacement, inter-drift displacements, top floor acceleration, and shear base force. As a result, the integration of this combined system significantly enhances structural performance and improves the overall reliability of the building.

Keywords: 3-6 words.

Base isolation, LRB (Lead Rubber Bearing), FPS (Friction Pendulum System) , seismic excitation, nonlinear analysis, Hysteresis curve.

NURTURING SPIRITUAL HEALTH IN YOUNG ADULTS: INSIGHTS AND IMPLICATIONS

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Abstract

This study investigates the role of spiritual health in the lives of students aged 16 to 25, examining its correlation with mental and emotional well-being. The research underscores the importance of incorporating spiritual health into educational curricula, providing essential guidance for youth in this critical area. It reveals that engagement in spiritual practices plays a significant role in students' daily life, fostering mental stability and emotional balance. The paper also highlights the potential of these findings to inform future research and contribute to enhancements in this field. A comprehensive and accessible questionnaire was distributed to high school and college students through a Google Form. The survey aimed to understand the impact of spiritual health on managing stress, enhancing mental wellness, and procuring physical advantages. The results indicate a prevalent engagement in spiritual practices among students, which aids in task completion, mental tranquillity, and emotional steadiness. The study emphasizes that spiritual health is as crucial as mental and physical health, enabling individuals to gain a deeper understanding of their role in the world, sense of purpose, and self-worth. Fostering spiritual health not only offers peace in stressful times but also enhances mental well-being and yields physical benefits. The research aims to deepen the understanding of spiritual health by closely examining its definitions, characteristics, origins, effects, and empirical references, ultimately proposing a comprehensive definition that encapsulates its multifaceted nature.

Keywords: Mental health, spiritual health, managing stress, educational inclusion

ON QUASI-FAT AND PSEUDO-FAT SETS IN RELATOR SPACES

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A family \mathcal{R} of relations on a set X is called a relator on X , and the ordered pair $X(\mathcal{R}) = (X, \mathcal{R})$ is called a relator space. Relator spaces of this simpler type are already substantial generalizations of not only ordered sets and uniform spaces, but also topological, closure and proximity spaces.

As it is usual, for any $x \in X$ and $A \subseteq X$, we write

- (1) $x \in \text{int}_{\mathcal{R}}(A)$ if $R(x) \subseteq A$ for some $R \in \mathcal{R}$;
- (2) $x \in \text{cl}_{\mathcal{R}}(A)$ if $R(x) \cap A \neq \emptyset$ for all $R \in \mathcal{R}$;
- (3) $\text{res}_{\mathcal{R}}(A) = \text{cl}_{\mathcal{R}}(A) \setminus A$.

Moreover, we may also naturally define

- (4) $\mathcal{T}_{\mathcal{R}} = \{A \subseteq X: A \subseteq \text{int}_{\mathcal{R}}(A)\}$;
- (5) $\mathcal{F}_{\mathcal{R}} = \{A \subseteq X: \text{cl}_{\mathcal{R}}(A) \subseteq A\}$;
- (6) $\mathcal{E}_{\mathcal{R}} = \{A \subseteq X: \text{int}_{\mathcal{R}}(A) \neq \emptyset\}$;
- (7) $\mathcal{D}_{\mathcal{R}} = \{A \subseteq X: \text{cl}_{\mathcal{R}}(A) = X\}$.

Results:

We have introduced that a subset A of the relator space (X, \mathcal{R}) will be called (1) quasi-fat if there exists $V \in \mathcal{E}_{\mathcal{R}}$ such that $V \subseteq A \subseteq \text{cl}_{\mathcal{R}}(V)$; (2) pseudo-fat if there exists $V \in \mathcal{E}_{\mathcal{R}}$ such that $A \subseteq V \subseteq \text{cl}_{\mathcal{R}}(A)$. And, the families of all such subsets A of $X(\mathcal{R})$ will be denoted by $\mathcal{E}_{\mathcal{R}}^q$ and $\mathcal{E}_{\mathcal{R}}^{ps}$, respectively. We prove that for a relator \mathcal{R} on X , if $A, B \subseteq X$ such that $A \subseteq B \subseteq \text{cl}_{\mathcal{R}}(A)$, then $A \in \mathcal{E}_{\mathcal{R}}^q$ implies $B \in \mathcal{E}_{\mathcal{R}}^q$. Also, we could show that for a quasi-topological relator \mathcal{R} on X , if $A, B \subseteq X$ such that $A \subseteq B \subseteq \text{cl}_{\mathcal{R}}(A)$, then $B \in \mathcal{E}_{\mathcal{R}}^{ps}$ implies $A \in \mathcal{E}_{\mathcal{R}}^{ps}$.

Keywords: Fat sets, Relator Spaces, Relations,

EFFECT OF MICROSILICA ADDITION ON PROPERTIES OF GEOPOLYMER COMPOSITES

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Abstract

Geopolymers are modern, inorganic aluminosilicate materials that, through their high mechanical properties, are used in many industries and can be an excellent alternative to concrete based on Portland cement. The purpose of this study is to determine the effect of the addition of microsilica on the properties of geopolymer composites. Reference samples were made by mixing pozzolanic material such as fly ash (50 wt.%) with sand (50% wt.%). The effect of the additive was analysed by introducing microsilica (T180) into the material in shares of 5%, 10% and 15% by weight, each time replacing part of the fly ash with microsilica. The samples were activated with 10 M sodium hydroxide solution mixed with an aqueous solution of sodium silicate. Laser particle size analysis, mineralogical analysis and SEM observations were carried out on the raw materials. Phase identification analysis, SEM observations, density tests, compressive and flexural strength tests, water absorption and thermal conductivity tests were carried out on the produced geopolymer composites. The results obtained on the basis of the compressive strength test showed that the strength of the material decreases with the increase of the silica content in the material. Increasing the silica addition by each subsequent 5% resulted in a decrease in strength of about 20-30%. The addition of silica at 5 wt.% resulted in an decrease in flexural strength compared to the reference sample by over 15%. However, the addition of 10% and 15% causes a decrease in flexural strength by more than 50% compared to the value for the reference sample. The thermal conductivity coefficient decreases with increasing silica content in the composite, which means that the introduction of this additive improves the thermal insulation properties of geopolymer composites. The addition of microsilica introduced into the geopolymer matrix in an amount of 10% ensures a good correlation between thermal conductivity and strength. The compressive strength of this composite is over 25 MPa, which makes it a construction material with improved thermal insulation by approximately 15% compared to the reference material. The investigated materials are dedicated to application in the construction industry. Acknowledgements: This research was supported by

the Polish National Agency for Academic Exchange under the Exchange programme for students and scientists as part of bilateral cooperation - offer for incoming students and scientist, grant no. BPN/BIL/2021/1/00159/U/00001. This research was funded by the project called the “Development of geopolymer composites as a material for protection of hazardous wrecks and other critical underwater structures against corrosion “ under the M-ERA.NET 3 program by the Polish National Centre for Research and Development, grant number M-ERA.NET3/2021/71/MAR-WRECK/2022.

Keywords: Materials, Amorphous Materials, Geopolymer, Microsilica, Fly ash.

TRACE METAL ANALYSIS OF SACHET WATER SOLD IN KAZAURE LOCAL GOVERNMENT AREA JIGAWA STATE NIGERIA.

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Abstract

The aim of this paper is to determine the presence and amount of trace metals in sachet water sold in Kazaure Local Government Area (LGA), Jigawa State, Nigeria. The brands of sachet water are obtained from local supermarkets and water vendors in kanti area of kazaure LGA. Nine popular commercial brands of sachet water that often enter the local government from Dambatta local government area, Kano state, Daura local government area, Katsina state and Kazaure Local Government Area, Jigawa State were randomly sampled. All the nine samples of a particular brand of sachet water were bulked together to form a composite sample, which is stored in a liter sterilized screw-capped polythene bottle. The samples were refrigerated at 4⁰C and analyzed within 24 hours of collection. Water samples were digested prior to trace metals [Zn, Mg, Cu, Fe and Pb] determination using Atomic Absorption Spectrophotometer (AAS). The analysis was conducted in three replicates. The results of the analysis show that all the brands of sachet water studied are colourless, odourless, tasteless and lack presence of suspended solids. The outcome of the trace

metal analysis posited that Kazaure LGA based brands have the range of values, 0.03 mg/l – 3.34 mg/l, while Dambatta LGA based brands gave the range 0.09 mg/l – 4.67 mg/l and Daura LGA based brands produced the range 0.05 mg/l – 10.02 mg/l. The case study for this work is Sachet water sold in Kazaure Local Government Area, Jigawa State Nigeria. The implications are relevant for all sachet water sold in Kazaure municipality. The concentrations of trace metals assayed in sachet water are below the maximum allowed limit recognized by World Health Organization (WHO) for safe drinking water as follows; NS (Ca), 0.10 mg/l (Pb), 3.0 mg/l (Zn), 2.0 mg/l (Cu), 3.0 mg/l (Fe) and 0.05 mg/l (Cr). Trace metals are metals in extremely small quantities that are present in animal and plant cells and tissue. Ingestion of excess quantities of these metals is often toxic. The emergence of sachet water in Nigeria is to provide safe hygienic and affordable instant drinking water to the teeming population and to checkmate the soaring water-related challenges. Such challenges may give rise to health hazards among the growing population of the federal republic of Nigeria. The study concludes that all the assayed brands of sachet water pose zero health risks to the consumers and display compliance to international standards.

Key words: Trace element; Sachet water, Water, Metals, Concentration

**ASSESSMENT OF THE PHYSICOCHEMICAL PROPERTIES OF NEAT
LUBRICATING OIL FOR AUTOMOBILES**

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Abstract

A lubricant is a substance, usually organic, introduced to reduce friction between surfaces in mutual contact, which ultimately reduces the heat generated when the surfaces move. It is undoubted that engine is the most important and crucial operating mechanism in a car. In order to protect the engine of the car from breakdown and maintain its performance, the engine needs to be lubricated with the appropriate lubricant. The usage of certain type of lubricants may affect the performance of the engine of automobiles. The study of automotive lubricating is important in order to predict the type of lubricant which is more suitable and cost-efficient within the current economic situation. In order to predict the overall health and performance of a lubricant, the properties of the lubricant need to be determined accordingly. This work does access the physical and chemical properties of neat lubricating or lube oil, using approved standard methods. The

results unveiled the following: physical tests; Density (0.9104 g/dm^3), viscosity (89.4), refractive index (1.4753), flash point (94°C), pH (8.5), aqua test (absent); spot tests; Area of spot (3.803 cm^2), Area of diffuse zone (25.531 cm^2), Colour of spot (colourless), Colour of diffuse zone (colourless), Optical property (translucent); chemical test (FTIR); O – H , C – H, C – N, N – O, N – H bond types stretching were detected.

Keywords: Lubricating oil, Friction, Automobile, Bond stretching

**DRY NEEDLING TECHNIQUE VERSUS MAITLAND MOBILIZATION
TECHNIQUE IN MANAGING CHRONIC NON-SPECIFIC NECK PAIN**

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Abstract

Background: Neck pain, being a multifactorial condition, poses a significant problem in modern society. While it may not be the most prevalent musculoskeletal disorder, its impact should not be underestimated. Currently, there is no universally accepted treatment for neck pain, and various treatment options exist for patients with chronic non-specific neck pain. Objective: The pilot study aimed to investigate the effects of different treatment techniques on patients with chronic non-specific neck pain. Methods: The sample selection was conducted using the convenience randomized sampling method to ensure an unbiased representation of patients. Participants included individuals who had received a diagnosis and required physiotherapy sessions as recommended by their physicians. A total of 20 patients were chosen and divided into two groups. A group (10 participants) received dry needling treatment, while the B group (10 participants) received the Maitland technique. Various variables were assessed using routine

methods, and additional evaluations, such as VAS (Visual Analog Scale) and ROM (Range of Motion) measurements, were conducted before and after treatment to compare the outcomes and achieve the study's objectives. 3 sessions per week for 2 weeks for each group; dry needling was applied for 10 minutes per session. Result: In the Maitland technique group, the analysis revealed significant differences at $\alpha=0.05$ for the levels of flexion, extension, lateral flexion (right and left), lateral rotation (right and left), and VAS. The post group demonstrated favorable differences compared to the pre group, with mean values indicating improvement in each of these measures. Similarly, in the dry needle group, significant differences at $\alpha=0.05$ were observed for the levels of flexion, extension, lateral flexion (right and left), lateral rotation (right and left), and VAS. The post group had lower mean values compared to the pre group, indicating improvement in these measures as well. Furthermore, the t-test analysis comparing the effects of Maitland mobilization and dry needling techniques in reducing pain and improving range of motion among patients with chronic nonspecific neck pain did not show any significant differences at $\alpha=0.05$. This suggests that both techniques yielded similar outcomes in terms of pain reduction and range of motion improvement. Conclusion: The results of this study revealed that the Maitland mobilization and dry needling techniques were effective in reducing pain and enhancing range of motion in patients with chronic nonspecific neck pain.

Key words: Maitland technique, dry needling, chronic non specific neck pain, Disability.

**SIGNE, SENS ET SYMBOLE POUR UNE SEMIOTIQUE DU DEVELOPPEMENT
CHEZ L'ARTISTE SLAMEUR HAMANI KARIMOU ALIAS JOHNEL AU NIGER**

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Résumé

La quête du sens, de symboles dans les textes verbaux et non verbaux africains comme objets essentiels des champs disciplinaires comme la sémiotique et la littérature orale reste toujours d'actualité. La symbiose entre l'oralité et la sémiotique favorisent ainsi la construction de la signification dans les sociétés africaines confrontées aux assauts de la modernité occidentale et son corollaire du nouvel ordre mondial. En ce sens, les chansons des artistes africains, sous toute leur forme n'échappent pas à l'analyse de ces disciplines. La compréhension du sens en termes de contenu sémiotique d'une part et dans le contexte de son emploi dans les textes oraux (la chanson pour le cadre de cette étude) d'autre part, est indispensable pour le développement durable en Afrique. Ici, le sens surpasse l'ordinaire. Mieux, « le sens revêt un pouvoir » (M. L. Ouédraogo : 400) car il s'élargit pour s'élever au-delà du signe afin de faire symbole et image. Il en est ainsi du Slam de HAMANI KARIMOU alias JOHNEL intitulé « *Il ne sont que des pauvres* ». Cette étude analyse ce texte en interrogeant sa quête de sens pour aboutir à sa part dans la sémiotique du développement de l'Afrique en général et celui du Niger en particulier. Les théories du signe, symbole et de la sémiotique perçienne et Greimasienne sont exploitées dans l'analyse du corpus objet de la méthodologie de cet article. Celui-ci est à la fois analytique et suggestive.

Mots-clés : sémiotique du développement, littérature orale, symbole, Jonhel, Niger.

**SIGN, MEANING AND SYMBOL FOR A SEMIOTICS OF DEVELOPMENT IN THE
SLAM ARTIST HAMANI KARIMOU ALIAS JOHNEL IN NIGER**

Abstract

The quest for meaning, for symbols in African verbal texts and non-verbal texts as essential objects of the disciplinary fields of semiotics and oral literature still remains relevant. The symbiotic encounter between orality and semiotics promotes the construction of meaning in African societies faced with the assaults of the Western world and the new world order. In this vein, the songs of African artists, in whatever form, do not escape the analysis of these disciplines. Understanding meaning in terms of semiotic content on the one hand and in the context of its use in oral texts (song for the context of this study) on the other hand is essential for sustainable development in Africa. Because the meaning goes beyond common understanding. Better, “meaning takes on power” (M. L. Ouédraogo: 400). It widens to rise beyond the sign to become a symbol and an image. This is the Slam of HAMANI KARIMOU alias JOHNEL entitled “They are only poor people”. This study attempts to study it by questioning its quest for meaning to arrive at its part in the semiotics of the development of Africa in general and that of Niger in particular. The theories of sign, symbol and Peircian and Greimasian semiotics are exploited in the analysis of the corpus subject to the methodology of this article. This one is both analytical and suggestive.

Keywords : semiotics of development, oral literature, symbol, Jonhel, Niger.

**ELECTROCHEMICAL POTENTIAL-BASED DIAGNOSTICS OF STEEL REBAR
CORROSION IN CONCRETE**

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Abstract

Corrosion in reinforced bars is a major cause of structural deterioration in concrete structures, leading to reduced structural integrity and increased maintenance costs. Corrosion in concrete structures become a very serious issues as buildings age. In Nigeria and most developing African countries were majority of building structures are more than 40 years old, this constitutes a major issue as building collapse has been on the increase. This paper will focus on the use of potential corrosion techniques to diagnose concrete structures in the bid to identify areas under corrosion threat thereby stalling the total failure of these structures. In this paper, full-scale reinforced concrete beams were corrosion analysed. Corrosion was stimulated by the Modied Immersion Accelerated Corrosion - CAIM method, at three levels of mass loss: 10, 15 and 20%. The diagnostic technique through the corrosion potential was applied, in which it was observed that there is uncertainty in the corrosion evaluation for the mass loss levels of 15 and 20%, resulting in a corrosion uncertainty interval, but at 15%, the potential technique proved to be satisfactory.

Keywords:Corrosion, reinforcement, diagnostic technique, corrosion potential

**ICHTHYOFAUNA IN FOUR INTERCONNECTED RIVERS TRAVERSING SEVERAL
COMMUNITIES IN TWO ZAMBOANGA PROVINCES**

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Abstract

This study was conducted to assess the relationship between environmental factors and the composition of fish assemblages from four interconnected rivers traversing several communities of Bayog Watershed comprising two provinces of Zamboanga in the Philippines. The distribution, abundance, and diversity of fish species in relation to the physicochemical parameters of the Sibugay, Dipili, Depore, and Guinoman rivers were obtained. A total of 1,004 fish individuals were collected during the field sampling and distributed into 11 families, 13 genera, and 18 species. The genus *Oreochromis* and *Barbodes* had the highest abundance and were prevalent in all the sites. Sibugay river obtained the highest Shannon-Weiner diversity index value ($H' = 2.05$) and several species (14), while Guinoman has the lowest (species=11; $H' = 1.671$). Sibugay river has the highest pH value (7.53), while Depore has the most deficient and acidic sites. Water temperatures were higher in Depore and significantly different from all other sites except in Guinoman. Influenced of environmental factors on the assemblages of freshwater fishes showed that depth (-0.894), pH (-0.813), and water temperature (0.859) were the three factors that are highly correlated with the first ordination axis in the CCA while dissolving oxygen (-0.250), and pH (-0.308) were positively associated with the second ordination axis. The biplot obtained from abundance and environmental data revealed that *P. disjunctivus* and *T. trichopterus* are positively associated with elevated water temperature and low pH. These introduced species can tolerate high temperatures and slightly acidic water. As observed in the study, channel water from the residential area, industrial waste, and effluents from agricultural activities are of most concern among the activities that affect the ecosystem.

Keywords CCA; fish assemblages; environmental factors; Bayog watershed.

COMEDOCARCINOMA IN A CAT: HISTOPATHOLOGICAL FINDINGS

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Abstract

Mammary gland tumors are the common neoplasms in female cats and comedocarcinoma is malignant epithelial neoplasm. In June 2023, a 10-year-old female cat with a left thoracic mammary gland mass was referred to veterinary hospital. Based on owner information, within the previous 6-month period the mass had become evident. On gross examination, the mass was approximately 3×3×2 cm in size. Finally, complete surgical removal was selected. Anesthesia was induced by intravenous injection of ketamine (0/5 mg/kg) and diazepam (0.5 mg/kg) and maintained with 1%-2% isoflurane in oxygen. The mass was removed for histopathological evaluation. Tissue samples of the mass were fixed in 10 % neutral buffered formalin and stained with Hematoxylin and Eosin. Microscopically, the mass was composed of necrotic area within the center of the neoplastic cell aggregates. The necrotic foci were consisted of amorphous eosinophilic material admixed with cell debris and necrotic cells. The peripheral tissue of the affected area was consisted of aggregates of closely packed cells arranged in nests, cord and tubules supported by a fine fibrovascular connective tissue stroma. Infiltration of lymphoplasmacytic inflammatory cells was seen at the periphery of neoplasm. In addition, multifocal hemorrhages and invasion of neoplastic cells between the muscle fibers and adipose tissue were observed in the sections. The mass was diagnosed comedocarcinoma. In the cat, the incidence of mammary gland tumor rate varies with geographic location and is related to ovariectomy. However, there are many other factors that influence the incidence, including breed popularity, husbandry, and socioeconomic factors.

Keywords: Cat, Mammary gland, Comedocarcinoma, Pathology

ORAL SQUAMOUS CELL CARCINOMA IN A DOG

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Abstract

Squamous cell carcinoma (SCC) is relatively more common and highly malignant neoplasm in dog. SCC is an invasive epithelial neoplasm with varying degrees of squamous differentiation. A six-year-old female dog with an oral mass on the right side was referred. Finally, complete surgical removal was selected. The dog was anesthetized with intravenous injection of diazepam (0/5 mg/kg) and ketamine (0/5 mg/kg) and maintained with 1%-2% isoflurane in oxygen. The mass was removed for histopathological evaluation. Tissue samples of the mass were fixed in 10% neutral buffered formalin and stained with Hematoxylin and Eosin. Histopathology of the oral mass revealed a proliferation of epithelial cells. Microscopically, the mass was composed of trabeculae and nests of epithelial cells. The small clusters and individual neoplastic cells were infiltrated adjacent connective tissue, but salivary glands were not affected. The neoplastic cells were surrounded by lymphoplasmacytic inflammatory cells. Cells at the periphery of the nests were smaller and more basaloid with cells in central areas larger with eosinophilic cytoplasm. Cellular pleomorphism and mitotic figures were marked. The mass was diagnosed Squamous cell carcinoma. Oral neoplasia represents around 5% of all neoplasia in dogs and around 65% of canine oral neoplasms were malignant. Squamous cell carcinomas (SCCs) represent 17–25% of oral malignant neoplasms.

Keywords: Dog, Oral mass, SCC, Pathology

POLYCYSTIC KIDNEY DISEASE IN A YORKSHIRE TERRIER

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Abstract

Unilateral polycystic kidney disease is caused by obstruction of a ureter anywhere throughout its length or at its entrance into the urinary bladder. In April 2023, a five-year-old female sterilized Yorkshire terrier dog with severe unilateral abdominal swelling and a clinical history of lethargy, anorexia, polyuria, and polydipsia was referred to the veterinary clinic. Physical examination, blood cell counts, serum biochemistry tests, urinalysis radiography and ultrasonography were performed. Hematology and biochemistry results showed mild leukocytosis and mild azotemia. Radiograph showed left unilateral abdominal distention. Ultrasonography revealed enlargement of left kidney with multiple anechoic or hypoechoic cysts. Finally, nephrectomy was selected. The left kidney was removed for histopathological evaluation. Tissue samples were fixed in 10% neutral buffered formalin and stained with Hematoxylin and Eosin. Histopathological examination of the kidney revealed cystic structures. The cystic tubules were lined by cuboidal or squamous epithelium and separated by a fibrous connective tissue. Based of clinical, radiological and histopathological findings, this disease was diagnosed polycystic kidney disease. Similar to our case, ultrasound as a noninvasive technique is the most commonly used imaging modality for diagnosis of PKD in dog. PKD is considered a progressive disease, and the prognosis is guarded.

Keywords: Dog, Kidney, Pathology, PKD

**ARTIFICIAL INTELLIGENCE -POWERED ROUTE OPTIMIZATION AND
AUTONOMOUS VEHICLES: TRANSFORMING LOGISTICS EFFICIENCY IN
TRANSPORTATION**

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The intersection of Artificial Intelligence (AI) and Transportation has ushered in a paradigm shift, fundamentally altering the dynamics of route optimization and logistics efficiency. This research delves into the transformative impact of AI, particularly in the context of route optimization, and explores the integration of autonomous vehicles as a catalyst for revolutionizing safety and efficiency in the transportation sector. In this paper, we develop a multi-objective mathematical model (MOMM) of Travel Time and CO_2 Emissions as well as subject to the constraints, i.e., Flow conservation constraint, Capacity constraint for each vehicle, and Dynamic Adjustments constraint for Travel Time and CO_2 Emissions. This mathematical model is solved using ortools.Linear_solver in Python programming language. The study elucidates the tangible benefits and challenges of AI-driven advancements through a multidimensional approach encompassing mathematical modeling, algorithmic analyses, and practical implementations. The investigation begins with meticulously examining route optimization algorithms, leveraging machine learning and optimization techniques to adapt to real-time traffic conditions dynamically. Subsequently, we expand its focus to autonomous vehicles, elucidating how they, guided by sophisticated AI systems, enhance logistics efficiency and safety metrics. Furthermore, this research contributes to the ongoing discourse on the confluence of AI and transportation, offering insights into the transformative potential and challenges associated with route optimization and autonomous vehicles.

Keywords: Artificial Intelligence, Transportation, Route Optimization, Autonomous Vehicles, Logistics Efficiency.

INHIBITORY EFFECTS OF MENTHOL AND EUGENOL ON THE YEASTS AS FOOD SPOILING AGENTS

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Abstract

Although the use of yeasts as starters is common in the food industry, it can lead to product corruption and poor quality of food in some cases. This study was assessed the anti-yeast impacts of two phenolic compounds; menthol and eugenol against 7 yeast species contaminating food products (*Candida albicans*, *Candida kefir*, *Candida famata*, *Rhodotorula glutinis*, *Kluyveromyces fragilis*, *Debaryomyces hansenii*, *Saccharomyces cerevisiea*). The anti-yeast impacts of two mentioned compounds and the minimum inhibitory concentration (MIC) were investigated using disk diffusion method and micro-dilution method, respectively. The findings showed that both compounds had anti-yeast effects on the tested isolates. Eugenol had the anti-yeast properties at the lower concentration (50µg/ml) in comparison with the other compound. Furthermore, the MIC of menthol and eugenol were *Rhodotorula glutinis* (58.3µg/ml), *Saccharomyces cerevisiea* (58.3µg/ml) and *Candida albicans* (50µg/ml), respectively. In conclusion, it could be stated that the natural phenol compounds; menthol and eugenol, have toxic and anti-yeast effects and are able to prevent the growth of tested yeast contaminating foods at the lower concentrations.

Keywords: Menthol, Eugenol, Food Products, Yeast

**AN ANALYSIS OF SHARE OF WOMEN IN MSME SECTOR - A COMPARATIVE
STUDY OF RAJASTHAN AND UTTARAKHAND**

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Abstract

MSMEs continue to be the backbone of the economy for countries like India where the problem of unemployment is steadily escalating and the agriculture land holdings continue to shrink. With the limited data and information, this paper aims to examine the recent developments in women participation / entrepreneurs in India. This paper focuses on women entrepreneurs in micro, small and medium enterprises. The objective of the paper is ; a) to estimate the ratio of women labour force in micro, small and medium enterprises, b) women share in registered and unregistered MSMEs, c) to identify the socio-economic problems faced by women, d) credit availability, e) development of women entrepreneurship under planning. The State of Uttarakhand and Rajasthan in India is looking at sustainable and inclusive industrial growth as it faces an acute problem of migration from the hilly terrain to the plains due to lack of employment and business opportunities. The purpose of this paper is to comprehensively analyse the role of women participation in micro, small and medium enterprises in Rajasthan and Uttarakhand and to explore the reasons responsible for hindering their growth. A descriptive study was conducted with the help of secondary data and is based on extensive review which significantly contributes in directing the stakeholders to take appropriate measures for speedy development of the region. The recent trends show that when women are better educated and have better paid employment opportunities, then participation of women might decline in SMES and they may move towards large scale industries.

Keywords: MSME, Unemployment, Business opportunities, Migration, Socio-economic.

**APPLICATION OF OPTIMAL CONTROL TO *PLASMODIUM KNOWLESI* MALARIA
IN HUMAN AND MACAQUES**

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Abstract

This study sought to determine the most effective means of preventing *Knowlesi* malaria in both humans and macaques. The model, which was built with a deterministic differential equation system, now includes an ideal illness control. The optimal control model was studied both dynamically and quantitatively. If the cost of biological control against mosquito larvae, forest dwelling mosquitoes, and chemical control against adult mosquitoes is greater than the cost of treating the infected human, the control strategy produces an increase in susceptible people, a decrease in infected humans, infected macaques, and mosquito population. Although this is one of the most effective strategies, medication is required to eradicate *Plasmodium knowlesi* malaria in a community. According to computational representations of the issue, implementing the three control strategies can reduce, if not eliminate, a community's probability of developing the disease.

Keywords: Optimal Control, Plasmodium Knowlesi, Malaria, Human, Macaques

**FRACTIONAL ORDER SEASONAL FORCING OF *PLASMODIUM KNOWLESI*
MALARIA MODEL TRANSMISSION DYNAMICS**

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Abstract

The parasite *Plasmodium knowlesi* causes malaria in humans and other primates. It is prevalent in Malaysia and is found throughout Southeast Asia. Like other *Plasmodium* species, *P. knowlesi* has a life cycle that necessitates the infection of both a mosquito and a warm-blooded host. The fractional order model of Seasonal Forcing of *Plasmodium Knowlesi* Malaria Model will be established in this study. To build the model scheme of the fractional order differential equations, the Caputo fractional derivative operator of order (0,1) will be employed. The Laplace-Adomian Decomposition Method was used to compute an estimated solution to the system of nonlinear fractional differential equations. As solutions to fractional differential equations, infinite series were generated. The model's proposed series solution swiftly converges to its precise value. The results obtained are compared to the standard case.

Keywords: Seasonal Forcing; *Knowlesi* malaria; Macaques; Transmission dynamics; fractional order.

PREDICTING OIL PRODUCTION: A MACHINE LEARNING APPROACH

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Abstract

With a vast repository of well production data available in the oil and gas sector, this study explores the creation of data-driven models for validating empirical correlations, particularly crucial in the volatile oil market. Given the extensive reservoir of well production data at our disposal in the oil and gas sector, this study investigates the development of data-driven models to forecast the oil production. Using machine learning (ML) methodologies, can be developed to forecast hydrocarbon production with an acceptable level of accuracy. This paper employs a range of ML techniques, including Artificial Neural Network (ANN), to develop models for predicting well production within an oil field. These models effectively estimate well production over time, considering various parameters such as on-stream hours, downhole pressure and temperature, choke size percentage, wellhead pressure and temperature, daily gas and water production. All the models exhibit outstanding performance in training, validation, and testing phases, characterized by high correlation coefficients (R^2) and strong predictive capabilities. The paper also conducts a comparative analysis to assess the predictability of different models.

Keywords: Hydrocarbon Production, Prediction, Data-driven, Machine Learning, Artificial Neural Network

VERNACULAR CONTENT IN TOPONYMY AND ITS LINGUISTIC AND COGNITIVE-COMMUNICATIVE FEATURES

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Abstract

Vernacular in toponymy, the study of place names, unveils a fascinating interplay between language, culture, and geography. This exploration delves into the linguistic and cognitive-communicative peculiarities found in toponyms, drawing examples from both English and Kazakh languages. The toponyms, or place names, offer a linguistic lens through which we can understand the historical, cultural, and environmental tapestry of a region. Vernacular or local language contrasts with the standard language. This usually refers to a native speaker of a language or dialect that is spoken informally, not in writing, and which is considered less status than codified or institutional forms. It can differ in different ways from authoritative forms of speech, since a spoken language can be a separate stylistic register, a regional dialect, a sociolect, or an independent language. Vernacular is a term denoting a type of speech commonly used to refer to a local language or dialect, as opposed to a standard language. Vernacular is compared with more authoritative forms of language, such as national, literary, liturgical or scientific idiom or lingua franca, which are used to facilitate communication over a large area. The article considers the comprehensive approach to the study of vernacular content in toponymy presented it possible to trace the patterns of formation and functioning of the toponymy of the English and Kazakh languages in their most marked territorial variants, as well as to establish the connection of toponymic nominations with other layers of vocabulary. The study tries to find out what features of language and thinking are present in "place names", especially in different parts of these countries. The main attention was paid to: cultural connotations, associations, symbolism in toponyms and links with vocabulary. This research delves into the symbiotic relationship between vernacular content and toponymy, investigating how local languages influence the naming of places and exploring the ensuing linguistic, cognitive, and communicative dimensions. The study meticulously examines the linguistic underpinnings, unraveling the cultural nuances embedded in toponyms shaped by regional languages. Simultaneously, it delves into the cognitive aspects, probing how vernacular toponyms contribute to collective memory and community identity. The communicative features of these toponyms are scrutinized, shedding light on their role in facilitating meaningful interaction within communities. By illuminating the interplay between language, cognition, and communication in toponymy, this research provides valuable insights into the profound meanings encapsulated in the names of places, enriching our understanding of cultural heritage and linguistic diversity. Ultimately, it contributes to the broader discourse on the intricate tapestry of vernacular expression and its significance within the context of toponymy.

Keywords: toponymy, vernacular, content, informal, geography.

**VASCULITIS SYNDROMES SHOULD BE CONSIDERED AS A PATHOGENESIS
MECHANISM IN SEVERAL SYSTEMIC DISEASES - A CASE REPORT OF
TAKAYASU ARTERITIS.**

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Abstract

Background: Takayasu Arteritis - Aortic arch syndrome, also known as pulseless disease, manifests as an uncommon, nonspecific granulomatous vasculitis that frequently affects the aorta. Irregular fibrosis of the blood vessels occurs as a result of chronic vasculitis, leading to substantial intimal fibrosis (fibrosis of the inner section of the blood vessels) with complete obstruction in some cases. This condition predominantly impacts young or middle-aged women of Asian descent. Takayasu's arteritis shares similarities with other vasculitis clinical conditions, such as giant cell arteritis, which typically afflicts older individuals. Case presentation: This article delineates Takayasu arteritis in a 41-year-old woman under our surveillance since 2020. Her medical history includes cerebral circulation disruption, coronary artery stenting, myocardial infarction, left carotid artery stenting, and coronary angiography with angioplasty. She also has diabetes mellitus, encephalopathy, and Parkinson's syndrome. The patient reported intense, pressing pain behind the sternum, radiating to the left ring, along with a dry cough, shortness of breath, sensation of pulse disappearance in the right upper limb, mild ataxia, and tremors in the upper limbs. Various laboratory and instrumental studies were conducted, encompassing ECG, cardiac ultrasonography, Doppler ultrasonography of the aortic arch and its emanating blood vessels, upper limbs, and chest radiography. Additionally, contrast angiography and a CT scan with contrast were performed. A blood test for the autoantibody panel (ANCA, FR, ANA) and anticardiolipin antibody test were also carried out. Treatment was prescribed with ongoing monitoring. The patient underwent six hospitalizations over three years. Currently, the disease shows no progression, allowing for effective management without additional complications. Conclusion: This case presents Takayasu's arteritis, the complications of which may provoke other systemic diseases. The six hospitalizations over three years indicate the recurrent nature of the disease, but the current stability of the patient's condition suggests effective therapeutic intervention and a favorable response to treatment.

Therefore, timely intervention, correct selection of treatment tactics, and its subsequent management are required.

Keyword: Takayasu Arteritis, Vasculitis.

**MACHINE LEARNING APPROACH TO PREDICT WELD ASPECT RATIO AND
TENSILE STRENGTH IN LASER WELDING OF UNS S32750 STEEL**

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Abstract

This study aims to develop a framework for predicting the weld bead aspect ratio (depth/width) and tensile strength of Nd: YAG laser welded UNS S32750 steel (SDSS), employing four machine learning techniques (k-Nearest Neighbor, Decision Tree, Random Forest and Extra Trees). The need to create a model is driven by the nonlinear relationship between the initial system variables (laser power, welding speed, laser focal position, and pulse frequency) which reflect the variation in the outcomes (weld aspect ratio, tensile strength). The development of computational approaches helps to optimize the welding and reduce man hours in doing trial and error experimentation. Python-based machine learning technique aids in the creation of predictive models by leveraging the process parameters deduced from the outcomes of experiments. The outcomes showed these algorithms are capable of predicting laser weld aspect ratio and tensile strength, with a deviation less than 10%, and holds the ability to automate prediction process. Of the attempted architectures, the Random Forest model exceeds the other three in terms of accuracy (>5%) in predicting the aspect ratio and tensile strength of the weld joints.

Keywords: Laser welding, SDSS, Machine learning, Prediction, Aspect ratio, Strength

**STRENGTHENING CYBERSECURITY WITH ARTIFICIAL INTELLIGENCE:
REVEALING THREATS, COUNTERACTIONS, AND MITIGATION STRATEGIES**

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Abstract

In an increasingly interconnected digital landscape, the role of artificial intelligence (AI) in bolstering cybersecurity has become paramount. This paper delves into the dynamic relationship between AI and cybersecurity, focusing on the identification, understanding, and mitigation of cyber threats and attacks. The synthesis of AI's cognitive capabilities with the intricacies of cybersecurity creates an innovative approach to fortify digital defenses. It also embarks on an exploration of the multifaceted threats that assail the digital realm, spanning from sophisticated hacking endeavors to stealthy infiltrations. It underscores how AI-driven technologies provide a transformative framework to comprehend the evolving threat landscape, enabling proactive detection, prediction, and analysis of potential vulnerabilities. Moreover, this paper delves into the strategic application of AI in thwarting cyber attacks. It elucidates the ways in which AI-driven algorithms can autonomously decipher patterns, anomalies, and unusual behaviors that signify potential breaches. This real-time analysis, coupled with AI's adaptability, empowers cybersecurity systems to respond swiftly and effectively, minimizing damage and loss. Finally, this paper underscores the indispensability of leveraging artificial intelligence for cybersecurity. It encapsulates how AI serves as a vanguard against ever-evolving threats, enhancing the capacity to safeguard digital landscapes. As AI continues to evolve and adapt, its integration into cybersecurity remains instrumental in fostering a safer, more resilient digital future.

Keywords: Security, Privacy, Artificial Intelligence, Machine Learning, Deep Learning

**INCORPORATING EFFECTIVENESS AND ACCOUNTABILITY FOR MEMBER
GOOD: POSSIBLE CHOICES FOR COOPERATIVES IN SUB-SAHARA AFRICA**

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Abstract

Cooperatives are multifaceted phenomena that add value to the members, communities and economies at large. Cooperatives in comparison with profit-maximizing investor-owned firms are considered better at coping with economic crises, driving economic development and promoting social inclusion among communities. However, cooperatives are saddled with several imperatives challenging their effectiveness, accountability, transparency and organisational integrity for the provision of member goods. Members remain the foundation of the cooperatives. Despite, the cooperative organisational structure, the model has come under blistering criticism for not living up to the "member good maximization", a situation which undermines cooperative good governance and sustainability. Thus, this paper, accordingly, proffers some possible choices in the paper, choices in the area itemized to cooperative stakeholders for incorporating effectiveness and accountability for the common member good in cooperatives in the region.

Keywords: Cooperatives, sub-Sahara, member good, possible choices

**ENHANCED PHOTOCATALYTIC DEGRADATION OF MALACHITE GREEN MG
DYE UNDER SUNLIGHT USING A NOVEL TERNARY NANOCOMPOSITE**

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Hassan OUACHTAK

Ibn Zohr University

Amane JADA

Ibn Zohr University

Abdelaziz AIT ADDI

Ibn Zohr University

Abstract

A novel ternary Z-scheme photocatalyst (designated as SC1/SC2/SC3) was synthesized by facile coprecipitation method and subjected to characterization through XRD, FTIR, SEM, and UV-vis DRS techniques to describe its morphology, structure, and photocatalytic efficacy. The characterization results indicate the successful formation of a composite SC1/SC2/SC3, showcasing improved performance and stability attributable to favorable electron transfer capabilities and an appropriate band structure. Under sunlight, the SC1/SC2/SC3 composite exhibited a remarkable 98.48% degradation rate of 10mg/L malachite green (MG) dye within 45 minutes. Even after four cycles of use, the photocatalyst maintained robust degradation efficiency, underscoring its advanced photocatalytic properties and enhanced stability. Reactive species trapping experiments with the SC1/SC2/SC3 composite unveiled distinctive roles played by holes (h^+) and $\cdot O_2^-$ in the photodegradation process. Through an investigation of the photocatalytic mechanism, a Z-scheme was proposed as a plausible explanation for the observed processes.

Keywords: Z-scheme, Sunlight, Photocatalyst, Degradation, Malachite green (MG) dye.

**ALPHA WEAKLY SEMI- CONTINUOUS AND ALPHA WEAKLY
SEMI –IRRESOLUTE MAPPINGS IN TOPOLOGICAL SPACES**

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Abstract

Analysis is one of the greatest achievements in the history of mathematics. The achievement opens a new era of mathematical progress and plays an important role in the development of physics, astronomy, signal processing and other disciplines. At the end of the 19th century, mathematicians deduced many properties of continuous functions on closed intervals, which undoubtedly promoted the development of analytical theory. Bolzano's Function Theory gives the earliest proofs of the Boundedness theorem and the Extreme value theorem and Weierstrass proved the Extreme value theorem in Berlin lecture. The Intermediate value theorem was first proved in 1817 by Bolzano, and then Cauchy gave a proof in 1821. The definition of uniform continuity is proposed by Heine, and he published a proof of the Uniform continuity theorem. There are some important properties of continuous functions on closed intervals including Weierstrass second theorem: Boundedness theorem, Weierstrass first theorem: Extreme value theorem, Bolzano-Cauchy second theorem: Intermediate value theorem, Cantor theorem: Uniform continuity theorem. Continuous functions have four fundamental properties on closed intervals: Boundedness theorem, Extreme value theorem, Intermediate value theorem, Uniform continuity theorem. These theorems are the basis of mathematical analysis and the direct expression of real number theory in functions. In 2018, R.S. Suriya and T. Shyla Issac Mary introduced a new class of sets which is called Alpha weakly semi closed (briefly α_{WS} -closed) and investigated properties of this set. Also, they studied and discussed some of its properties and compared this new notion with some other classes of sets and investigated some of their basic properties in topological spaces. We introduce α_{WS} -continuous function and α_{WS} -irresolute function and investigate several properties and characterizations of these new types of mappings in topological spaces. Mathematics Subject Classification (2020): 54C05, 54C08, 54C10.

Keywords and Phrases: Topological space, α_{WS} -open set, α_{WS} -closed set, α_{WS} -interior set, α_{WS} -closure set, α_{WS} -continuous function, α_{WS} -irresolute function.

**ALPHA WEAKLY SEMI- OPEN AND ALPHA WEAKLY SEMI-
CLOSED MAPPINGS IN TOPOLOGICAL SPACES**

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Abstract

Analysis is one of the greatest achievements in the history of mathematics. The achievement opens a new era of mathematical progress and plays an important role in the development of physics, astronomy, signal processing and other disciplines. At the end of the 19th century, mathematicians deduced many properties of continuous functions on closed intervals, which undoubtedly promoted the development of analytical theory. Bolzano's Function Theory gives the earliest proofs of the Boundedness theorem and the Extreme value theorem and Weierstrass proved the Extreme value theorem in Berlin lecture. The Intermediate value theorem was first proved in 1817 by Bolzano, and then Cauchy gave a proof in 1821. The definition of uniform continuity is proposed by Heine, and he published a proof of the Uniform continuity theorem. There are some important properties of continuous functions on closed intervals including Weierstrass second theorem: Boundedness theorem, Weierstrass first theorem: Extreme value theorem, Bolzano-Cauchy second theorem: Intermediate value theorem, Cantor theorem: Uniform continuity theorem. Continuous functions have four fundamental properties on closed intervals: Boundedness theorem, Extreme value theorem, Intermediate value theorem, Uniform continuity theorem. These theorems are the basis of mathematical analysis and the direct expression of real number theory in functions. In 2018, R.S. Suriya and T. Shyla Issac Mary introduced a new class of sets which is called Alpha weakly semi closed (briefly α_{ws} -closed) and investigated properties of this set. Also, they studied and discussed some of its properties and compared this new notion with some other classes of sets and investigated some of their basic properties in topological spaces. We introduce α_{ws} -open function, α_{ws} -closed function, pre- α_{ws} -open function, and pre- α_{ws} -closed function and investigate several properties and characterizations of these new types of mappings in topological spaces. Mathematics Subject Classification (2020): 54C05, 54C08, 54C10.

Keywords: Topological space, α_{ws} -open set, α_{ws} -closed set, α_{ws} -interior set, α_{ws} -closure set, α_{ws} -open function, α_{ws} -closed function, pre- α_{ws} -closed function, pre- α_{ws} -open function.

**STRATEGIC FRAMEWORKS FOR NURTURING SUSTAINABLE COMPETITIVE
ADVANTAGE THROUGH INNOVATION MANAGEMENT ACROSS DIVERSE
INDUSTRIES WITHIN NIGERIA**

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Abstract

This paper explores the pivotal role of strategic frameworks in fostering and sustaining competitive advantages through innovation management across diverse industries within the Nigerian business landscape. With globalization and technological advancements shaping the competitive terrain, the pursuit of sustainable competitive advantage remains a strategic imperative for organizations. This paper focuses on elucidating various strategic frameworks tailored to the Nigerian context, emphasizing their efficacy in leveraging innovation management as a means to achieve and maintain competitive edges in diverse industries. Drawing upon theoretical models and empirical studies, it delineates the nuanced interplay between innovation strategies and sustainable competitive advantage. Moreover, this paper underscores the need for adaptable and industry-specific approaches, considering the intricacies inherent in Nigeria's multifaceted business environment. By offering insights into strategic frameworks that integrate innovation management, this conceptual paper aims to equip practitioners and policymakers with a comprehensive understanding of the pathways to nurture and sustain competitive advantages within Nigeria's diverse industrial landscape.

Keywords: innovation management, sustainable competitive advantage, strategic frameworks, diverse industries, organizational success, market leadership.

A SURVEY ON CHANNEL CAPACITY ESTIMATION FOR MASSIVE MULTIUSER MIMO SYSTEMS

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Abstract

As the need for high-speed data grows in current wireless communication systems, new ways must be found to make the best use of bandwidth. Massive Multiuser Multiple-Input Multiple-Output (MU-MIMO) systems have become a potential way to improve spectral efficiency and link reliability. But as these systems get bigger, they get more complicated, especially when it comes to estimating channel capacity, which is an important job for getting the most out of a system. This study paper gives a detailed look at the methods and techniques used to estimate channel capacity in large-scale MU-MIMO systems. Traditional methods like Least Square (LS) and Linear Minimum Mean Square Error (LMMSE) as well as newer methods that use machine learning are talked about. The paper also talks about the current problems with estimating channel capacity, such as how to deal with channels that are getting old, how to estimate in settings that change a lot, and how to deal with interference. Lastly, the field's future is looked at, with a focus on how it might be possible to use artificial intelligence methods and tap into new frequency bands.

Keywords: Massive MU-MIMO ,Channel Capacity Estimation ,Deep Learning-based Estimation ,5G and Beyond Communication Systems ,Artificial Intelligence in Wireless Communications

ANTIBIOFILM OF PLANTS ORIGIN IN ANTIMICROBIAL RESISTANCE CONTROL

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Abstract

This review provides a comprehensive analysis of the potential of antibiofilm agents of plant origin in controlling antimicrobial resistance. A systematic literature search was conducted using various databases, including PubMed, Scopus, and Google Scholar. The keywords used for the search included “antibiofilm agents,” “plant-derived compounds,” “antimicrobial resistance,” and related terms. Studies published in the past decade were considered for inclusion in this review. The selected studies were analyzed and categorized based on the plants used, extraction methods, biofilm inhibition assays, and potential mechanisms of action against biofilms. Numerous studies have reported the effectiveness of plant-derived compounds in inhibiting biofilms formed by various pathogenic microorganisms. Several plant species, including but not limited to, Aloe vera, Curcuma longa, Zingiber officinale, and Punica granatum, have shown promising antibiofilm properties. The extracts obtained from these plants have demonstrated significant inhibition of biofilm formation, as well as disruption of established biofilms. Various mechanisms have been proposed, including interference with quorum sensing, disruption of extracellular polymeric substances, and adhesion mechanisms.

Keyword: Antibifim agents, Plant derived compounds, Antimicrobial resisistance

**BEYOND FOOD: REVIEWING RECENT TRENDS IN THE APPLICATION OF
Sorghum bicolor L. (Moench) IN PHYTOREMEDIATION**

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Abstract

Sorghum bicolor (L.) Moench (English/common name: great millet/Guinea corn/Indian millet/sweet sorghum, and Hausa name: *dawa*), is regarded as the 5th most important cereal crop globally, and the 2nd in Africa, respectively. FAOSTAT estimated its production as 58.92 million tonnes, worldwide, with Nigeria accounting for 6.73 million tonnes. Valorisation involves enhancing and utilising the socioeconomic/environmental value of crops, e.g. using food crops in non-food sectors, and is a current area of focus in agriculture. The phenotypic/genetic versatility, fast growth and stress tolerance of this crop extends its usage beyond traditional cultivation for food/feed, extending it to realms of bioenergy production and synthesis of useful chemicals/value-added products. Moreover, considering its high biomass production and hyperaccumulation ability, it is among the 20 plants commonly applied in phytoremediating persistent environmental pollutants, especially heavy metals (HMs). This review involved a literature search (articles, theses and conference papers) spanning the last twenty years (2004-2023) to provide a comprehensive snapshot of HMs phytoremediated by this crop, the mechanisms involved, effects exerted by the HMs on the crop and residue utilisation after the phytoremediation process. The results revealed the successful application of this crop in phytoremediating: Al, As, Cd, Co, Cr, Cs, Fe, Mg, Ni, Pb, Sr, U and Zn in Africa, the Americas, Asia and Europe. Furthermore, recent trends/areas of current research in phytoremediation using this crop include: exploring the molecular principles behind HM tolerance in the plant and the use of microbial consortia in microbially-assisted phytoremediation. Further research shall focus on additional efforts to valorise phytoremediation end-products, and developing phenotypically and genetically resilient varieties for improved outcomes. The review highlighted the massive potentials of this crop to be utilised as a successful phytoremediation agent especially in areas where HMs are rampant, and where the crop is indigenously cultivated in substantial amounts, e.g. Nigeria, towards a healthier environment.

Keywords: Heavy metals, Phytoremediation, *Sorghum bicolor*, Valorisation

**EXAMINATION OF THE CORRELATION BETWEEN THE AGE OF TOURISTS AND
WILLINGNESS FOR INTERNAL TOURISM IN ALGERIA**

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Abstract

This study aims to measure the nexus or correlation between the age of respondents and their willingness to do tourism in Algeria. This type of research wants to check the behavior toward intern tourism and assess which category is affected. The method used is quantitative, through an online questionnaire between June and October 2023. It should be mentioned that our sample is composed of 51 respondents. The result based on the use of Kendall's tau b test shows that there is no correlation between the two variables ($p\text{-value: } 0.107 > 0.05$) and the correlation coefficient is negative (-0.214).

Keywords: Tourism - Kendall's tau b test- Alegria.

İMİC MÜASİR POSTSENAYE MEKANINDA KOMMUNİKASIYA VASİTESİ KİMİ

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Xülasə

Müasir postsənaye cəmiyyəti qeyri-xətti inkişaf mərhələsinə qədəm qoymuşdur və bu gün sənaye cəmiyyətinin sadə davamı qismində dəyərləndirilə bilməz. Öz növbəsində, mədəniyyət də həmçinin mürəkkəb təkamül strukturundan ibarət olmaqla yanaşı həmçinin elementlərin transformasiya və struktur yenidən qruplaşma imkanı nəzərdə tutur ki, burada transformasiya təzahürlərindən biri dəbdir. Hazırda postsənaye dövründə baş verən dünyagörüşü istiqamətlərin və əhəmiyyətli dəyərlərin dəyişməsi nəticəsində yeni dəb təmayüllərinin konstruksiyası əmələ gətirilir ki, onun vəziyyəti, əsas əlamətləri, xarakterik xüsusiyyətləri onun haqqında özünü təşkilədıcilik elementlərinə malik sistem kimi danışmağa imkan verir. Onun məhz belə vəziyyəti tədqiqatçı üçün böyük maraq kəsb edir. İmic anlayışı satış məfhumu ilə sıx bağlıdır. İnsanların qarşılıqlı fəaliyyəti nəticəsində meydana gələn istənilən aksiya bu və ya digər şəkildə birbaşa yaxud dolayı satışla bağlıdır. Gələcəkdə bir-birinə faydalı olmaq üçün insanlar bir-birinin rəğbətini qazanmağa, xoşuna gəlməyə çalışır. Bu baxımdan ancaq yaxın dostlar və ailə üzvləri istisna təşkil edir. Bütün qalan insanlar məhz özləri üçün bu və ya digər fayda əldə etmək üçün bir-birilə, bəzən hətta düşünülməmiş də olsa ünsiyyət qurur. Odur ki, biznes aləmində imic məfhumu kifayət qədər geniş yayılmışdır. İmic – hər hansı insanın şəxsiyyəti və fəaliyyəti haqqında digər insanların təsəvvürüdür. Bir qayda olaraq, imic məfhumu daha çox bu və ya digər şəxsiyyətə aid edilir. Dəbin mürəkkəb təbiəti cəmiyyətin dinamikası ilə birgə inkişaf edir, buna görə dəbin sosial şərtlənməsi və yönəldilməsi, solum daxilində onun möhkəmlənməsi tədqiqat işləri üçün dəyişməz olaraq aktual mövzu kəsb edir. Dəbin ekstensiyaları, bir qayda olaraq, fasiləsiz baş verən dəyişikliklərdə, yeniliyə və gözlənilməzliyə oriyentasiyasında ifadə olunur. Bununla əlaqədar, dəbli innovasiyalar sahəsində fərqlərin seçimi problemi daha da kəskinləşir. Dəbin tənzimləyici təsirini qeyd etməmək mümkün deyil, dəb insanın şüurunu determinasiya etmək iqtidarındadır, bu da kütləvi ifrat istehlak cəmiyyəti üçün xüsusilə aktualdır.

Açar sözlər: dəb, imic, geyim, dəbli innovasiyalar

IMAGE AS A MEANS OF COMMUNICATION IN THE MODERN POST-INDUSTRIAL SPACE

Summary

The modern post-industrial society has entered the stage of non-linear development and today it cannot be evaluated as a simple continuation of the industrial society. In its turn, culture also consists of a complex evolutionary structure and also implies the possibility of transformation and structural regrouping of elements, where one of the manifestations of transformation is fashion. As a result of the change of worldview directions and traditional values, which is currently occurring in the post-industrial era, the construction of new fashion trends is formed, whose condition, main signs, and characteristic features allow us to talk about it as a system with elements of self-organization. Its very situation is of great interest to the researcher. The concept of image is closely related to the concept of sales. Any action that occurs as a result of human interaction is directly or indirectly related to sales in one way or another. In order to be useful to each other in the future, people try to win each other's sympathy and be liked. From this point of view, only close friends and family members are exceptions. All other people communicate with each other, sometimes even without thinking, just to get one benefit or another for themselves. Therefore, the concept of image is quite widespread in the business world. Image— is the perception of other people about the personality and activities of any person. As a rule, the concept of image is mostly attributed to one or another personality. The complex nature of fashion develops together with the dynamics of society, therefore, the social conditioning and direction of fashion, its consolidation within society, is an invariably relevant topic for research. Existences of fashion, as a rule, are expressed in continuous changes, orientation to novelty and unpredictability. In this regard, the problem of the choice of individuals in the field of fashionable innovations becomes even more acute. It is impossible not to mention the regulatory effect of fashion, fashion is able to determine the consciousness of a person, which is especially relevant for a society of mass extreme consumption.

Keywords: fashion, image, clothing, fashionable innovations

SILLA FACE-INLAID GLASS BEAD AND ITS VERIFICATION

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Abstract

In 1973, the world's most beautiful glass bead, measuring 1.8 cm in diameter, was unearthed in Gyeongju of Korea. This small glass bead is delicately inlaid with four human faces, six birds, and four flowering trees (Fig. 1). The inlaid glass beads, which demonstrate the high level of technological sophistication of the period, are partly unexplained, although there are various opinions about their origin and makers. There is a hypothesis that the figures inlaid in the glass are Roman kings and queens, or that there is an inlaid glass bead workshop in Java, Indonesia, and that they are the four faces of the Hindu Brahman. There are many records showing that ancient Korea revered white and blue, and preferred white animals and Goryeo celadon. Therefore, the purpose of this study is to investigate the symbolism of the inlaid glass bead design, its relationship to Silla culture, and the conditions under which the glass beads could be produced, and to reveal of Silla's own production of inlaid glass beads that converge artistic and technical skills. Research methods include relics and literature. There are written records that the people of Mahan, Buyeo, and Silla considered beads as treasures and used them as ornaments. In the patterned part of the beads, the sangtu and gold crowns are traditional elements of ancient Korea that cannot be explained by other cultures (Fig. 2). The six white birds can be seen as ducks or chickens, and bird figures such as ducks and chickens were often used in ancient Korea for religious purposes (Fig. 3). In addition, Silla is closely related to birds, as the early Silla was referred to as the 'country of birds'. The flower tree, with its symmetrical branches branching out from the trunk, is found in many Silla artefacts (Fig. 4). The figures in the inlaid glass beads are the king and queen of Silla, the white birds are ducks or chickens, and the flower trees can be seen as spiritual trees revered by northern peoples. In addition, the Silla people had excellent iron skills and produced a variety of glass beads from the slag produced by ironworking, as evidenced by the ruins and artefacts. In addition, various inlaid glass beads excavated in Korea and inlaid glass beads excavated alongside Silla-style tombs at Doganmori Tumulus in Japan support the theory of Silla's own production. The history of beads and the Silla's ability to produce glass beads can be gleaned from excavated gold tubes and metal inlaid artefacts, revealing the environment in which the Silla were able to produce their own.

Keywords:Silla face-inlaid glass bead, Sea Silk Road, Topknot, Hair ornament, Bird, Flower tree

**INVESTIGATING THE BIOCHEMICAL IMPACT OF DIPHENYL PYRAZOLE IN
BIOLOGICAL SYSTEM.**

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Abstract

This abstract outline a focused investigation in to the promising potential of pyrazole-based compound such as di phenyl pyrazole and their derivatives as biologically active compound. Diphenyl pyrazole is a chemical compound that has been studied for its potential biochemical impact in biological systems. One example of its application is in the field of medicinal chemistry, where it has been investigated for its potential as a pharmacologically active compound. The central aim of this study is elucidating the different biological activity of di phenyl pyrazole such as anticancer, anti-inflammatory, antimicrobial, antimalarial, antiparkinsonian, antitubercular, antiviral, neuroprotective etc. In a biological system diphenyl pyrazole and their derivatives may interact with specific molecular target such as enzyme or receptors influencing various biochemical pathways. For instance, they might modulate signalling pathways involved in inflammation, leading to a therapeutic effect. Through these investigations, we aimed to elucidate the which mechanism responsible for its pharmacological effects. This study contributes to the growing body of knowledge surrounding the biochemical impact of diphenyl pyrazole in biological systems, offering valuable insights for researchers and pharmaceutical developers seeking innovative solutions in the pursuit of novel therapeutics.

Keywords: pyrazole-based compounds, therapeutics, biological activity

**ON THE EFFECT OF LIVESTOCK AVAILABILITY ON MALARIA TRANSMISSION
WITH OPTIMAL CONTROL**

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Abstract

The complexity of the behavior of some species of the causative vectors for malaria disease contributes to the challenges on malaria elimination. Livestock are known to play a role in the disease prevalence as they serve as the preferred host for bloodmeal for some species of the causative vector. Based on a system of differential equations, the dynamics of malaria under optimal control was explored. The basic reproduction number, a threshold parameter for the disease incidence was estimated and the local stability of the disease-free equilibrium point is asymptotically stable provided the basic reproduction number is less than unity. Analysis of the local stability of the endemic equilibrium shows that the malaria model undergoes a forward bifurcation. The presence of livestock was found to influence the malaria incidence and prevalence based on sensitivity analysis. Based on optimal control analysis, the best control tools to be combined with the potential of contributing significantly to the disease elimination within a minimal time frame was recommended.

Keywords: Differential Equations, Malaria, Livestock, Optimal control.

EXPLORING THE POTENTIAL OF TERBINAFINE-LOADED NANOEMULGEL FOR TREATING DERMATOPHYTOSIS

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Abstract

Dermatophytosis is a fungal infection with severe incidences reported every year. To treat this, terbinafine loaded oil in water nanoemulsion (TH-NE) was fabricated using aqueous microtitration method with olive acid (oil phase), Span 80 (surfactant), and propylene glycol (co-surfactant). Pseudo-phase ternary diagrams and thermodynamic studies revealed the stability of TH-NE. TH-NE was optimized by Box-Behnken Design (BBD) and recorded a particle size of $28.07\text{nm} \pm 0.5$, PDI 0.1922 ± 0.1 and zeta potential $-41.87\text{ mV} \pm 1$. Furthermore, TH-NE was incorporated into 1.5% Carbopol and nanoemulgel (TH-NEG) was formed. TH-NEG was subjected to texture analysis which showed firmness (168.00g), consistency (229.81g.s), cohesiveness (-83.36g), work of cohesion (-107.02g.s). In vitro drug release for TH-NEG and TH-NE showed an initial burst effect followed by sustained release of 88% and 74% respectively for 48 h when compared with the marketed formulation (66%). Similarly, ex-vivo release studies showed that TH-NEG and TH-NE have sustained release of 86% and 71% respectively when compared with marketed formulation (67%). Moreover, TH-NEG and TH-NE showed $30\mu\text{m}$ and $25\mu\text{m}$ penetration into the epidermal layer respectively as seen in Confocal microscopy. Moreover, the dermatokinetic study demonstrated enhanced drug penetration through mouse skin with the drug-loaded emulgel compared to the TH-NE. Hence, TH-NEG proved to be potential carrier of TH for dermatophytosis treatment.

Keywords: TH-NEG, TH-NE, Dermatophytosis

**PRODUCTION OF BRIQUETTES FROM SAWDUST BIOMASS AND COAL BLEND
USING CORNSTARCH AS BINDER**

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Abstract

The decreasing availability of fuel woods has made it necessary that efforts be made towards efficient utilization of agricultural wastes, some of these agricultural wastes include coconut shell, wood pulp, and wood waste (sawdust). In this study, briquettes were produced using coal and sawdust in different proportions using cornstarch as binder, this was evaluated by the amount of fixed carbon which was determined through proximate analysis, the calorific value, and some physical tests. The briquettes produced using cornstarch as binder had fixed carbon of 76.75% and, a calorific value of 28.5 MJ/kg, the briquette ignited at 34sec and burned for 14.02 min. This result suggests that cornstarch is a very good binder for briquette production. The coal blend in sawdust biomass yielded a bio-coal briquette with shorter ignition time, superior combustion sustaining properties, decreased the generation of dust and soot, and emitted less SO₂. The briquettes obtained in this study are efficient and environmentally friendly.

Keywords: Biomass, Briquette, Coal, corn starch, sawdust, calorific value

MICROSTRIP PATCH ANTENNA: BRIDGING CONNECTIVITY IN THE LTE AND WIMAX ERA

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Abstract

This paper presents a printed antenna with multiple bands, fed by a microstrip line and featuring different slots for increased bandwidth. The study involves thorough experimental analysis of impedance, radiation, and gain characteristics associated with this antenna design. Experimental results show significant enhancement in impedance bandwidth, with an operational range of 1.8 GHz observed around 2.8 GHz. This operational bandwidth marks a substantial fourfold improvement over conventional microstrip-line-fed printed wide-slot antennas. Moreover, the antenna's gain within this operational band is studied, resulting over 2-dB gain bandwidth achieved over at least 1.8 GHz.

Index Terms : Microstrip Patch, Antenna, LTE, WiMAX .

**ANTIBACTERIAL ACTIVITY OF BUCHHOLZIA CORIACEAE EXTRACT AGAINST
ORAL PATHOGENS ISOLATED FROM PATIENTS ATTENDING GENERAL
HOSPITAL, MINNA, NIGERIA**

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Abstract

Despite significant advancements in the field of pharmaceutical microbiology, the challenge of bacterial resistance to drugs, emerging and re-emerging infections remain an issue of global concern, hence, the need for alternative methods of treatment. *Buchholzia coriacea*, also known as wonderful kola, is a good option among several other options because of its many phytochemical components. The wonderful kola sample used for this study was purchased from Mobil Market in Niger State, Nigeria. The powdered plant materials were extracted using cold maceration method with aqueous and ethanol. Using standard methods, the antibacterial susceptibility test, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC), and phytochemical screening were carried out. Flavonoids, tanins, alkaloids, steroids with the exception of saponins were found in the phytochemical analysis. Wonderful kola seed exhibits antibacterial activity, producing a zone of inhibition against all tested bacteria, and has the highest zone of inhibition at 250 mg/ml concentration. The zones of inhibition ranging from 14±0.00mm to 16±0.00mm. Minimum inhibitory concentration of the two extracts against *Streptococcus pyogenes*, *Streptococcus pneumonia*, and *Klebsiella pneumonia*, were all at 20mg/ml, with a minimum bactericidal concentration (MBC) of 50mg/ml against all the test isolates. The antibacterial activity of wonderful kola is demonstrated against some oral bacterial pathogens, including *Streptococcus pyogenes*, *Streptococcus pneumonia*, and *Klebsiella pneumonia*, which were isolated from General Hospital, Minna, Nigeria. The study's findings indicate that wonderful kola seed may have applications in both antibacterial and therapeutic drug development for the management of oral infections linked to the test organisms.

Keywords: Aqueous, ethanol, *Buchholzia coriacea*, oral pathogens

THE EFFECT OF WORK-LIFE BALANCE, JOB SATISFACTION AND ORGANIZATIONAL COMMITMENT ON EMPLOYEE PERFORMANCE IN NIGERIAN INSTITUTE OF LEATHER AND SCIENCE TECHNOLOGY, ZARIA

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Abstract

This study is to assess the Effect Of Work-Life Balance, Job Satisfaction And Organizational Commitment On Employee Performance In Nigerian Institute Of Leather and Science Technology, Zaria: from 2016- 2023. The problem investigated revolves around the effect of work-life balance, job satisfaction and organizational commitment on employee performance. The Objective of the study is to assess the effect of work-life balance, job satisfaction, and organisational commitment on employee performance at the Nigerian Institute of Leather and Science Technology zaria. Literature were review on work-life balance, job satisfaction and organisational commitment. Vroom's Expectancy Theory (1964) was used for the study. The data for the study were generated from primary and secondary sources. The instruments of the primary data collection used were questionnaire and interview, while secondary sources made use of reports, books, gazettes, journals, research theses and dissertations. Questionnaires were distributed on a sample of 163 respondents selected from 238 population of the study through a stratified and simple random sampling techniques to test the hypotheses. Data were analysed using descriptive, inferential and thematic statistical tools. Regression analysis tests result revealed that the variables under study has a significant effect on employee performance also the result from the interview indicate that work-life balance, job satisfaction and organizational commitment has significant effect on employee performance. It was recommended among other things that employees were able to balance time, work-life and personal life and more attention should be given to them in terms of incentives and working conditions. This will further enhance their performance.job satisfaction brings the best out of an employee and that organizations should use the best motivational tools that suit the organization to make the employees give more in the service of the organization which will lead to employees' performance and NILEST should encourage employees to improve in their competence at work so that they can be committed to the organization performance.

Keywords: Effect Of Work-Life Balance, Nigerian Institute of Leather and Science Technology

**A REVIEW ON SYNTHESIS OF NATURAL PRODUCTS VIA MITSUNOBU
REACTION**

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Abstract

The extensive synthetic applications of the Mitsunobu reaction make it an essential component of organic chemistry. The essential components of the Mitsunobu reaction are azodicarboxylate, which acts as an oxidizing agent, and phosphines, which act as reducing agents. Both these components work together to convert alcoholic groups to ester groups. It is a well-known stereoselective process that provides the final products with an inverted stereochemical configuration. The synthesis of natural compounds is one of the most significant uses of the Mitsunobu reaction. Here, the Mitsunobu reaction's recent contributions to the overall synthesis of natural products, emphasizing their biological potential have been presented.

Keywords: Mitsunobu reaction; Natural products; Stereoselective synthesis.

**EV ORTAMINDAKİ MATEMATİK YAŞANTILARININ OKUL ÖNCESİ
ÇOCUKLARIN MATEMATİK BECERİLERİNE ETKİSİNİN
İNCELENMESİ**

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Özet

Yaşamımızın önemli bir kısmını oluşturan matematik becerileri, erken çocukluk dönemindeki matematiksel deneyimlerin ürünüdür. Erken yaşlarda kazanılan matematik becerileri, çocukların ileriki yıllarda karşılaştıkları matematiksel kavramlar için temel oluşturmaktadır. Çocukların matematikle ilgili sahip oldukları beceriler ev ortamındaki matematik yaşantılarıyla doğrudan bağlantılı bir süreci işaret etmektedir. Çünkü çevresel uyaranlara karşı en hassas dönemlerden biri olarak nitelendirilen okul öncesi dönemde ev yaşantılarının her biri çocuklar için birer eğitim deneyimidir. Bu deneyimler aileler tarafından çocuklar için bir eğitim fırsatı olarak kullanılabilir. Bu sayede erken matematik becerilerini geliştirme potansiyeli üst noktalara ulaşabilmektedir. Araştırmada, ev ortamındaki matematik yaşantılarının okul öncesi çocukların matematik becerilerine etkisinin incelenmesi amaçlanmıştır. Araştırmada karma yöntem desenlerinden açılımlı sıralı desen kullanılmıştır. Araştırmanın çalışma grubunu Ankara ilinde Milli Eğitim Bakanlığına bağlı bağımsız bir okul öncesi eğitim kurumuna devam eden yirmi çocuk ve ebeveynleri oluşturmaktadır. Araştırmanın nicel verileri Aydoğan, Akkaya ve Özyürek (2020) tarafından geliştirilen Erken Matematik Testi (EMAT) ile Aydoğan ve Özaslan tarafından geliştirilen Ev Ortamı Değerlendirme Ölçeği (EV-DE) aracılığıyla elde edilmiştir. Nitel veriler ise araştırmacılar tarafından geliştirilen Aile Görüşme Formu ile elde edilmiştir. Araştırmada EMAT ve EV-DE değerlendirme araçları ile elde edilen veriler SPSS paket programı ile analiz edilmiş, ardından en yüksek ve en düşük puana sahip beş çocuğun ebeveynleri ile Aile Görüşme Formu aracılığıyla yarı yapılandırılmış görüşmeler gerçekleştirilmiştir. Görüşmelerden elde edilen veriler içerik analizi yöntemi ile incelenmiştir. Araştırma sonucunda, EMAT ve EV-DE arasında pozitif yönde anlamlı ilişki bulunmuştur ($p < 0,01$). Aile Görüşme Formu bulgularında ise, erken matematik becerisi yüksek olan çocukların ailelerinin matematiği ev yaşantılarına daha fazla dahil ettikleri görülürken; erken matematik becerisi düşük olan çocukların ailelerinin ev yaşantılarında matematiğe daha az yer verdikleri görülmüştür.

Anahtar Kelimeler: Ev ortamında matematik, erken matematik eğitimi, matematik becerilerinin desteklenmesi, okul öncesi.

THE IMPACT OF MATHEMATICAL EXPERIENCES IN THE HOME ENVIRONMENT ON PRESCHOOL CHILDREN'S MATHEMATICAL SKILLS

Abstract

Mathematical skills, which constitute an important part of our lives, are the product of mathematical experiences in early childhood. Mathematical skills acquired at an early age form the foundation for the mathematical concepts that children will encounter in later years. Children's mathematical skills are directly related to their mathematical experiences in the home environment. During the preschool period, which is characterised as one of the most sensitive periods to environmental stimuli, each home experience serves as an educational opportunity for children. These experiences can be used by families as an educational opportunity for children. In this way, the potential for developing early mathematics skills can reach high levels. In this study, it was aimed to examine the effect of mathematics experiences in the home environment on preschool children's mathematics skills. Exploratory sequential design, one of the mixed method designs, was used in the study. The study group consisted of twenty children attending an independent preschool education institution affiliated to the Ministry of National Education (MoNE) in Ankara and their parents. Quantitative data were obtained through the Early Mathematics Test (EMAT) developed by Aydođan, Akkaya, and Özyürek (2020) and the Home Environment Evaluation Scale (EV-DE) developed by Aydođan and Özaslan. Qualitative data were obtained through the Family Interview Form developed by the researchers. In the study, the data obtained with the EMAT and EV-DE assessment tools were analysed with the SPSS package programme, and then semi-structured interviews were conducted with the parents of the five children with the highest and lowest scores through the Family Interview Form. The data obtained from the interviews were analysed by content analysis method. As a result of the study, a significant positive correlation was found between EMAT and EV- DE ($p < 0.01$). In the findings of the Family Interview Form, it was observed that the families of children with high early mathematics skills included mathematics more in their home life, while the families of children with low early mathematics skills included mathematics less in their home life.

Keywords: Mathematics in home environment, early mathematics education, supporting mathematics skills, preschool.

ANNELERİN VE ÇOCUKLARININ GÖZÜNDE KARDEŞ KISKANÇLIĞI: SORUNLAR VE ÇÖZÜM STRATEJİLERİ

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Özet

Aile, çocuğun ilk sosyal ve duygusal çevresidir ve çocuk dünyayı ilk olarak ailenin ilgisi ve desteği ile keşfeder. Aileye katılan yeni bir kardeş desteğin ve ilginin paylaşılmasına neden olur. Yeni doğan bebek temel ihtiyaçlarını gidermek için ailesine bağımlı olduğundan zaman zaman annenin ilgisi yeni doğan bebek üzerine yoğunlaşır. Bu durumda ilgi ve desteği paylaşılan çocuk yeni doğana karşı kıskançlık davranışları sergiler. Kıskançlık davranışları yenidoğana ve anneye karşı saldırgan ve tepkisel olabilmektedir. Kardeş kıskançlığı çocuklarda genellikle 3-6 yaş döneminde görülmektedir. Bu dönemdeki çocuklar gelişimsel olarak benmerkezci dönemde oldukları için her şeyin sebebinin kendileri ile ilgili olduğunu düşünürler. Dolayısıyla yeni bir bebeğin dünyaya gelme sebebini ailenin kendisini sevmediği olarak düşünebilirler. Ayrıca, bu yaş grubu çocukların okul öncesi eğitime başlamasına denk geldiği için çocuklarda ailenin kendisinden kurtulmak istediğine dair düşünceler ortaya çıkabilmektedir. Bu araştırmanın amacı annelerin ve çocukların gözünden kardeş kıskançlığının incelenerek sorunlar ve çözüm stratejilerinin ortaya konmasıdır. Araştırmada nitel araştırma desenlerinden fenomenoloji (olgubilim) deseni kullanılmıştır. Çalışma grubunun belirlenmesinde ölçüt örnekleme tekniği kullanılmıştır. Bu bağlamda Rize ilinde 0-12 ay arası kardeşe sahip olma ölçütünü sağlayan 3-6 yaş grubu sekiz çocuk ve anneleri çalışma grubunu oluşturmuştur. Araştırmanın verileri anneler ve çocuklarla ayrı oturumlar şeklinde gerçekleştirilen odak grup görüşmeleri ile elde edilmiştir. Görüşmelerde anneler ve çocuklar için araştırmacılar tarafından geliştirilen görüşme formları kullanılmıştır. Odak grup görüşmeleri bir moderatör başkanlığında ve iki gözlemci eşliğinde yürütülmüştür. Anneler ile yapılan görüşme 60 dakikalık bir oturumda gerçekleştirilmiştir. Annelere öncelikle araştırmanın amacı açıklanmış, ardından görüşme formunda yer alan sorular sorulmuştur. Veri kaybını önlemek amacıyla annelerin izni alınarak yanıtları kayıt altına alınmıştır. Çocuklar ile yapılan görüşme ise ebeveyn onayı alınarak 30 dakikalık bir oturumda gerçekleştirilmiştir. Çocuklarla tanışmak için buz kırıcı bir oyun oynanmış, ardından görüşme formunda yer alan sorular sorulmuştur. Araştırmadan elde edilen veriler içerik analizi tekniği ile analiz edilmiştir. Bu doğrultuda anneler ile yapılan görüşmeler sorunlar ve çözüm stratejileri açısından; çocuklar ile yapılan görüşmeler ise kardeşlik ve kardeşe uyum bağlamında ele alınmıştır.

Anahtar Kelimeler: Kardeş kıskançlığı, kardeşler arası rekabet, kardeşler arası ilişki

SIBLING JEALOUSY FROM THE PERSPECTIVE OF MOTHERS AND THEIR CHILDREN: PROBLEMS AND SOLUTION STRATEGIES

Abstract

The family serves as the child's primary social and emotional environment, and it is within the family's care and support that the child initially explores the world. The arrival of a new sibling in the family fosters shared parental support and attention. As the newborn relies on the family for basic needs, the mother's focus may shift towards the new baby. In this case, the child who shares the attention and support exhibits jealous behaviors towards the newborn. Jealousy behaviors can be aggressive and reactive towards the newborn and the mother. Sibling jealousy is usually observed in children between the ages of 3-6. Since children in this period are developmentally self-centered, they think that everything is about them. Therefore, children in this age group may perceive the arrival of a new baby as a sign that the family does not like them. In addition, since this age group coincides with the start of preschool education, children may think that the family wants to get rid of them. This study aimed to examine sibling jealousy from the perspective of mothers and children and to reveal the problems and solution strategies. Phenomenology design, one of the qualitative research designs, was used in the study. Criterion sampling technique was used to determine the study group. Eight children aged 3-6 years and their mothers who met the criteria of having siblings between 0-12 months in Rize province constituted the study group. The data of the study were obtained through focus group interviews conducted with mothers and children in separate sessions. Interview forms developed by the researchers for mothers and children were used. The focus group interviews were conducted under the supervision of a moderator and two observers. The interview with the mothers was conducted in a 60-minute session. The purpose of the study was first explained to the mothers, and then the questions in the interview form were asked. In order to prevent data loss, the mothers' consent was obtained, and their responses were recorded. The interview with the children was conducted in a 30-minute session with parental consent. The children were introduced through an icebreaker game, followed by asking questions from the interview form. The data obtained from the research were analyzed with the content analysis technique. Accordingly, interviews with mothers were analyzed in terms of problems and solution strategies, while interviews with children were analyzed in terms of siblingship and sibling adjustment.

Keywords: Sibling jealousy, sibling rivalry, sibling relationship

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Özet

Türkiye'de Millî Eğitim Bakanlığı Öğretmen Yetiştirme Genel Müdürlüğü ile Birleşmiş Milletler Eğitim, Bilim ve Kültür Örgütü (UNESCO) iş birliğinde gerçekleştirilen "Anadolu Masalları Projesi" geleneksel Anadolu masallarının korunması ve gelecek nesillere aktarılmasını amaçlayan bir girişimdir. Proje, Türkiye'nin zengin kültürel mirasını yansıtan masalları toplamayı, belgelemeyi ve öğretmenlere bu masalları eğitim süreçlerine entegre etme fırsatı sunmayı hedeflemektedir. Bu sayede, çocuklara geleneksel değerleri ve kültürel mirası öğretme amacı güdülmektedir. Bu proje kapsamında okul öncesi ve ilkökul çocuklarına yönelik masal kitaplarından oluşan iki eğitim seti yayınlanmıştır. Bu araştırmanın amacı, Okul Öncesi Anadolu Masalları eğitim setinde yer alan masallara yönelik çocukların görüşlerinin incelemesidir. Bu amaç doğrultusunda araştırmada nitel araştırma yöntemlerinden olgubilim (fenomenoloji) deseni tercih edilmiştir. Araştırmanın çalışma grubuna, Ankara'da Millî Eğitim Bakanlığına bağlı bağımsız bir okul öncesi eğitim kurumuna devam eden beş yaş grubu 15 çocuk dahil edilmiştir. Veriler araştırmacılar tarafından geliştirilen Anadolu Masalları Değerlendirme Formu ile elde edilmiştir. İki bölümden oluşan formun birinci bölümde her bir masala ilişkin değerlendirme soruları, ikinci bölümde ise Anadolu Masallarına yönelik genel değerlendirme soruları yer almaktadır. Veri toplama sürecinde çalışma grubuna her bir masal kitabı etkileşimli olarak okunmuş, ardından masal değerlendirme soruları sorulmuş ve çocukların yanıtları kaydedilmiştir. Son olarak, çocuklardan okunan masaldan aklında kalanı çizmeleri istenmiştir. Tüm masalların okuma süreci tamamlandığında çocuklarla bireysel görüşmeler gerçekleştirilerek Anadolu Masallarına ilişkin genel değerlendirmeleri alınmıştır. Araştırmadan elde edilen veriler içerik analizi tekniği ile çözümlenmiştir. Araştırma bulguları masal değerlendirme ve genel değerlendirme olmak üzere iki başlık altında incelenmiştir. Elde edilen veriler alan yazın doğrultusunda yorumlanarak tartışılmıştır.

Keywords: Anadolu masalları, okul öncesi, masal, çocukların görüşleri

ANATOLIAN TALES THROUGH CHILDREN'S EYES

Abstract

In Turkey, the "Anatolian Tales Project," implemented in collaboration with the Ministry of National Education (MoNE), General Directorate of Teacher Training, and the United Nations Educational, Scientific, and Cultural Organization (UNESCO), is an initiative aimed at preserving traditional Anatolian tales and passing them on to future generations. The project seeks to collect and document tales reflecting Turkey's rich cultural heritage and provide teachers with the opportunity to integrate these tales into their educational processes. This way, it aims to teach children about traditional values and cultural heritage. Two educational sets, consisting of fairy tale books for preschool and primary school children, have been published within the scope of this project. This study aimed to examine children's opinions about fairy tales in the Preschool Anatolian Tales education set. For this purpose, a phenomenology design, one of the qualitative research methods, was chosen for the study. The study group comprised 15 five-year-old children attending an independent preschool education institution affiliated with the MoNE in Ankara. The data were obtained using the Anatolian Tales Evaluation Form developed by the researchers. The form, consisting of two parts, includes evaluation questions about each tale in the first part and general evaluation questions about Anatolian Tales in the second part. During the data collection process, each fairy tale book was read interactively to the study group. Subsequently, the fairy tale evaluation questions were posed, and the children's responses were recorded. Finally, the children were asked to draw what they remembered from the fairy tale. Upon completion of the reading process for all fairy tales, individual interviews were conducted with the children, and their general evaluations of Anatolian Fairy Tales were gathered. The data obtained from the research were analyzed using the content analysis technique. Research findings were categorized under two headings: fairy tale evaluation and general evaluation. The data obtained were interpreted and discussed in line with the literature.

Keywords: Anatolian fairy tales, preschool, fairy tale, children's opinions

YİYECEK İÇECEK İŞLETMELERİ MENÜLERİNİN İSTANBUL'DAKİ MÜŞTERİ TERCİHLERİ ÜZERİNE BİR İNCELEME

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Özet

Bu çalışmanın amacı, menü kartlarının yiyecek içecek satın alma davranışlarını ne şekilde etkilediğini saptamak amacıyla planlanmıştır. Çalışma kapsamında müşterilerin menü kartlarında dikkat ettikleri özellikler değerlendirilmiştir. Bu kapsamda İstanbul'da ikamet eden 18-60 yaş arasındaki 151 kişi araştırmanın örneklemini oluşturmuştur. “Menü kartının rengi sipariş tercihim olumlu etkiler” önermesine (%34,4) ve menü kartında yiyecek ve içeceklerin servis süresinin belirtilmesi sipariş tercihim çok etkiler” önermesine büyük çoğunluğu katılıyorum yanıtını vermişlerdir (%39.1). “Menü kartında yiyecek içeceklerin enerji değerlerinin belirtilmesini mutlaka isterim” ve “Menü kartında yiyeceklerin yanında verilecek garnitür ve sosların açıkça belirtilmesi benim için çok önemlidir” önermesi cinsiyet açısından anlamlı olarak farklı bulunduğu ve erkeklerin daha fazla önem verdiği tespit edilmiştir.

Anahtar Kelimeler: Menü, Menü Kartı, Menü Planlama,

**A REVIEW ON CUSTOMER PREFERENCES OF FOOD AND BEVERAGE
ESTABLISHMENTS MENUS IN ISTANBUL**

Abstract

The aim of this study is to determine how the menu cards affect the food and beverage purchasing behaviors, The features noted in the menu cards were evaluated. In this context. 151 people between the ages of 18-60 residing in Istanbul formed the sample of the research. The color of the menu card affects my order preference positively.” (34.4%) and specifying the serving time of food and drinks on the menu card affects my order preference a lot.” majority of them gave the answer I agree (39.1%). In the sub-dimension of the content in terms of gender, the propositions "I definitely want the energy values of food and beverages to be stated on the menu card" and "it is very important for me to clearly indicate the garnishes and sauces to be given on the menu card" were found to be significantly different in terms of gender and men gave more importance.

Keywords: Menu, Menu Card, Menu Planning

THE PERCEPTION OF COGNITIVE TRIAD ACCORDING TO ATTACHMENT STYLES WITH PETS AND PARENTS

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Abstract

The aim of this study was to assess whether patterns of attachment to pets and parents were predictive of basic cognitive perceptions which is called negative cognitive triad. Additionally, it also aims to investigate whether some demographic and animal-based variables affect negative cognitive triad. The study sample included 368 (female 67.9% and $N = 250$; male 32.1% and $N = 118$) adult who have pet. The Cognitive Triad Inventory, Lexington Pets Attachment Scale, Three Dimensional Attachment Styles Scale, and a questionnaire including questions to measure demographic variables were administered to the participants. To analyze the relationship between cognitive triad and attachment patters to parents and pets, comparisons of the independent group samples for all variables were examined. For this purpose, cut-off points were determined by dividing the mean score of the Lexington Pets Attachment Scale and the secure attachment subscale of Three Dimensional Attachment Styles Scale according to their cumulative percentages. Groups were decided according to the determined inclusion criteria to the level of the attachment style for each participant. The findings reveal that the attachment styles to the parents has a crucial effect on basic cognition scores which is called cognitive triad. The tendency to negatively perceive view of self, others/world, and the future (cognitive triad) is more likely to one who has strong emotional bound with their pets, and weak emotional bound with others. Additionally, it is also found that the pattern of attachment to parents is more determinant than the pattern of attachment to pets in terms of cognitive triad. The findings of the study were discussed within the context of related theorems, research, and literature.

Keywords: Attachment, Animal attachment, Cognitive triad

FUTURE OF EMPLOYMENT IN THE LIGHT OF GLOBAL TRENDS

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Abstract

Nowadays, the concept of employment is constantly gaining importance due to the continuous increase in unemployment. Compared to thirty years ago, there has been a significant decline in employment conditions and the trend continues to intensify, leading to increased concerns about the future of employment. In the future of employment, it is argued that the industrial sector, especially the traditional industries, will lose its weight over time, that the money earned from financial instruments will replace the money earned from industry - which is already the case - and that technological developments and the widespread use of robots in production will eliminate the concept of labour in the present sense. According to the same views, with the change in the content of the concept of worker due to technological developments and the use of robots, the role of the labour factor in production -especially in terms of unskilled labour- will disappear and the spread of unemployment will be inevitable. The main purpose of this study is to find a solution to the question of whether the above-mentioned claims and doubts will be realised in the future. In line with the aforementioned purpose, in the first part, the general trends and tendencies of labour markets and employment have been tried to be determined, and in the other parts, answers have been sought to some questions that we believe to be important for the future, such as unmanned production with robots, the replacement of industry and production by speculations made with financial instruments.

Keywords: Employment, Technology, Deregulation.

GİRİŞİMCİLERİN UYUMSUZ DAVRANIŞLARI: ASI, BAŞINA BUYRUK VE AYKIRI GİRİŞİMCİLER

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Özet

Girişimciler yaygın olarak toplum gözünde asi, başına buyruk ve aykırı olarak tasvir edilmektedir. Örgüt ile uyumsuzluk ve normdan kopma isteği girişimciliğin özünde yer alan bir özelliktir (McMullen ve diğerleri, 2021). Hatta bazı akademisyenler, yerleşik standartlara uymamanın girişimciliğe aykırı olduğunu iddia etmektedir (Navis ve Glynn, 2011). Dahası, son yıllarda uygulamalı sosyal bilimlerdeki akademisyenler, asi kişilerin örgütlerde nasıl değişimin aracı olabileceğini (Gino, 2018), aykırı kişilerin sürü karşıtı davranış göstererek nasıl daha özgün bir kimlik yaratabileceğini (Baddeley, 2018), başına buyruk kişilerin yeni fikirleri benimseme cesaretinin takipçilere nasıl ilham verebileceğini (Baddeley, 2018), ve kurallara karşı gelmenin ve kurallara meydan okumanın nasıl özgün fikirleri harekete geçirebileceğini (Grant, 2016) anlatmaktadır. Üstelik farklı davranışların girişimcilik üzerindeki etkisine ilişkin bu kavramlar yeni değildir. Schumpeter (1934; 1942) girişimcileri, "yaratıcı yıkım" veya yerleşik uygulamaların yeni üretim araçlarıyla değiştirilmesi yoluyla yenilik ve ekonomik büyümenin sağlanmasından sorumlu olarak görüyordu. Uyumsuz davranışlar ile girişimcilik çabaları arasındaki bu yaygın ilişkiye ve girişimci inovasyonu için statükodan kopmanın gerekli olduğu varsayımına rağmen, girişimcilik bağlamında uyumsuz bireylerin özelliklerini ve benzersiz etkilerini araştırmak için çok az araştırma yapılmıştır. Bu nedenle, bu çalışmada, girişimcilik alanındaki uyumsuz davranışlara ilişkin anlayışımızı genişletmek, girişimcilikte asilerin, başına buyrukların ve aykıruların rolünü araştırmak, bu üç yapının doğasını kavramsallaştırmak, bunların çeşitli girişimci davranışlar ve sonuçlarla olan bağlantılarını ortaya koymak ve bu davranışsal eğilimleri ölçmek için ölçekler geliştirmek amaçlanmaktadır. **Anahtar Kelimeler:** Girişimcilik, Uyumsuz Davranışlar, Asi Girişimciler, Başına Buyruk Girişimciler, Aykırı Girişimciler

INADAPTIVE BEHAVIORS IN ENTREPRENEURSHIP: REBEL, MAVERICK AND CONTRARIAN ENTREPRENEURS

Abstract

Entrepreneurs are commonly portrayed in society as rebels, mavericks and contrarians. Disharmony with the organization and the desire to break away from the norm is an inherent characteristic of entrepreneurship (McMullen et al., 2021). Some scholars even argue that complying with established standards is anti-entrepreneurship (Navis and Glynn, 2011). Moreover, in recent years, scholars in applied social sciences have studied how rebel individuals can be agents of change in organizations (Gino, 2018), how contrarians can create a more unique identity by displaying anti-herd behavior (Baddeley, 2018), how mavericks' courage to adopt new ideas can inspire followers (Baddeley, 2018), and how going against and challenging the rules can mobilize original ideas (Grant, 2016). Moreover, these concepts regarding the impact of different behaviors on entrepreneurship are not new. Schumpeter (1934; 1942) described entrepreneurs as responsible for driving innovation and economic growth through "creative destruction," or the replacement of established practices with new means of production. Despite this widespread association between inadapative behaviors and entrepreneurial efforts, and the assumption that breaking with the status quo is necessary for entrepreneurial innovation, few research has been conducted to investigate the characteristics and unique effects of inadapative individuals in the entrepreneurial context. Therefore, this study aims to expand our understanding of inadapatability in the field of entrepreneurship, explore the role of rebels, mavericks, and contrarians in entrepreneurship, conceptualize the nature of these three constructs, reveal their connections to various entrepreneurial behaviors and outcomes, and develop scales to measure these behavioral tendencies.

Keywords: Entrepreneurship, Inadapative Behaviors, Rebel Entrepreneurs, Maverick Entrepreneurs, Contrarian Entrepreneurs

**EBEVEYN TUKENMIŞLIGI, EBEVEYN STRESİ VE İLİŞKİSEL YILMAZLIGIN
SOSYO-DEMOGRAFIK DEĞİŞKENLER AÇISINDAN İNCELENMESİ**

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Abstract

When a child is born in family, alongside with happiness, a stressful and exhausting period begin. Parents' are usually worn out physically and emotionally throughout the day struggling with daily parenting. Parental burnout is a chronic stress-based disorder. This disorder may lead to suicidal thoughts, child neglect and violence. Accordingly, this study's aim is to examine parental burnout, parental stress and relationship resilience by socio-demographic variables. Study group of this research is consisted of students' parents from 2020-2021 academic year, all graduation levels (pre-primary-middle-high school) and from private and state schools in Ankara, in total of 510 parents, (%68,6) 350 mothers and (%31,4) 160 fathers. In this research, data was gathered by "Parental Burnout Assessment", "Parenting Stress Inventory" , "Relational Resilience Scale" and "Personal Information Form" which was prepared by the researcher. In this research, this data was analysed on SPSS 25.0 (Statistical, Package For Social Sciences). It is concluded based on the data that parental burnout, parental stress and relational resilience differ between gender. Parental burnout and parental stress was at a higher level on male. But, relational resilience was at a lower level than female. While parental burnout and parental stress differs by age, relational resilience does not. Evidence gathered to put forth the sociodemographic variables that affect parental burnout, parental stress and relational resilience was discussed and commented in scope of this literature. Suggestions were presented by research results.

Keywords: Parental Burnout, Parenting Stress, Relational Resilience.

**EFFECTS OF SOCIAL MEDIA ON THE MOTIVATION OF UNDERGRADUATE
PHYSICS EDUCATION STUDENTS IN ILORIN, NIGERIA**

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Abstract

This study investigates the impact of social media on the motivation and academic performance of physics undergraduate students in Kwara State, Nigeria. Data from 200 respondents were collected using a descriptive survey design. The findings reveal that students extensively use social media, with a substantial proportion dedicating over six hours daily. While many use it primarily for entertainment, a notable number also leverage it for educational purposes, showing a positive correlation between such use and academic performance. However, excessive social media engagement, addiction, and poor time management are associated with decreased academic performance. The study underscores the complex relationship between social media and academic outcomes and suggests the need for a balanced approach to maximize its educational benefits while mitigating distractions. These findings offer valuable insights for educators, institutions, and students in the digital age of tertiary education.

Keywords: Social media, Social networking sites, Social networking, Media and Undergraduate

**ELECTROMECHANICAL ENERGY HARVESTING: A PROMISING SOURCE OF
SUSTAINABLE POWER FOR VARIOUS APPLICATIONS**

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Abstract

Renewable energy has become increasingly popular these days, with wind turbines and solar panels being used extensively to store energy. However, energy storage has emerged as a very promising source of electricity, due to its ability to generate large amounts of electricity, which can be used in a variety of applications. Electromechanical energy storage is a method for obtaining electricity from due to mechanical stimulation. This technology works by converting the energy of mechanical stimuli into electricity, which can then be used to power devices and systems. It is a promising source of electricity because it offers many advantages. The automotive industry is one of the areas where electric circuit breakers are being explored as part of the process. For example, power-cutting pedals generate electricity from the driver's movement, which can be used to power the vehicle's electrical system or to charge its battery. This technology can reduce reliance on external power sources to improve the overall energy efficiency of the vehicle. The power cut pedal is driven by a mechanical connection from the driver's throttle or brake pedal, which generates an electric current that can power the vehicle's electrical system or charge its battery. Nevertheless, an electric motor driven harvest the energy. The potential is that we can change the way we produce and energy is used, creating a sustainable source of renewable energy for a wide range of applications.

Keywords: Energy harvesting, break, and throttle pedal, Mechanical parts (connecting rod, shaft, and bearing)

YÜKSEKÖĞRETİMDE AKADEMİSYEN KAYIRMACILIĞININ ÖĞRENCİ ALGILARINA GÖRE İNCELENMESİ

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Özet

Pek çok kişi tarafından bilinen fakat genellikle fazla konuşulmayan bir konu olan kayırmacılık, toplumsal hayatın pek çok alanında insanların karşısına çıkabilir. Kayırmacılık kısaca, bireylere çeşitli gerekçelerle nesnellikten uzak, hak edilmeyen ayrıcalıklar sağlanması olarak ifade edilebilir. Kayırmacılık türleri alanyazında farklı şekillerde ele alınmasına rağmen genel olarak; nepotizm (akraba kayırmacılığı), kronizm (eş-dost kayırmacılığı), partizanlık (siyasi kayırmacılık), hizmet kayırmacılığı ve cinsel kayırmacılık başlıkları altında incelenebilir. Alanyazında işletme, siyaset, spor, otomotiv ve sağlık gibi birbirinden çok farklı alanlarda yapılan çalışmalarda incelenen bir kavram olan kayırmacılık, son yıllarda eğitim alanında çalışan araştırmacıların da ilgi alanına girmiştir. Öğrenme süreci, öğrenci ve öğretmenler arasında yakın bir ilişkiyi gerektirir. Bu öğretmen öğrenci ilişkisinin nesnel ve adil olması beklenir. Bununla birlikte teoride adil olması beklenen bu ilişki, kimi zaman uygulamada beklentilerden uzaklaşabilir. Öğretmen tarafından yapılan herhangi bir kayırmacı uygulama, öğrencilerin adalet algısını doğrudan olumsuz etkilemesinin yanı sıra, pek çok dolaylı olumsuz sonuca sebebiyet verebilir. Bu durum öğrencinin okula ve öğretmene karşı olan tutumu, okula bağlılığı, akademik motivasyonu ve akademik başarısı gibi farklı alanlarda olumsuz sonuçlara yol açabilir. Bu bağlamda bu çalışmada, yükseköğretim kurumlarında akademisyen kayırmacılığının öğrenci algılarına göre incelenmesi amaçlanmıştır. Nitel araştırma yönteminin kullanıldığı araştırma, Türkiye’de bir üniversitede lisans eğitimi gören 4. sınıf öğrencileri ile gerçekleştirilmektedir. Araştırmanın veri toplama süreci devam etmekte olduğundan araştırmanın bulgu, sonuç ve önerileri veri toplama sürecinin ardından sunulacaktır.

Keywords: Kayırmacılık, yükseköğretim, nepotizm, kronizm.

**EXAMINATION OF THE FAVOURITISM OF ACADEMICS IN HIGHER
EDUCATION BASED ON STUDENT PERCEPTIONS**

Abstract

Favouritism, which is known by many people but is generally not talked about much, can be encountered by people in many areas of social life. In short, favouritism can be defined as providing unjustified privileges to individuals on various grounds that are far from objectivity. Although the types of favouritism are discussed in different ways in the literature, they can be generally examined under the headings of nepotism (favouritism towards relatives), cronyism (favouritism of friends), partisanship (political favouritism), service favouritism and sexual favouritism. In the literature, favouritism, which is a concept that has been examined in studies in many different fields such as business, politics, sports, automotive and health, has recently been of interest to researchers working in the field of education. The learning process requires a close relationship between students and teachers. Teacher-student relationship is expected to be objective and fair. However, this relationship, which is expected to be fair in theory, may sometimes move away from expectations in practice. Any favouritism practice by the teacher may cause many indirect negative consequences as well as directly affecting students' perception of justice. This situation may lead to negative consequences in different areas such as student's attitude towards school and teacher, commitment to school, academic motivation and academic achievement. In this context, this study aims to examine academic favouritism in higher education institutions according to student perceptions. The research, in which qualitative research method is used, is carried out with 4th year undergraduate students studying at a university in Turkey. Since the data collection process of the research is ongoing, the findings, conclusions and recommendations of the research will be presented after the data collection process.

Keywords: Favouritism, higher education, nepotism, cronyism.

FULL TEXT

SOME PROPERTIES OF THE MULTI-INTERVAL DISCONTINUOUS STURM-LIOUVILLE PROBLEM WITH PERIODIC BOUNDARY CONDITIONS

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Abstract

Sturm-Liouville problems play an important role in applied sciences and are of great interest in many branches of natural sciences. The methods of this theory are the most effective for investigating many physical problems such as elasticity, quantum mechanics, acoustics, seismic motion of the earth, transmission of sound in layers of variable density, velocity of large-scale waves in the atmosphere. This theory also is one of the rich branches of the theory of linear operators in Hilbert spaces, especially the theory of differential operators. In this paper, we study a boundary value problem consisting of a two-interval Sturm-Liouville equation, periodic boundary conditions, and additional conduction conditions between the left and right solutions (such conditions are also called transfer conditions). It is shown that the investigated boundary-value problems can be represented by a self-adjoint differential operator. Results obtained in this paper extend and generalize the corresponding classical results. By using a new approaches we obtained some important properties of eigenvalues and eigenfunctions.

Keywords: Multi-interval Sturm-Liouville problems, conduction conditions, boundary conditions.

Introduction

With the notation

$$L[u] = \frac{d}{dx} \left(p(x) \frac{du}{dx} \right) + q(x) u$$

consider the Sturm-Liouville equation

$$L[u] + \lambda r(x)u = 0 \quad (1)$$

where $p > 0$, $r > 0$ and p, q, r are continuous functions on interval $[a, b]$ along with the boundary conditions

$$a_1 u(a) + \alpha'_1 u'(a) + b_1 u(b) + b'_1 u'(b) = 0 \quad (2)$$

$$a_2 u(a) + \alpha'_2 u'(a) + b_2 u(b) + b'_2 u'(b) = 0 \quad (3)$$

where $\text{rank} \begin{bmatrix} a_1 & \alpha'_1 & b_1 & b'_1 \\ a_2 & \alpha'_2 & b_2 & b'_2 \end{bmatrix} = 2$. The problem of finding a complex number μ , if any, such that the BVP (2)-(3) with $\lambda = \mu$, has a non-trivial solution is called a Sturm-Liouville Eigen Value Problem (SL-EVP). Such a value μ is called an eigenvalue and the corresponding non-trivial solutions $u(\cdot; \mu)$ are called eigenfunction. Further, if $p(a) = p(b)$, $p > 0$ and $r > 0$ on $[a, b]$, p, q, r are continuous functions on $[a, b]$, then solving Sturm-Liouville equation (1) coupled with boundary conditions

$$u(a) = u(b), u'(a) = u'(b)$$

is called a periodic SL-EVP. In some areas of physics, including quantum mechanics or frequency and vibration theory, the Sturm-Liouville problems with periodic boundary conditions appears frequently. For example, let us consider the Quantum particle freely moving on a circle. This phenomena is modelled by the familiar differential equation, the so-called Schrödinger equation given by

$$-\frac{\hbar^2}{2m} \psi''(x) = E\psi(x), \quad 0 \leq x \leq L$$

subject to the periodic boundary conditions

$$\psi(0) = \psi(L),$$

$$\psi'(0) = \psi'(L)$$

This is an example of a periodic SL system. The eigenvalues and eigenfunctions are

$$E_k = \frac{2\pi^2 \hbar^2 k^2}{n L^2}, \quad k=0,1,2,\dots$$

and for each eigenvalue E_k (except $k = 0$) there are two linearly independent eigenfunctions $\cos(\frac{2\pi kx}{L})$ and $\sin(\frac{2\pi kx}{L})$. In recent years, Sturm-Liouville problems with periodic boundary conditions have become an important area of applied and theoretical mathematics, because the needs of modern physics and technology (see, for example, [1-10] and references, cited therein).

Main Results

Consider the multi-interval Sturm-Liouville equation

$$-y''(x) + q(x)y = \lambda y, \quad x \in [0, c_1) \cup (c_1, c_2) \cup (c_2, 1] \quad (1)$$

together with periodic boundary conditions, given by

$$y(0) = y(1), \quad (2)$$

$$y'(0) = y'(1) \quad (3)$$

and with interaction conditions (the so-called transmission conditions) given by

$$y(c_i - 0) = \alpha_i y(c_i + 0) + \alpha'_i y'(c_i + 0) \quad (4)$$

$$y'(c_i - 0) = \beta_i y(c_i + 0) + \beta'_i y'(c_i + 0) \quad (5)$$

for $i=1,2$. Throughout the coefficients in the periodic multi-interval Sturm-Liouville problem (p-MISLP, for short) are assumed to satisfy the following conditions:

C.1. The function $q(x)$ is real-valued and continuous on each of the intervals $[0, c_1)$, (c_1, c_2) and $(c_2, 1]$.

C.2. There are finite one-hand limit values $q(c_i \pm 0) = \lim_{x \rightarrow c_i \pm} q(x)$

C.3. $\alpha_i, \alpha'_i, \beta_i, \beta'_i$ are real numbers

C.4. $\theta_i := \begin{bmatrix} \alpha_i & \beta_i \\ \alpha'_i & \beta'_i \end{bmatrix} \neq 0$

C.5 λ is a complex eigenvalue parameter

Theorem 1. Let $(\lambda_0, y_0(x))$ be any eigenpair. Then the eigenfunction $y_0(x)$ can have at most a finite number of zeros in the three-interval $[0, c_1) \cup (c_1, c_2) \cup (c_2, 1]$.

Proof. Suppose that $y_0(x)$ has infinitely many zeros in $[0, c_1) \cup (c_1, c_2) \cup (c_2, 1]$ can select a convergent subsequence $b_k = a_{n_k}, k=1,2,\dots$. Denote by a the limit of this convergent subsequence b_k . The proof for the case $a \in [0, c_1) \cup (c_1, c_2) \cup (c_2, 1]$ follows immediately from the classical results (see, for example, [11]). Therefore it is enough to consider only the

case $a = c_1$ or $a = c_2$. Let $a = c_1$. Since $\lim_{k \rightarrow \infty} b_k = c_1$ there is a subsequence $d_s = b_{k_s}$ $k=1,2,\dots$ such that $d_s \in [0, c_1)$ and $d_1 < d_2 < d_3 < \dots$, or $d_s \in (c_1, c_2)$ $d_1 > d_2 > d_3 > \dots$, Let $d_s \in [0, c_1)$ with $d_1 < d_2 < d_3 < \dots$. Then we have $y_0(c_1 - 0) = \lim_{s \rightarrow \infty} y(d_s) = 0$. By using the well-known mean-value theorem (see, for example, [12]) we have that

$$y'_0(c_1 - 0) = \lim_{s \rightarrow \infty} \frac{y(d_{s+1}) - y(d_s)}{d_{s+1} - d_s} = 0$$

By well-known uniqueness theorem (see, for example, []) we have $y(x) = 0$ for $x \in [0, c_1)$. Applying the transmission conditions (4)-(5) we have

$$y(c_1 + 0) = y'(c_1 + 0) = 0$$

and so $y(x) = 0$ for $x \in (c_1, c_2)$ by uniqueness theorem mentioned above. Again from the transmission conditions (4)-(5) it follows immediately that $y(c_2 + 0) = y'(c_2 + 0) = 0$ and so $y(x) = 0$ also for $x \in (c_2, 1]$. Thus we have contradiction that $y_0(x) = 0$ for all $x \in [0, c_1) \cup (c_1, c_2) \cup (c_2, 1]$. The proof is complete.

By using similar technique used in the proof of the previous Theorem 1 we can prove the next theorem.

Theorem 2. Let $x = x_0$ be zero of the eigenfunction $y_0(x)$. Then $y'_0(x) \neq 0$, that is any zero of the eigenfunction $y_0(x)$ is simple.

Theorem 3. Suppose that $\begin{bmatrix} \alpha_i & \beta_i \\ \alpha'_i & \beta'_i \end{bmatrix} > 0$. Let $y = \varphi(x)$ and $y = \psi(x)$ are two linearly independent eigenfunctions of the problem (1)-(5). Suppose that the eigenfunctions $y = \varphi(x)$ has at least two zero, say x_1, x_2 . Then between x_1 and x_2 the eigenfunctions $y = \psi(x)$ has at least one zero.

Proof. Without loss of generality we can assume that x_1, x_2 are two consecutive zeros of $\varphi(x)$. In the case when both x_1, x_2 belongs to one of the intervals $[0, c_1)$, (c_1, c_2) and $(c_2, 1]$ the proof follows immediately from the classical results (see, for example, [11]). Consider the case $x_1 \in [0, c_1)$ and $x_2 \in (c_1, c_2)$. Suppose to the contrary that between x_1 and x_2 there is no zero of the eigenfunction $y = \psi(x)$. Without no restrictions we can assume that both of the eigenfunctions $y = \varphi(x)$ and $y = \psi(x)$ are positive between x_1 and x_2 . Since $\varphi(x_1) = \varphi(x_2) = 0$ and $\varphi(x) > 0$ between x_1 and x_2 , we have $\varphi'(x_1) > 0$ and $\varphi'(x_2) < 0$. Consequently,

$$W(\varphi, \psi; x_1) = \varphi(x_1)\varphi'(x_2) - \varphi'(x_1)\varphi(x_2) = -\varphi'(x_1)\varphi(x_2) < 0$$

Using the transmission conditions (4)-(5) we have

$$\begin{aligned} W(\varphi, \psi; x_1) &= W(\varphi, \psi; c_1 - 0) \\ &= (\alpha_1 \beta_1' - \alpha_1' \beta_1) W(\varphi, \psi; c_1 + 0) \\ &= (\alpha_1 \beta_1' - \alpha_1' \beta_1) \varphi'(x_2) \psi(x_2) > 0 \end{aligned}$$

Thus we have a contradiction, which completes the proof for the case $x_1 \in [0, c_1)$, $x_2 \in (c_1, c_2)$. The proof for the other cases are totally similar.

By using the Rayleigh method (see, [11]) we can prove the following theorems.

Theorem 4. Assume that the following conditions are satisfied for $i=1$ and $i=2$

- 1) $q(x) \geq 0$ for all $x \in [0, c_1) \cup (c_1, c_2) \cup (c_2, 1]$
- 2) $\alpha_i \beta_i \leq 0$, $\alpha_i' \beta_i' \leq 0$
- 3) $\alpha_i \beta_i' + \alpha_i' \beta_i = 1$

Then all eigenvalues of the problems (1)-(5) are nonnegative.

Theorem 5. Assume that all conditions of the previous theorem are fulfilled and $q(x) > 0$ for all $x \in [0, c_1) \cup (c_1, c_2) \cup (c_2, 1]$ then all eigenvalues of the problem (1)-(5) are positive.

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TÜRKİYE’DE KURU BAKLAGİLLER ÜRETİMİNDE KENDİNE YETERLİLİĞİN DEĞERLENDİRİLMESİ

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Özet

Türkiye iklim ve toprak yapısı bakımından özellikle kuru baklagiller üretiminde önemli bir potansiyele sahiptir. Yaklaşık 900 bin hektar alanda 1 milyon 295 bin ton kuru baklagil üretilmiş olup mercimek ve nohut üretiminde dünyada dördüncü sırada, kuru fasulye üretiminde ise 19. sırada yer almaktadır. Türkiye kuru baklagiller dış ticaretinde miktar bakımından dış ticaret açığı, değer bakımından ise dış ticaret fazlası vermektedir. Bunun sebebi Türkiye’de üretilen kuru baklagillerin yüksek fiyattan ihraç edilmesi, ithalatın ise daha düşük fiyattan gerçekleşmesidir. Bu çalışmada Türkiye İstatistik Kurumu (TÜİK), Birleşmiş Milletler Gıda ve Tarım Örgütü (FAO) veri tabanından elde edilen verilerle Türkiye tarımı için önemli gıda grubu olan kuru baklagillerde kendine yeterlilik derecesi ortaya koyulmuş olup kendine yeterlilik derecesini artırmak için öneriler geliştirilmiştir. Sonuçlar Türkiye’nin kuru fasulye ve mercimek üretiminde kendine yeterli olmadığını, nohut üretiminde ise kendine yeterli olduğu göstermiştir. Kuru baklagiller grubu açısından değerlendirildiğinde ise kendine yeterli olmadığı tespit edilmiştir. Araştırma bulgularından hareketle Türkiye’de kuru baklagillerde kendine yeterliliğin artırılması için kaliteli ve verimli yeni çeşitlerin geliştirilmesi, sulu tarım alanlarında kuru baklagil üretimi için arazilerin suya eriştirilmesi ve modern sulama sistemleri kullanılması gibi altyapı olanaklarının iyileştirilmesiyle verim ve üretim artışının sağlanması gerekmektedir. Dolayısıyla kuru baklagil üretiminde kendine yeterlilik derecesi istenilen seviyelere gelecektir.

Anahtar Kelimeler: Dış ticaret, Kendine yeterlilik, Baklagiller, Beslenme

EVALUATING SELF-SUFFICIENCY IN DRY LEGUMES PRODUCTION IN TÜRKİYE

Abstract

Türkiye has an important potential, especially in producing dry legumes in terms of climate and soil structure. Approximately 900 thousand hectares of land produced 1 million 295 thousand tons of dry legumes and ranks 4th in the world in lentil and chickpea and 19th in dry bean production. Türkiye has a foreign trade deficit in terms of quantity and a foreign trade surplus in terms of value in the foreign trade of dry legumes. This is because legumes produced in Türkiye are exported at high prices, while imports are realized at lower prices. In this study, with the data obtained from the Turkish Statistical Institute (TurkStat) and the Food and Agriculture Organization of the United Nations (FAO), the degree of self-sufficiency in dry legumes, which is an important food group for Turkish agriculture, was revealed and recommendations were developed to increase the degree of self-sufficiency. It was determined that Türkiye is not self-sufficient in dry bean and lentil production, while it is self-sufficient in chickpea production. When evaluated in terms of the dry legumes group, it was determined that it is not self-sufficient. Based on the findings of the research, in order to increase self-sufficiency in dry legumes in Türkiye, yield and production will be increased by improving infrastructure facilities such as the development of quality and productive new varieties, access to water for dry legume production in irrigated agricultural areas and the use of modern irrigation systems. Therefore, the self-sufficiency in dry legume production will reach the desired levels.

Keywords: Foreign trade, Self-sufficiency, Legumes, Nutrition

Giriş

Türkiye’de bitkisel üretim içerisinde tahıl üretiminden sonra baklagil üretimi gelmektedir (Gündüz vd., 2009). Baklagiller içerdikleri protein ve aminoasitler sayesinde besin değeri yüksek olması sebebiyle tüketiciler tarafından, kazık kökleri sayesinde toprak verimliliğini artırması ve ekim nöbetine uygun olması sebebiyle üreticiler tarafından tercih edilen önemli temel gıda grubudur (Kadakoğlu ve Karlı, 2022). Türkiye’de Toprak Mahsulleri Ofisi (TMO) ilk kez 1941 yılında nohut, kuru fasulye, kırmızı ve yeşil mercimek alımı gerçekleştirmiş olup bu alımlar 1994 yılına kadar piyasanın ihtiyaçları doğrultusunda devam etmiştir (Kadakoğlu ve Karlı, 2022). Bu tarihler arasında çeşitli projeler (kırsal kalkınma, baklagil-tahıl sistemi, nadas alanlarının daraltılması) uygulanarak kuru baklagil ekim alanları ve üretimi artmıştır (Gül ve Işık, 2002). 1994 yılından 2018 yılına kadar TMO kuru baklagil alımı yapmamıştır. 2018 yılından sonra ise tekrardan kuru fasulye, mercimek ve nohut alımına başlamıştır (Resmî Gazete, 2018). Gıdada kendine yeterlilik ülkeleri savaş veya siyasi gerginlikler, diğer ülkelerdeki üretim eksiklikleri veya gıda fiyatlarındaki ani ve keskin artışlar sonucunda ortaya çıkabilecek uluslararası arz kesintilerinden koruyabilir (FAO, 1996; Clapp, 2017). Bu bağlamda ülkeler açısından tarım sektöründe kendine yeterliliğin sağlanması kaçınılmazdır. Tarım sektörü desteklendiğinde sadece bu sektörde çalışanların gelirleri değil aynı zamanda ülkelerin kendine yeterlilik dereceleri de artacaktır. Bu çalışmanın amacı Türkiye tarımı için önemli gıda grubu olan kuru baklagillerde kendine yeterlilik derecesinin belirlenmesidir. Ayrıca kendine yeterlilik derecesini artırmak için öneriler geliştirilmiştir.

Materyal ve Metot

Çalışmanın ana materyalini Türkiye İstatistik Kurumu (TÜİK), Birleşmiş Milletler Gıda ve Tarım Örgütü (FAO) ve ulusal sektör raporlarından elde edilen ikincil veriler oluşturmaktadır. Ayrıca literatürdeki ulusal ve uluslararası konuyla ilgili bilimsel yayınlardan da yararlanılmıştır. Dünya ve Türkiye’de kuru baklagil ekim alanı, üretim miktarı ve verime ait verilere basit indeks hesabı yapılarak yıllar itibariyle incelenmiştir.

Araştırma Bulguları ve Tartışma

Dünya kuru baklagiller ekim alanı 2007/2008 piyasa yılında 44 milyon 513 bin hektar iken %26,95 artarak 2021/2022 piyasa yılında 56 milyon 511 bin hektar olarak gerçekleşmiştir. 2021/2022 piyasa yılında 35 milyon 921 bin hektar alanda fasulye, 15 milyon 5 bin hektar alanda nohut ve 5 milyon 586 bin hektar alanda mercimek üretilmiştir. Bu ürünlerin toplam kuru baklagil ekim alanı içerisindeki payları sırasıyla %63,6, %26,5 ve %9,9’dur. Dünya kuru baklagil ekim alanları incelenen yıllarda 41 milyon hektar ile 58 milyon hektar arasında dalgalı

bir seyir izlemiştir. Aynı dönemde kuru fasulye ekim alanı %21,68, nohut ekim alanı %33,18 ve mercimek ekim alanı %49,95 artmıştır (Çizelge 1).

Çizelge 1. Dünyada kuru baklagiller ekim alanları (ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Mercimek	Toplam
2007/08	29.521.573	11.266.332	3.725.201	44.513.106
2008/09	26.977.246	11.069.550	3.337.466	41.384.262
2009/10	25.774.280	11.552.815	3.681.234	41.008.329
2010/11	31.087.466	12.011.683	4.375.018	47.474.167
2011/12	30.761.528	12.809.877	4.118.896	47.690.301
2012/13	29.464.117	12.369.037	4.162.332	45.995.486
2013/14	29.731.983	12.434.651	4.084.325	46.250.959
2014/15	30.998.608	13.736.839	4.079.508	48.814.955
2015/16	31.604.515	11.819.315	4.709.640	48.133.470
2016/17	35.422.500	12.915.145	5.463.000	53.800.645
2017/18	37.163.941	14.567.096	6.156.884	57.887.921
2018/19	36.303.277	16.189.864	5.512.261	58.005.402
2019/20	33.086.417	13.840.338	4.863.292	51.790.047
2020/21	34.466.620	13.561.629	4.958.876	52.987.125
2021/22	35.920.593	15.004.885	5.585.879	56.511.357
İndeks (2007/08=100)	121,68	133,18	149,95	126,95

Kaynak: FAO, 2023.

Dünya kuru baklagiller üretim miktarı 2007/2008 piyasa yılında 34 milyon 716 bin ton iken %41,71 artarak 2021/2022 piyasa yılında 49 milyon 197 bin ton olarak gerçekleşmiştir. 2021/2022 piyasa yılında 27 milyon 715 bin ton fasulye, 15 milyon 872 bin ton nohut ve 5 milyon 610 bin ton mercimek üretilmiştir. Bu ürünlerin toplam kuru baklagil üretimi içerisindeki payları sırasıyla %56,3, %32,3 ve %11,4'tür. Dünya kuru baklagil üretimi incelenen yıllarda 33,4 milyon ton ile 51,5 milyon ton arasında dalgalı bir seyir izlemiştir. Aynı dönemde kuru fasulye üretimi %28,03, nohut üretimi %62,85 ve mercimek üretimi %68,82 artmıştır (Çizelge 2).

Çizelge 2. Dünyada kuru baklagiller üretim miktarı (ton)

Piyasa Yılı	Kuru Fasulye	Nohut	Mercimek	Toplam
2007/08	21.646.545	9.746.059	3.323.139	34.715.743
2008/09	21.889.992	8.621.558	2.835.380	33.346.929
2009/10	21.962.688	10.416.680	3.937.491	36.316.859
2010/11	24.780.792	10.836.652	4.980.911	40.598.355
2011/12	24.155.058	11.721.522	4.382.445	40.259.025
2012/13	24.622.426	11.630.712	4.431.590	40.684.728
2013/14	25.106.810	13.038.219	5.298.706	43.443.735
2014/15	25.409.165	13.303.959	4.781.395	43.494.519
2015/16	26.291.935	10.940.449	5.547.490	42.779.874
2016/17	27.108.373	11.623.457	6.693.339	45.425.169
2017/18	29.170.468	15.152.266	7.130.548	51.453.282
2018/19	27.487.537	16.940.225	6.580.219	51.007.980
2019/20	25.553.122	14.219.491	5.787.579	45.560.192
2020/21	27.412.686	15.065.906	6.471.039	48.949.631
2021/22	27.715.024	15.871.846	5.610.104	49.196.973
İndeks (2007/08=100)	128,03	162,85	168,82	141,71

Kaynak: FAO, 2023.

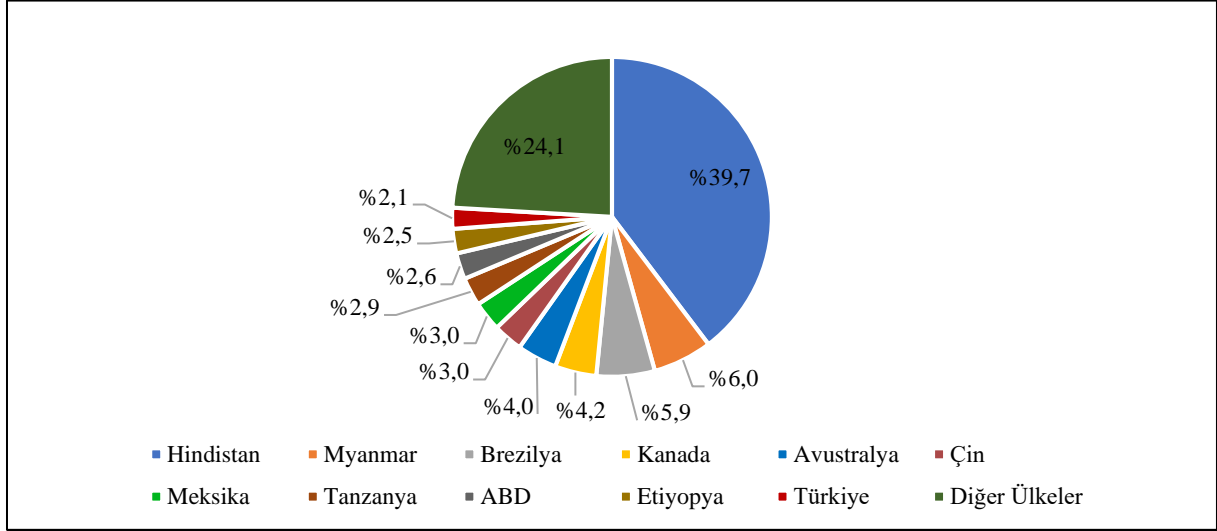
Dünyada hektara kuru fasulye verimi 772 kg, nohut verimi 1.058 kg, mercimek verimi 1.004 kg olmak üzere kuru baklagiller verim ortalaması 871 kg'dır. İncelenen 15 yıllık dönemde kuru fasulye verimi %5,24, nohut verimi %22,27, mercimek verimi %12,58 artmıştır. Kuru baklagiller ortalama verimi ise %11,63 artmıştır. Dünya kuru fasulye verimi incelenen 15 yıllık dönemde yatay seyretmiştir. Nohut ve mercimek verimleri ise dalgalı artan bir seyir izlemiştir (Çizelge 3).

Çizelge 3. Dünyada kuru baklagiller verimi (kg/ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Mercimek	Toplam
2007/08	733	865	892	780
2008/09	811	779	850	806
2009/10	852	902	1.070	886
2010/11	797	902	1.139	855
2011/12	785	915	1.064	844
2012/13	836	940	1.065	885
2013/14	844	1.049	1.297	939
2014/15	820	969	1.172	891
2015/16	832	926	1.178	889
2016/17	765	900	1.225	844
2017/18	785	1.040	1.158	889
2018/19	757	1.046	1.194	879
2019/20	772	1.027	1.190	880
2020/21	795	1.111	1.305	924
2021/22	772	1.058	1.004	871
İndeks (2007/08=100)	105,24	122,27	112,58	111,63

Kaynak: FAO, 2023.

Dünya kuru baklagil üretimi 49 milyon 197 bin ton olup kuru baklagil üretiminde önde gelen ülkeler ve payları sırasıyla Hindistan %39,7, Myanmar %6,0, Brezilya %5,9, Kanada 4,2, Avusturalya %4,0, Çin %3,0, Meksika %3,0, Tanzanya %2,9, ABD %2,6, Etiyopya %2,5 ve Türkiye %2,1'dir. Diğer ülkelerin payları toplamı ise %24,1'dir (Şekil 1). Türkiye dünya kuru fasulye üretimindeki payı %1,1 olup dünyada 19. sırada yer almaktadır. Nohut üretimindeki payı %3,0 olup dünyada dördüncü sırada ve mercimek üretimindeki payı ise %4,7 olup dünyada dördüncü sıradadır (FAO, 2023).



Şekil 1. Kuru baklagil üretiminde önemli ülkeler (%)

Türkiye kuru baklagiller ekim alanı 2007/2008 piyasa yılında yaklaşık 1 milyon hektar iken yıllar itibariyle azalarak 2022/2023 piyasa yılında yaklaşık 900 bin hektar olarak gerçekleşmiştir. Bu dönemler arasında kuru baklagiller ekim alanları %10,57 azalmıştır. Kuru fasulye ekim alanı 109 bin 250 hektardan %11,17 azalarak 97 bin 52 hektara, nohut ekim alanı 503 bin 674 hektardan %9,30 azalarak 456 bin 834 hektara, kırmızı mercimek ekim alanı ise 357 bin 233 hektardan %16,07 azalarak 299 bin 812 hektara gerilemiştir. İncelenen yıllar arasında kuru baklagiller içerisinde sadece yeşil mercimek ekim alanları artış göstermiştir. Yeşil mercimek ekim alanı 32 bin 308 hektardan %32,55 artarak 42 bin 825 hektara yükselmiştir (Çizelge 4).

Çizelge 4. Türkiye’de kuru baklagiller ekim alanları (ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Toplam
2007/08	109.250	503.674	357.233	32.308	1.002.465
2008/09	98.233	505.165	290.977	27.698	922.073
2009/10	94.928	455.934	189.378	25.553	765.793
2010/11	103.381	455.690	211.600	22.892	793.563
2011/12	94.625	446.413	192.323	22.525	755.886
2012/13	93.174	416.242	214.788	22.690	746.894
2013/14	84.763	423.557	260.500	20.678	789.498
2014/15	91.110	388.518	232.446	17.048	729.122
2015/16	93.584	359.304	207.469	16.388	676.745
2016/17	89.820	359.529	235.474	16.762	701.585
2017/18	89.722	395.310	269.318	23.220	777.570
2018/19	84.805	514.416	243.065	34.163	876.449
2019/20	88.939	520.595	242.776	39.612	891.922
2020/21	102.986	511.561	209.821	37.844	862.212
2021/22	107.797	487.886	260.199	48.159	904.041
2022/23	97.052	456.834	299.812	42.825	896.523
İndeks (2007/08=100)	88,83	90,70	83,93	132,55	89,43

Kaynak: TÜİK, 2023a.

Türkiye kuru baklagiller üretimi 2007/2008 piyasa yılında yaklaşık 1 milyon 195 bin ton iken 2022/2023 piyasa yılında %8,39 artarak 1 milyon 295 bin tona yükselmiştir. İncelenen yıllarda kuru fasulye üretimi %75,05 artarak 270 bin ton, nohut üretimi %14,77 artarak 580 bin ton ve yeşil mercimek üretimi %67,89 artarak 45 bin ton olarak gerçekleşmiştir. Kırmızı mercimek üretimi ise %21,32 azalarak 400 bin tona gerilemiştir (Çizelge 5). Kuru fasulye ve nohut ekim alanları azalmasına rağmen üretim miktarlarının artmasının sebebi verimdeki artıştır.

Çizelge 5. Türkiye’de kuru baklagiller üretim miktarı (ton)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Toplam
2007/08	154.243	505.366	508.378	26.803	1.194.790
2008/09	154.630	518.026	106.361	24.827	803.844
2009/10	181.205	562.564	275.050	27.131	1.045.950
2010/11	212.758	530.634	422.000	25.400	1.190.792
2011/12	200.673	487.477	380.000	25.952	1.094.102
2012/13	200.000	518.000	410.000	28.000	1.156.000
2013/14	195.000	506.000	395.000	22.000	1.118.000
2014/15	215.000	450.000	325.000	20.000	1.010.000
2015/16	235.000	460.000	340.000	20.000	1.055.000
2016/17	235.000	455.000	345.000	20.000	1.055.000
2017/18	239.000	470.000	400.000	30.000	1.139.000
2018/19	220.000	630.000	310.000	43.000	1.203.000
2019/20	225.000	630.000	310.000	43.631	1.208.631
2020/21	279.518	630.000	328.418	42.397	1.280.333
2021/22	305.000	475.000	228.000	35.000	1.043.000
2022/23	270.000	580.000	400.000	45.000	1.295.000
İndeks (2007/08=100)	175,05	114,77	78,68	167,89	108,39

Kaynak: TÜİK, 2023a.

Türkiye kuru baklagiller verim miktarı 2007/2008 piyasa yılında 1.192 kg/ha iken 2022/2023 piyasa yılında %21,14 artarak 1.444 kg/ha olarak gerçekleşmiştir. İlgili yıllar itibariyle kuru baklagiller üretimi dalgalı artan bir seyir izlemiştir. Kuru fasulye verimi %97,03 artarak 2.782 kg/ha, nohut verimi %26,62 artarak 1.270 kg/ha ve yeşil mercimek verimi %26,63 artarak 1.051 kg/ha yükselmiştir. Kırmızı mercimek verimi ise 6,25 azalarak 1.334 kg/ha olarak gerçekleşmiştir (Çizelge 6). Birim alandan verim artışının en önemli kriteri iyi ve kaliteli tohum kullanılmasıdır. İyi ve kaliteli tohum kullanımının verimi %25-30 oranında artırdığı belirlenmiştir (Anonim, 2019). Türkiye’de çeşit geliştirme çalışmalarının temel amaçları tüketici isteklerinin farklılaşması, dengeli ve sağlıklı beslenme istekleri, yüksek verimlilik, yüksek adaptasyon kabiliyet ve hastalıklara-zararlılara dayanıklılıktır (Şener, 2021). Türkiye’de yemeklik tane baklagillerde ıslah çalışmaları 1965 yılında başlamış olup bugüne kadar milli çeşit listesine kayıtlı 55 adet nohut, 45 adet kuru fasulye ve 35 adet mercimek olmak üzere toplamda 135 adet çeşit geliştirilmiştir. Bunun yanı sıra 2 adet nohut, 6 adet kuru fasulye ve 4 adet mercimek üretim izni olmak üzere tescillenmiştir (Anonim, 2023).

Çizelge 6. Türkiye’de kuru baklagiller verimi (kg/ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Ortalama
2007/08	1.412	1.003	1.423	830	1.192
2008/09	1.574	1.025	366	896	872
2009/10	1.909	1.234	1.452	1.062	1.366
2010/11	2.058	1.164	1.994	1.110	1.501
2011/12	2.121	1.092	1.976	1.152	1.447
2012/13	2.147	1.244	1.909	1.234	1.548
2013/14	2.301	1.195	1.516	1.064	1.416
2014/15	2.360	1.158	1.398	1.173	1.385
2015/16	2.511	1.280	1.639	1.220	1.559
2016/17	2.616	1.266	1.465	1.193	1.504
2017/18	2.664	1.189	1.485	1.292	1.465
2018/19	2.594	1.225	1.275	1.259	1.373
2019/20	2.530	1.210	1.277	1.101	1.355
2020/21	2.714	1.232	1.565	1.120	1.485
2021/22	2.829	974	876	727	1.154
2022/23	2.782	1.270	1.334	1.051	1.444
İndeks (2007/08=100)	197,03	126,62	93,75	126,63	121,14

Kaynak: TÜİK, 2023a.

Türkiye’de 2007/2008 piyasa yılında kuru baklagiller üretim kayıpları yaklaşık 22 bin ton olup kullanılabilir üretim 1 milyon 173 bin tondur. 2022/2023 piyasa yılında ise üretim kayıpları %26,21 azalarak yaklaşık 16 bin ton, kullanılabilir üretim ise %12,45 azalarak yaklaşık 1 milyon ton olarak gerçekleşmiştir. Yurt içi kuru baklagil kullanımı %12,99 artarak 1 milyon 228 bin ton olup bunun %9,96’sı tohumluk olarak geri kalan %90,04’ü ise insan tüketimi için kullanılmaktadır. Kişi başına kuru baklagil tüketimi incelenen dönemler arasında 10,9 kg ile 15,6 kg arasında değişmekle birlikte ortalama 14,1 kg’dır. 2007/2008 piyasa yılına göre 2021/2022 piyasa yılında kişi başına kuru baklagil tüketimi %11,03 azalarak 12,9 kg olarak gerçekleşmiştir (Çizelge 7).

Çizelge 7. Türkiye’de kuru baklagiller denge durumu

Piyasa Yılı	Ekim Alanı (ha)	Üretim Miktarı (ton)	Üretim Kayıpları (ton)	Kullanılabilir Üretim (ton)	Kullanım (Arz) (ton)	Yurt İçi Kullanım (ton)	Tüketim (ton)	Kişi Başına Tüketim (kg)
2007/08	1.002.465	1.194.790	22.182	1.172.608	1.317.591	1.086.654	956.959	14,5
2008/09	922.073	803.844	11.846	791.998	1.069.573	849.209	732.042	10,9
2009/10	765.793	1.045.950	17.162	1.028.788	1.329.215	1.071.883	963.685	14,0
2010/11	793.563	1.190.792	20.870	1.169.922	1.472.833	1.223.066	1.108.707	15,6
2011/12	755.886	1.094.102	19.099	1.075.003	1.371.760	1.114.933	1.006.840	13,9
2012/13	746.894	1.156.000	20.322	1.135.678	1.345.871	1.128.437	1.021.961	13,9
2013/14	789.498	1.118.000	19.565	1.098.435	1.470.476	1.240.243	1.127.440	15,0
2014/15	729.122	1.010.000	17.185	992.815	1.406.846	1.180.663	1.075.454	14,2
2015/16	676.745	1.055.000	17.925	1.037.075	1.464.931	1.194.972	1.094.715	14,2
2016/17	701.585	1.055.000	17.990	1.037.010	1.550.954	1.251.973	1.148.369	14,7
2017/18	777.570	1.139.000	19.919	1.119.081	1.619.693	1.302.241	1.189.873	15,0
2018/19	876.449	1.203.000	19.788	1.183.212	1.719.501	1.298.432	1.156.843	14,4
2019/20	891.922	1.208.631	19.859	1.188.772	1.752.251	1.251.214	1.108.982	13,6
2020/21	862.212	1.280.333	20.906	1.259.427	1.927.923	1.328.758	1.188.367	14,5
2021/22	904.041	1.043.000	16.368	1.026.632	1.683.219	1.227.759	1.074.811	12,9
İndeks (2007/08=100)	90,18	87,30	73,79	87,55	127,75	112,99	112,32	88,97

Kaynak: TÜİK, 2023b.

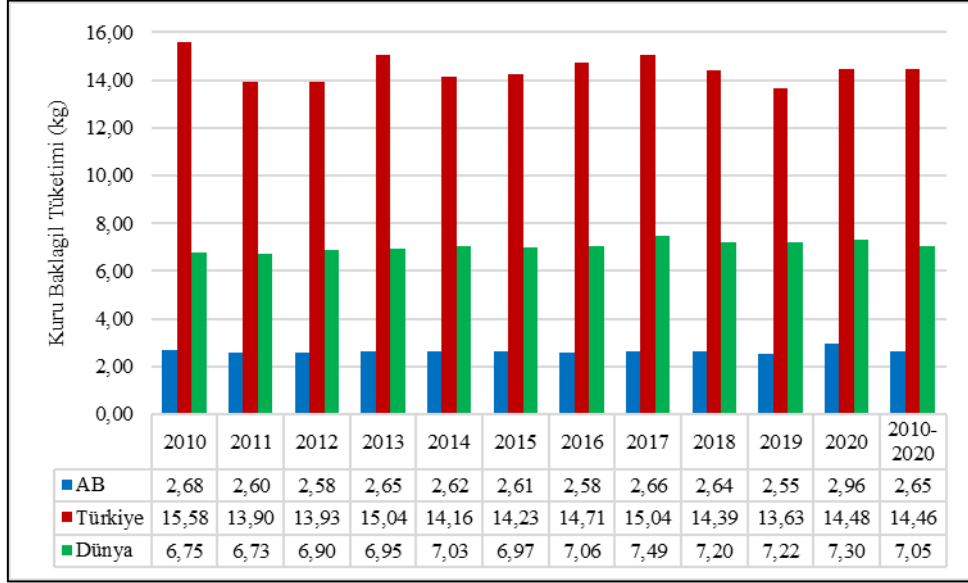
Türkiye’de incelenen dönemler ortalamasına göre kuru baklagiller yurt içi kullanımının %7,7’si tohumluk olarak %92,3’ü ise insan tüketimi için kullanılmaktadır. Tohumluk kullanım oranı %5,78 ile %11,30 arasında değişmekte olup 2021/2022 piyasa yılında %9,96 olarak gerçekleşmiştir. Kuru fasulyenin tohumluk kullanımı 10 bin 780 ton, nohudun tohumluk kullanımı 68 bin 304 ton, kırmızı mercimek tohumluk kullanımı 36 bin 428 ton ve yeşil mercimek tohumluk kullanımı 6 bin 742 ton olup kuru baklagillerin toplamda tohumluk kullanımı 122 bin 254 tondur (Çizelge 8).

Çizelge 8. Türkiye’de kuru baklagillerin tohumluk kullanımı

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Toplam	Tohumluk Kullanım Oranı (%)
2007/08	10.925	60.441	28.579	2.585	102.530	9,44
2008/09	9.823	60.620	23.278	2.216	95.937	11,30
2009/10	9.493	54.712	15.150	2.044	81.399	7,59
2010/11	10.338	54.683	16.928	1.831	83.780	6,85
2011/12	9.463	53.570	15.386	1.802	80.221	7,20
2012/13	9.317	49.949	17.183	1.815	78.264	6,94
2013/14	8.476	50.827	20.840	1.654	81.797	6,60
2014/15	9.111	46.622	18.596	1.364	75.693	6,41
2015/16	9.358	43.116	16.598	1.311	70.383	5,89
2016/17	8.982	43.143	18.838	1.341	72.304	5,78
2017/18	8.972	47.437	21.545	1.858	79.812	6,13
2018/19	9.329	66.874	29.168	3.758	109.129	8,40
2019/20	9.783	67.677	29.133	4.357	110.950	8,87
2020/21	11.328	66.503	25.179	4.163	107.173	8,07
2021/22	10.780	68.304	36.428	6.742	122.254	9,96
İndeks (2007/08=100)	98,67	113,01	127,46	260,81	119,24	105,51

Kaynak: TÜİK, 2023b.

Kişi başına kuru baklagil tüketimi 2010-2020 yılları ortalamasına göre Avrupa Birliği (AB)’nde 2,65 kg/yıl, Türkiye’de 14,46 kg/yıl, dünyada ise 7,05 kg/yıl olarak gerçekleşmiştir. İncelenen dönemlerde kişi başına kuru baklagil tüketimi AB’de %10,45 ve dünyada %8,15 artmış, Türkiye’de ise %7,08 azalmıştır (Şekil 2). İncelenen yıllar ortalamasına göre Türkiye’de kişi başına 5,47 kg/yıl nohut, 4,84 kg/yıl kırmızı mercimek, 3,23 kg/yıl kuru fasulye ve 0,56 kg/yıl yeşil mercimek tüketilmiştir (TÜİK, 2023b).



Şekil 2. Kişi başına tüketilen kuru baklagil miktarları (kg/yıl)

Türkiye’de kuru baklagiller ihracat miktarı ve değeri 2021 yılında 650 bin ton ve 608 milyon dolar olarak, ithalat miktarı ve değeri ise 735 bin ton ve 574 milyon dolar olarak gerçekleşmiştir. Türkiye 2021 yılında 86 bin ton kuru baklagil dış ticaret açığı verirken 33,5 milyon ton dış ticaret fazlası vermiştir (Çizelge 9). Türkiye kuru baklagiller dış ticaretinde miktar bakımından dış ticaret açığı vermesine rağmen değer bakımından dış ticaret fazlası vermektedir. Bunun sebebi olarak Türkiye’de üretilen kuru baklagiller yüksek fiyattan ihraç edilirken, ithalat daha düşük fiyattan gerçekleşmektedir. Nitekim yurt içinde tüketimin önemli bir bölümü ithal kuru baklagiller ile karşılanmakta olup yurt içinde üretilen kaliteli kuru baklagiller ihraç edilmektedir.

Çizelge 9. Türkiye’de kuru baklagiller dış ticareti

Dış Ticaret	2007-2009	2010-2012	2013-2015	2016	2017	2018	2019	2020	2021	İndeks (2007/2009=100)
İhracat Miktarı (ton) (1)	219,2	239,8	218,9	269,4	291,8	436,8	639,3	743,6	649,5	296,30
İthalat Miktarı (ton) (2)	174,9	279,8	353,5	401,8	504,7	487,0	661,2	867,7	735,4	420,47
Denge (ton) (1-2)	44,3	-40,0	-134,6	-132,4	-212,9	-50,2	-21,9	-124,1	-85,9	-193,91
İhracat Değeri (milyon dolar) (3)	196,1	236,1	235,3	313,9	277,6	322,1	441,2	566,2	607,7	309,89
İthalat Değeri (milyon dolar) (4)	188,2	226,4	297,3	354,0	415,0	318,0	364,1	523,9	574,2	305,10
Denge (milyon dolar) (3-4)	7,8	9,6	-62,0	-40,1	-137,4	4,2	77,2	42,4	33,5	429,49

Kaynak: FAO, 2023a.

Gıda için kendine yeterlilik kavramı bir ülkenin gıda ihtiyaçlarını kendi yerli üretiminden karşılayabilme derecesidir (Thomson ve Metz, 1999). Türkiye’de kuru baklagiller üretiminde kendine yeterlilik derecesi 2007/2008 piyasa yılında %107,2 iken 2022/2023 piyasa yılında %22,2 azalarak %83,4 olarak gerçekleşmiştir. İncelenen dönemlerde kendine yeterlilik dereceleri %82,9 ile %107,2 arasında değişmekle birlikte ortalama %92,1’dir. Ortalama yeterlilik dereceleri kuru fasulyenin %82,7, nohudun %107,3, kırmızı mercimeğin %83,5 ve

yeşil mercimeğin %56,6'dır. Türkiye nohut üretiminde kendine yeterli olup kuru fasulye üretiminde özellikle son yıllarda kendine yeterliliği yükselmiştir. Kırmızı mercimek ve yeşil mercimek üretiminde kendine yeterli değildir. Özellikle kırmızı mercimek üretiminde yeterlilik derecesi yıllar itibariyle düşüş eğilindedir (Çizelge 10).

Çizelge 10. Türkiye’de kuru baklagiller üretiminde kendine yeterlilik düzeyleri (%)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Kuru Baklagiller
2007/08	71,0	121,0	121,6	50,0	107,2
2008/09	83,7	127,7	45,2	65,7	93,6
2009/10	78,8	118,2	82,9	51,3	96,1
2010/11	81,9	110,5	91,3	58,5	95,8
2011/12	83,4	101,7	102,0	61,7	96,5
2012/13	83,2	99,5	122,4	54,2	100,5
2013/14	78,5	96,6	90,3	41,7	88,9
2014/15	86,2	96,5	74,7	39,0	84,3
2015/16	82,6	98,1	81,6	43,1	86,7
2016/17	81,8	92,1	76,7	46,1	82,9
2017/18	82,7	87,5	89,6	56,5	86,0
2018/19	72,1	114,0	74,9	86,8	91,0
2019/20	76,0	127,5	71,7	85,3	94,7
2020/21	92,0	122,3	71,2	58,7	94,3
2021/22	106,7	96,0	57,0	50,9	83,4
Ortalama	82,7	107,3	83,5	56,6	92,1
İndeks (2007/08=100)	150,28	79,34	46,88	101,80	77,80

Kaynak: TÜİK, 2023b.

Sonuç

Türkiye mercimek ve nohut üretiminde dünyada 4. sırada, kuru fasulye üretiminde ise 19. sırada yer almaktadır. Kuru fasulye üretiminde kendine yeterlilik derecesi son yıllarda artmasına karşın henüz istenilen düzeyde değildir. Nohut üretiminde kendine yeterlilik derecesi yıllar itibariye dalgalı bir seyir izlemekte olup kendine yeterli olduğu söylenebilir. Ancak mercimek üretiminde kendine yeterli değildir. Tüm kuru baklagiller için değerlendirildiğinde ise Türkiye’nin kendine yeterli olmadığı belirlenmiştir. Türkiye’de kuru baklagiller açısından kendine yeterliliğin artırılması için aşağıdaki öneriler sıralanabilir.

Kuru baklagiller için kalite standartlarını belirleyerek sertifikalı üretim yapılabilir. Bu sayede Türkiye’nin dünya pazarına rekabet gücü artacaktır. Kuru baklagil üretimi çoğunlukla kuru tarım ile üretilmektedir. Kuru arazileri suya erişirmek, mevcut sulama sistemlerini modernize etmek, depolama olanaklarını iyileştirmek ve kapasitesini artırmak gibi altyapı olanaklarının iyileştirilmesi üreticilerin daha fazla ürün üretmelerini ve ürünlerini korumalarına yardımcı olacaktır. Kuru baklagillerde kaliteli ve verimli yeni çeşitlerin geliştirilmesi için ilgili kurum ve kuruluşlara araştırma ve geliştirme yatırımları yapılabilir. Böylece kaliteli ve verimli çeşitler sayesinde ekstrem geçen yıllarda verimde ve üretimde sert düşüşlerin önüne geçilmiş

olunacaktır. Tüm bu öneriler ile Türkiye’de kuru baklagil üretiminde kendine yeterliliğin istenilen seviyelere geleceği düşünülmektedir.

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BÜYÜYEN DÜNYADA ARMUT: KÜRESEL PİYASALARDA ÜRETİM VE TİCARET

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Özet

Besin içeriği, lezzeti ve ekonomik değeri açısından armut önemli ılıman iklim meyve türlerinden biridir. Bu çalışma ile küresel olarak armut endüstrisinin genel durumu son on yıllık (2012-2021) veriler ışığında ortaya koyulmuştur. Bu amaç için armut üretim ve ticaretinde söz sahibi ülkelere ait veriler değerlendirilmiş, armut üretim ve ticaretine ait gelişmeler irdelenmiştir. Sonuçlar, dünya armut üretiminin son on yılda %5,56 oranında arttığını, bu artışın büyük çoğunluğunun Çin'in armut üretimindeki artışından kaynaklandığını göstermiştir. Son on yılda armut üretimi Asya ve Afrika'da artış gösterirken, Avrupa, Amerika ve Okyanusya'da azalış trendine sahiptir. Armut üretiminde Çin lider konumda olup, Çin'i sırasıyla Amerika Birleşik Devletleri, Arjantin, Türkiye ve Güney Afrika takip etmektedir. Dış ticaret verilerine göre armut ihracatında Çin, Hollanda ve Belçika önemli ihracatçı ülkelerdir. Dünya armut ticareti armut üretimine paralel olarak artmaktadır. Dünya armut üretim ve ticareti başta armut ateş yanıklığı hastalığı olmak üzere çeşitli hastalık ve zararlılar, iklim değişikliği, tüketici tercihleri ve pazarlama gibi faktörlerden etkilenmektedir. Bu faktörlerin analizi, armut sektörünün geleceğini belirlemek için önemlidir. Bu nedenle sektörün sürdürülebilirliği açısından uygun stratejilerin geliştirilmesi gerekmektedir.

Anahtar Kelimeler: Armut, Uluslararası ticaret, Pazar, Trend, Türkiye

PEAR IN A GROWING WORLD: PRODUCTION AND TRADE IN GLOBAL MARKETS

Abstract

Pear is one of the important temperate climate fruit species in terms of nutritional content, flavor, and economic value. In this study, the general situation of the pear industry globally was revealed in the light of the data for the last ten years (2012-2021). For this purpose, the data of the leading countries in pear production and trade were evaluated, and the developments in pear production and trade were analyzed. The results showed that world pear production increased by 5.56% in the last decade, most of which came from China's increase in pear production. In the previous decade, pear production increased in Asia and Africa, while it decreased in Europe, America and Oceania. China is the leader in pear production, followed by the United States, Argentina, Türkiye, and South Africa. According to foreign trade data, China, the Netherlands, and Belgium are the major exporters of pears. World pear trade is increasing in parallel with pear production. World pear production and trade are affected by factors such as various diseases and pests, especially pear fire blight disease, climate change, consumer preferences and marketing. Analyzing these factors is essential for determining the future of the pear sector. Therefore, it is necessary to develop appropriate strategies for the industry's sustainability.

Keywords: Pear, International trade, Market, Trending, Türkiye

Giriş

Küresel ekonominin temel taşlarından biri tarım sektörüdür. Doğrudan insan beslenmesiyle alakası, bu sektörü hayati öneme sahip kılmaktadır. Bu sektör içinde meyvecilik, önemli bir besin kaynağı olması, küresel gıda güvenliği ve ekonomik kalkınma açısından ön plana çıkmaktadır. Son yıllarda soğuk zincirle meyvelerin tazeliğini muhafaza ederek uzak mesafelere taşıma imkanlarının artması, insanların farklı meyve türleriyle tanışmasına ve uluslararası ticaretin gelişmesine neden olmuştur.

Ilıman iklim meyve türlerinden biri olan armut geniş bir alanda yetiştirilmektedir. Kart ve Gül (2021) armudun dünyada ilk kez Yunanistan'da yetiştirilmeye başlandığını ve tarihinin MÖ 1000 yıllarına dayandığını bildirmiştir. Armut çoğunlukla taze olarak tüketilen ve zengin besin içeriği ile öne çıkan bir meyvedir. İyi bir diyet lifi, C vitamini ve antioksidan kaynağı olduğu için armutların besin değeri önemlidir. Armutlar ayrıca K vitamini, potasyum ve diğer mikro besinleri de içerdiğinden sağlıklı bir diyeteye değerli bir katkı sağlar (Albano vd., 2015). Her ne kadar armut geniş bölgelerde yetiştiriliyor olsa bile, ateş yanıklığı hastalığı armut yetiştiriciliğini sınırlayan en büyük neden olmuştur

Genel olarak, armut üretimi ve ticareti; çeşitli hastalık ve zararlılar, iklim değişikliği, tüketici tercihleri, pazarlama besin değeri, bölgesel üretim yoğunluğu, organik ürünlere yönelik pazar talebi ve sürdürülebilir tarım uygulamalarının benimsenmesi gibi çeşitli faktörlerden etkilenmekte olup, bunların tümü armut endüstrisinin şekillenmesinde önemli rol oynamaktadır.

Bu çalışmada küresel armut üretimi ve ticareti değerlendirilmiş, Türkiye'nin bu pazardaki konumu ele alınmıştır.

Materyal ve Metot

Materyal

Çalışmada Türkiye İstatistik Kurumu (TÜİK) ve Birleşmiş Milletler Tarım ve Gıda Örgütü (FAO) tarafından yayınlanan verilerden ve bu konuda yayınlanmış her türlü yayın, rapor ve belgelerden yararlanılmıştır.

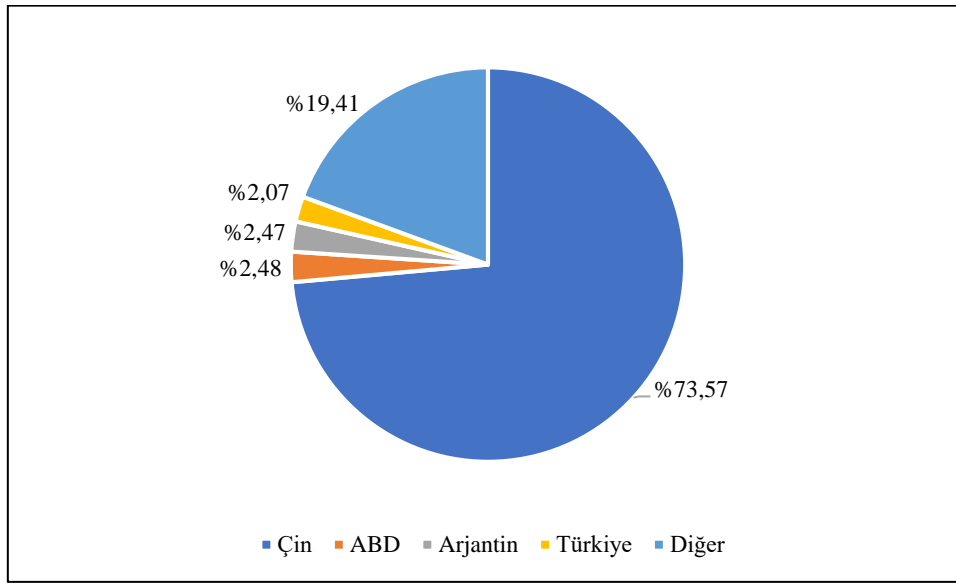
Metot

Çalışmada son on yıllık (2012-2021) dünya ve Türkiye armut üretim ve ticaret yapısı değerlendirilmiştir. Elde edilen verilerle basit indeksler hesaplanmış, artış ve azalışlar yorumlanmıştır.

Araştırma Bulguları ve Tartışma

Üretim ve Alan

Armut üretimi 2021 yılında yaklaşık 25,7 milyon ton olarak gerçekleşmiştir. Çin dünya armut üretiminden %73,57'lik bir pay alırken, Çin'i ABD (%2,48), Arjantin (%2,47) ve Türkiye (%2,07) takip etmektedir (Şekil 1). Kıtalarla göre üretim oranları dikkate alındığında armut üretim alanlarının Asya kıtasında bulunması nedeniyle üretimin büyük çoğunluğu (%81,26) Asya kıtasında gerçekleşmektedir. Asya kıtasından sonra Avrupa ve Amerika kıtaları en fazla armut üretiminin yapıldığı kıtalardır (FAO, 2023).



Şekil 1. Armut üretiminde lider ülkeler ve üretimdeki payları

Son on yıllık veriler ışığında dünya armut üretimi %5,56'lık bir artış göstermiştir. Üretimini mutlak olarak en fazla artıran ülke Çin olmuştur. Armut üretiminde lider ülkelerden Türkiye, Güney Afrika ve Hollanda son on yılda armut üretimini artırırken, Arjantin, İspanya, Hindistan ve İtalya'da ise armut üretimi azalmıştır. Özellikle İtalya'da armut üretiminde 2021 yılında 2012 yılına göre %57,64'lük bir düşüş yaşanmıştır (Çizelge 1). Bu durumun başta hastalık ve zararlılar olmak üzere, sel, don, dolu ve rekor düzeyde yaşanan sıcaklıkların yanı sıra üretim alanlarındaki daralmalardan kaynaklandığı düşünülmektedir.

Çizelge 1. Armut üretiminde lider ülkelerin üretim miktarları ve payları

Ülke	Üretim Miktarı (ton)			Pay (%)	Değişim (%)*
	2012	2017	2021		
Çin	17.073.000	16.410.000	18.875.900	73,57	10,56
ABD	778.583	669.000	636.390	2,48	-18,26
Arjantin	825.115	517.754	634.000	2,47	-23,16
Türkiye	442.646	503.004	530.349	2,07	19,81
Güney Afrika	338.584	416.215	459.532	1,79	35,72
Belçika	236.400	301.818	355.680	1,39	50,46
Hollanda	199.000	330.000	340.000	1,33	70,85
İspanya	407.428	360.957	316.270	1,23	-22,37
Hindistan	340.000	346.000	276.000	1,08	-18,82
İtalya	645.540	772.578	273.450	1,07	-57,64
İlk 10 Ülke	21.286.296	20.627.326	22.697.571	88,46	6,63
Diğer Ülkeler	3.020.071	3.195.048	2.961.142	11,54	-1,95
Dünya	24.306.368	23.822.374	25.658.713	100,00	5,56

* 2012 yılına göre 2021 yılındaki değişimi ifade etmektedir.

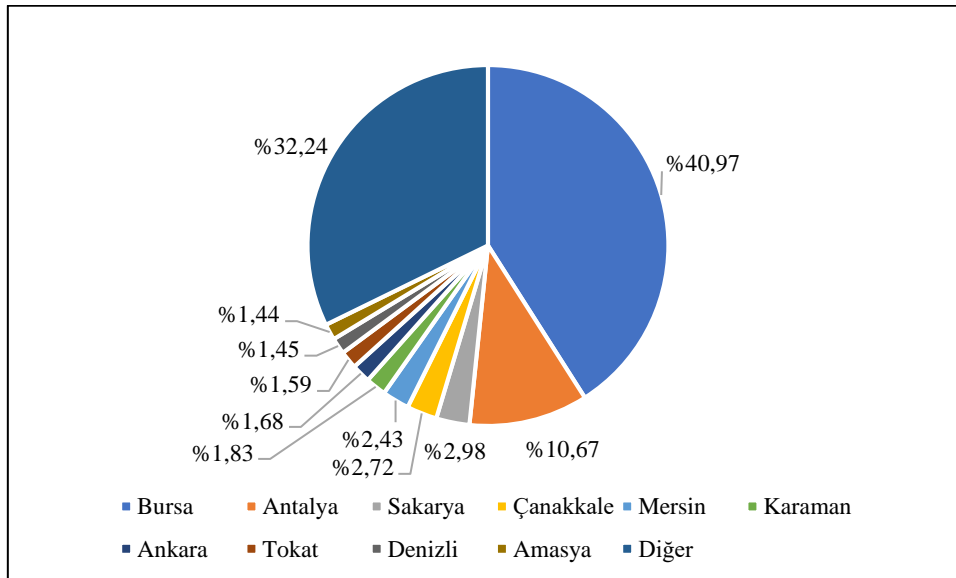
Armut, 2021 verilerine göre dünyada 1,40 milyon hektar alanda yetiştirilmektedir. Yetiştiricilik yapılan armut alanlarının %80,88'i (1,13 milyon ha) Asya kıtasında, %11,15'i (156,10 bin ha) Avrupa kıtasında, %4,22'si (59,11 bin ha) Amerika kıtasında, %3,35'i (46,95 bin ha) Afrika kıtasında ve %0,39'u (5,43 bin ha) Okyanusya kıtasında bulunmaktadır. Çizelge 2'de armut üretiminde lider ülkelerin üretim alanları ve değişimleri verilmiştir. Dünya armut üretim alanları son on yılda %10,52 azalma göstermiştir. Armut üretiminde lider ülkelere Çin, ABD, İspanya, Hindistan ve İtalya'da armut üretim alanları azalırken, Arjantin, Türkiye, Güney Afrika, Belçika ve Hollanda armut üretim alanlarını artıran ülkeler olmuştur. Dünya armut alanlarındaki bu azalmanın özellikle çözümü olmayan armut ateş yanıklığı hastalığından kaynaklandığı düşünülmektedir. Nitekim Kart ve Gül (2021)'ün Antalya'da armut üreticileriyle yürüttükleri çalışmada ateş yanıklığı ve karalekenin armutta mücadele edilen en önemli hastalıklar olduğu bildirilmiştir.

Çizelge 2. Armut üretiminde lider ülkelerin üretim alanları ve payları

Ülke	Üretim Alanı (ha)			Pay (%)	Değişim (%)*
	2012	2017	2021		
Çin	1.088.570	922.780	981.485	70,13	-9,84
ABD	20.275	18.700	16.876	1,21	-16,76
Arjantin	24.284	20.879	24.802	1,77	2,13
Türkiye	23.223	26.000	25.155	1,80	8,32
Güney Afrika	10.645	11.989	11.964	0,85	12,39
Belçika	8.600	10.023	10.450	0,75	21,51
Hollanda	8.169	9.741	10.070	0,72	23,27
İspanya	25.512	21.888	20.020	1,43	-21,53
Hindistan	45.285	44.000	42.000	3,00	-7,25
İtalya	35.195	31.729	26.790	1,91	-23,88
İlk 10 Ülke	1.289.758	1.117.729	1.169.612	83,57	-9,32
Diğer Ülkeler	274.341	235.538	229.872	16,43	-16,21
Dünya	1.564.099	1.353.267	1.399.484	100,00	-10,52

* 2012 yılına göre 2021 yılındaki değişimi ifade etmektedir.

Türkiye özelinde değerlendirildiğinde armut üretimi tüm illerde yapılabilmektedir (TUİK, 2023). Ancak ticari armut yetiştiriciliği başta Bursa olmak üzere Antalya, Sakarya, Çanakkale ve Mersin illerde söz konusudur. Türkiye İstatistik Kurumu (TUİK) verilerine göre 2022 yılında Türkiye’de 551 bin ton armut üretilmiş, bu üretimin yaklaşık %41’ini Bursa tek başına karşılamıştır. Armut üretiminde lider ilk on ilin armut üretimi içindeki payı yaklaşık %68’dir (Şekil 2).



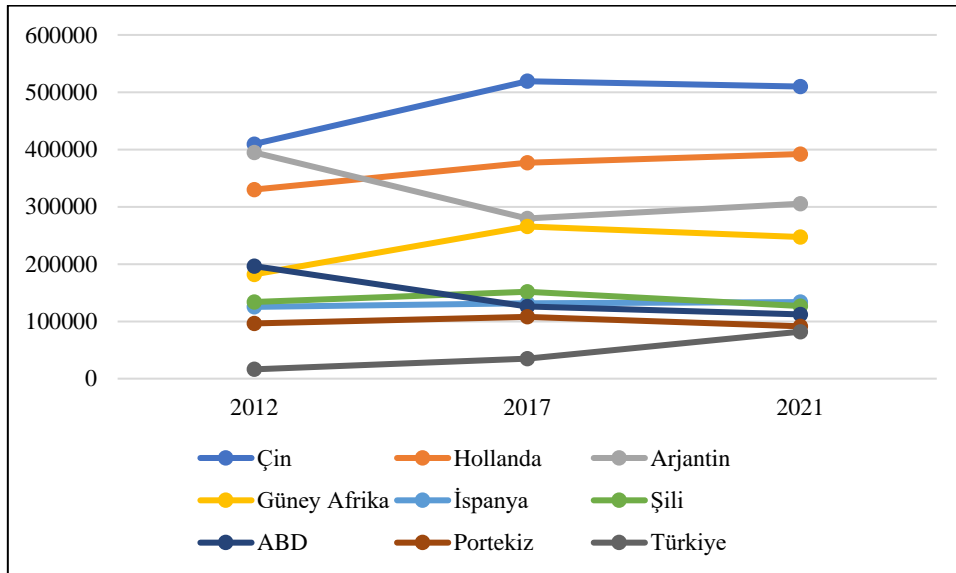
Şekil 2. Armut üretiminde lider illerin üretimdeki payları

Uluslararası Ticaret

Son on yıllık veriler dikkate alındığında küresel armut üretiminin yaklaşık %10-12'si uluslararası ticarete söz konusu olmaktadır. Tüm sektörlerde olduğu gibi dünya armut ticaretinde de gelişmeler yaşanmaktadır. Bu bölümde armut ihracat ve ithalatında söz konusu ülkeler ele alınmış ve değerlendirilmiştir.

İhracat

Armut üretiminde önemli paya sahip ülkeler, armut ihracatında da önde gitmektedir. FAO verileri 2021 yılında armut üretiminin yaklaşık 2,6 milyon tonunun ihracata konu olduğunu göstermektedir. Çin bu ihracattan %18,38'lik pay alarak en fazla ihracat yapan ülke olurken, %14,13'lük payla İspanya, %12,72'lik payla Belçika, %11,00'lik payla Arjantin, %8,90'lık payla Güney Afrika, %4,81'lik payla İspanya, %4,57'lik payla Şili, %4,32'lik payla Polonya ve %4,04'lük payla ABD Çin'i takip eden ülkeler olmuştur (FAO, 2023). Türkiye 82 bin tonluk ihracat miktarıyla ihracatta %2,95'lik paya sahiptir. Burada Şili'ye dikkat çekmek gerekir. Her ne kadar üretim miktarı bakımından ilk on ülke arasında yer almasa da ihracatta ön sıralarda yer edinmiştir. Şili'de ihracatın üretime oranı %58'den fazladır. Şekil 3'te İhracatta lider ülkelerin ihracat miktarları verilmiştir. Şekil 3 incelendiğinde Türkiye'nin son on yılda ihracatını artırma eğiliminde olduğu görülmektedir.



Şekil 3. İhracatta lider ülkelerin ihracat miktarları

İhracatta önde giden ilk on ülke küresel armut ihracatının %86,16'sını gerçekleştirmektedir. Çin ihracatının %42,85'ini Endonezya'ya yapmaktadır. Vietnam, Tayland, Hong Kong, Malezya ve Filipinler Çin'in diğer önemli pazarları olarak karşımıza

çıkılmaktadır. Türkiye ihracatının %36,30'unu Rusya Federasyonu'na, %21,38'ini Irak'a yapmaktadır. Türkiye'nin toplam 56 ülkeye armut ihracatı söz konusu olsa da ihracatının %80'inden fazlasını Rusya Federasyonu, Irak, Romanya, İsrail, Bulgaristan, Almanya ve Ukrayna'ya yapmaktadır.

İthalat

Armut ithalatını en fazla yapan ülkelerin başında Endonezya, Rusya Federasyonu, Almanya, Fransa, Brezilya, Hollanda, Belarus, İtalya, İngiltere ve Vietnam gelmektedir. Çizelge 3'de önemli armut ithalatçı ülkeler ve ithalat miktarları verilmiştir. İthalatta ilk on ülke toplam ithalatın %54,03'ünü gerçekleştirmektedir. En fazla ithalat yapan Endonezya ithalatının %95,6'sını Çin'den, %3,8'ini Güney Afrika'dan yapmaktadır. Türkiye Endonezya pazarından pay alamamıştır. Önemli bir ithalatçı ülke olan Rusya Federasyonu ise ithalatının %32,7'sini Arjantin'den, %21,1'ini Güney Afrika'dan karşılamaktadır. Türkiye'nin Rusya pazarından aldığı pay %14,4'tür. Almanya ise ithalatının büyük çoğunluğunu (%78,44) Hollanda, İtalya ve Belçika'dan karşılarken, Türkiye bu pazardan %0,25 gibi çok küçük bir pay almaktadır.

Çizelge 3. Dünya armut ithalatında önemli ülkelerin ithalat miktarları

Ülke	İthalat (ton)	Pay (%)
Endonezya	227.219	8,76
Rusya Federasyonu	225.553	8,70
Almanya	166.470	6,42
Fransa	125.394	4,83
Brezilya	120.781	4,66
Hollanda	117.747	4,54
Belarus	111.124	4,28
İtalya	110.677	4,27
İngiltere	100.204	3,86
Vietnam	96.262	3,71
İl 10 Ülke	1.401.430	54,03
Diğer Ülkeler	1.192.577	45,97
Dünya	2.594.007	100,00

Sonuç ve Öneriler

Armut önemli bir ılıman iklim meyve türüdür. Besin değeri ve lezzeti ile sürekli talep görmektedir. Ancak bu derece talep gören bir meyvenin üretiminde önemli sorunlar yaşanmaktadır. Dünyada ve Türkiye’de 1985’li yıllarda ortaya çıkan ateş yanıklığı hastalığı armut üretiminde keskin düşüslere neden olmuştur. Günümüzde bu hastalığa hala kesin çözüm bulunamamış olması armut üretiminin artmasının en büyük engelidir. Son yıllarda başlatılan ıslah çalışmaları ümitvar olarak değerlendirilmektedir.

Dünyada yaklaşık 25,7 milyon ton armut üretilmektedir. Bu üretimin büyük çoğunluğu Çin tarafından gerçekleştirilmektedir. Türkiye küresel armut üretiminde dördüncü sırada yer almaktadır. Küresel armut üretimini tehdit eden unsurlar Türkiye için de gündemdedir.

Küresel armut ticareti son yıllarda gelişmektedir. Türkiye ihracattaki payını son on yılda artırma eğilimindedir. Türkiye mevcut pazarlarını koruyarak, elmada olduğu gibi Endonezya pazarından pay alma arayışlarına girmelidir. Önemli armut ithalatçısı olan Almanya pazarına ihracat olanakları araştırılmalıdır.

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DİKKAT DAĞITICI REKLAMDAN BAĞLANTI KURUCU REKLAMA: NATİVE REKLAMIN ETKİSİ VE AVANTAJLARI

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Özet

Dijital pazarlama stratejilerinin vazgeçilmez bir parçası haline gelen native reklam, reklamın içeriğinin, kullanıldığı platformun doğal içeriğiyle uyumlu bir şekilde tasarlandığı ve sunulduğu bir reklam türüdür. Native reklamcılığın amacı, reklam mesajlarını kullanıcı deneyimini kesintiye uğratmayacak veya bozmayacak şekilde sunmaktır. İçeriklerin, yayın platformlarına uyumlu olarak tasarlanması ve kullanıcılara rahatsızlık vermeden aktarılması, kullanıcı deneyimini olumlu bir şekilde etkiler. Native reklamlar, izleyicinin/dinleyicinin reklam mesajına maruz kaldıkları sırada gözünden kaçmayan, reklamı içerikten ayırt etmekte zorlanmayacakları bir şekilde sunulur. Native reklamların, reklam olmayan içeriklerden açıkça ayırt edilebilmesini sağlamak, hem platformun hem de reklamverenlerin güvenini ve inandırıcılığını koruma noktasında etik değerler açısından önem arz etmektedir. Uygun bir şekilde yapıldığında, native reklamcılık, markaların hedef kitlelerine ulaşmaları ve etkileşim sağlamaları için etkili bir strateji olabilir. Native reklamlar, markalar için bir itibar oluşturma fırsatı sunar. Doğal olarak entegre edildikleri için, tüketiciler reklamları daha az rahatsız edici bulur ve markaya karşı daha olumlu bir tutum geliştirirler. Ayrıca, içeriğiyle uyumlu olarak sunulan reklamlar, izleyicilerin marka hakkında daha fazla bilgi edinmelerine yardımcı olabilir. Bu, tüketicilerin reklamları daha olumlu bir şekilde algılamalarına ve içerikle daha fazla etkileşimde bulunmalarına olanak tanır. Kullanıcı dostu yaklaşımı ve etkili sonuçlarıyla, markalar için vazgeçilmez bir araç haline gelen, reklamları daha keyifli hale getirmeyi amaçlamayan ve reklam sektöründe yükselen bir trend olmaya başlayan native reklamcılık, yüksek kullanıcı ilgisi yaratarak kabul edilebilirliği arttırıp marka ile bir bağ kurmasının önünü açar.

Anahtar kelimeler: Native reklam, Doğal reklam, Bağlantı kurucu reklam.

**FROM DISTRACTING TO ENGAGING ADVERTISING: THE IMPACT AND
ADVANTAGES OF NATIVE ADVERTISING**

Abstract

Native advertising, which has become an indispensable part of digital marketing strategies, is a type of advertising in which the content of the advertisement is designed and presented in a way that is compatible with the natural content of the platform it is used. The purpose of native advertising is to deliver advertising messages in a way that does not disrupt or disrupt the user experience. Designing content in accordance with publishing platforms and transferring content without disturbing the surrogates positively affects the user experience. Native ads are presented in a way that the viewer/listener does not lose sight of when they are exposed to the ad message and they will not have a hard time distinguishing the ad from the content. Ensuring that native ads are clearly distinguishable from non-advertising content is important in terms of ethical values to protect the trust and credibility of both the platform and advertisers. When done appropriately, native advertising can be an effective strategy for brands to reach and engage their target audience. Native ads provide an opportunity to build a reputation for brands. Because they are naturally integrated, consumers find ads less offensive and develop a more positive attitude towards the brand. Also, ads that are presented in line with their content can help viewers learn more about the brand. This allows consumers to perceive ads in a more positive way and engage more with the content. With its user-friendly approach and effective results, native advertising, which has become an indispensable tool for brands, does not aim to make ads more enjoyable and is starting to become a rising trend in the advertising sector, creates high user interest and increases acceptability and opens the way for a connection with the brand.

Keywords: Native ad, Link building ad. Influencer ads.

Giriş

Rekabet ortamının küresel boyuta taşınması, tüketicilerin beklenti ve satın alma davranışlarındaki değişimler, teknolojinin hayatımızı adeta ele geçirmesi, her şeyin çok kısa sürede eskitilip tüketilmesi ve yenilik arayışları, pazarlama ve reklam anlayışlarında da değişiklik yapılmasını da zorunlu kılmıştır.

Tüketicinin, kendisini tükettiği ürünle özdeşleştirilmesi, duygusal bağ kurması; pazarlama ve reklamcılığı, sadece ürün üretip tanıtmaya/satma amacının dışında yeni hedefler belirleme noktasına getirmiştir. Tüketiciyi salt “tüketen” noktasından alıp, onu değer yaratma sürecinin bir parçası olarak konumlandıran işletme/markalar; neyi, nasıl üretecekleri aşamadan başlayarak tüketici katılımını sağlayıp, onların bağ kurma ve özdeşleştirme duygularını kullanarak süreç sonunda “marka savunucusu” kimliği kazandırmayı amaç edinmişlerdir.

Değişimlere adapte olabilmek, ayak uydurabilmek, hedef kitleyi anlama ve onlara ulaşma noktasında hem mesaj hem de mesajın iletileceği ortamı belirleme açısından oldukça önemlidir. Geleneksel medyadan gittikçe uzaklaşan günümüz tüketicisi, bu mecralardan kendisini hedefleyen mesajlara da maruz kalmamaktadır. Reklam iletişiminin önemli bir unsuru haline gelen dijital platformlar, tüketicilere ulaşmak isteyen firma/markaların gözdesi olmaya başlamıştır. Yeni ortam diyebileceğimiz bu dijital ortamlardaki formatlar bile etkisini kaybetmeye, dikkat çekmemeye farkındalık yaratmamaya başlamıştır. Her ortamın kendine has formatı vardır. Bu yüzden yeni ortamlara uygun yeni formatlar gerekmektedir

NATIVE REKLAM NEDİR? TEMEL UNSURLARI NELERDİR?

Native kelimesi İngiliz dilinde yerel, yerli, doğuştan, asıl ve doğal anlamlarına (dictionary.cambridge.org, 2023) gelen bir kelime olmakla beraber, “native advertising” kavramı dilimize “doğal reklam” olarak çevrilmiştir.

Doğal reklam, kendisini barındıran editoryal içerik platformunun, sosyal medya ağlarının ya da web sitelerinin amaçlarına, içerik yapısına ve formatına uygun olarak, içeriğe doğrudan veya dolaylı olarak katkıda bulunan ödenmiş ya da sponsorlu reklam stratejilerini içeren bir uygulamadır. (Arslan, 2017)

Doğal reklamcılık, çevresindeki reklam dışı içeriğin formatına uyan nispeten yeni bir çevrimiçi reklamcılık biçimidir (Campbell & Evans, 2018).

Ücret karşılığında yayınlanan bir reklam içeriği olan ve mecranın kendi özgün içeriğine entegre edilerek yayınlanan doğal reklam (Kazaz, 2022), dışarıdan bakıldığında kolayca fark edilemeyen bir yapıya sahiptir. Reklamın mecradaki içeriğe gömülmesi, onu içeriğin bir parçasıymış gibi algılanmasına yol açmaktadır.

İlgili medyadaki editoryal içeriğinin formatına uyumlu, ücretli bir reklamcılık olan doğal reklamcılıkta (Wojdynski & Evans, 2016) verilen bilgi, algılanan aşinalık ve kabul edilebilirliğe yol açarak olumlu duygulanım yaratacaktır (Mandler, 1982).

Doğal reklamcılık, aslında yeni bir olgu değildir. Geleneksel medya platformlarında zaten kullanılmakta olan ve genellikle dolaylı, gizli, örtülü ya da maskeli reklam olarak adlandırılan; ticari bir mesajın doğrudan reklam olarak değil de bir haber formatında sunulması, doğal reklamcılığın öncülleri olarak kabul edilebilir. Dijital medyadaki doğal reklamcılık bu öncüllerle birçok benzerlik taşısa da, çeşitli özelliklerinden ötürü hala benzersiz bir reklamcılık olgusudur (Wu & Overton, 2021).

Bir bukalemunun bulunduğu ortama göre renk değiştirmesi ve kolayca ortamdan ayırt edilememesi native reklamın ortama uygun formatlarda sunulmasına bir örnek teşkil edebilir. O halde yukarıdaki tanımlamalara ek olarak doğal reklamı bukalemun reklam olarak da ifade edebiliriz.

DİJİTAL REKLAMIN EVRİMİ: NATİVE REKLAMIN YÜKSELİŞİ

Reklamcılığın evrimi, sadece reklam içeriklerinin görsel ve konseptüel özellikleri ile sınırlı kalmayıp, aynı zamanda bu içeriklerin oluşturulma süreçleri, pazarlama stratejileri ve etkileri ölçme metodolojileri gibi faktörleri de içermektedir.

İnternet temelli ortamlarda yürütülen pazarlama ve reklam çalışmaları olarak tanımlayabileceğimiz dijital reklamcılık, video, görsel, metin ve ses formatlarının biri ya da birkaçının birlikte kullanımı ile oluşturulmaktadır.

İnteraktif Reklamcılık Derneğinin ((Interactive Advertising Bureau) Türkiye şubesinin 2023 yılı ilk 6 aylık verilerine göre toplam medya yatırımları içerisinde, dijital platformların payı %65,9 olarak gerçekleşmiştir (iabtr.org, 2023). Bu verileri, reklam verenlerin yönünü dijital platformlara çevirdiğinin bir göstergesi olarak yorumlamak mümkündür.

Özünde, ürün veya hizmetin medya aracılığı ile kitlelere tanıtılması olarak ifade edilebilecek olan reklamın amacına ulaşabilmesi, mesajın hedef kitle tarafından alınmasına ve kabul edilmesine bağlıdır.

İnternet temelli uygulamalarda gezinen kişilerin gittikçe artan oranda reklam engelleme yazılımları kullanması, reklam verenlerin kendilerine ulaşmasını engellemekte (de Haan, 2023) ve bunun sonucu olarak, dijital reklam endüstrisine ciddi anlamda zarar vermektedir (Singh & Potdar , 2009)

NATIVE REKLAM YÖNTEMLERİ

Native reklam, çeşitli metodları kullanarak organik bir biçimde içerikle entegre olmayı hedefler.İçerik Pazarlaması: Native reklamın temelini oluşturan yöntemlerden biri içerik pazarlamasıdır. Markalar, platformun içeriğiyle uyumlu bir şekilde özgün ve değerli içerikler oluşturarak hedef kitlelerine ulaşmayı amaçlar.Sosyal Medya Reklamları: Sosyal medya platformları, kullanıcıların günlük etkileşimde bulunduğu yerlerdir. Native reklam, bu platformlarda özgün ve içeriğe uygun reklamlarla kullanıcılarla etkileşim kurmayı amaçlar.Arama Motoru Reklamları: Arama motorları, kullanıcıların aktif olarak bilgi aradığı yerlerdir. Native reklam, arama sonuçları içinde doğal bir şekilde yer alarak, kullanıcının arama ihtiyacına uygun reklam sunar. Ayrıca ücreti ödenerek reklamın, arama motorunun sonuç sıralamasında üst sıralarda yer alması sağlanır.Görsel ve Videolu Reklamlar: Görsel ve videolu içerik, kullanıcıların dikkatini çeken etkili araçlardır. Native reklam, platformun formatına uygun görsel ve videolarla içerik akışını bozmadan reklam yapmayı hedefler.E-posta Pazarlaması: Doğru hedef kitleye ulaşan içerikle zenginleştirilmiş e-posta kampanyaları da native reklamın bir parçası olabilir. Bu, abonelerin ilgisini çekmek ve markayla bağ kurmalarını sağlamak için kullanılır.Sponsorlu İçerik: Platformun içeriğine doğrudan entegre edilen sponsorlu içerik, native reklamın en temel öğelerinden biridir. Bu içerik, reklam verenin hedef kitleyle etkileşimde bulunmasını ve güven oluşturmasını sağlar.Öneri Eklentileri (Widget): Yayıncının, yayın esnasında izleyiciye bir link önererek marka içeriğine yönlendirmesi şeklinde kullanılan yöntemdir. Konuyla ilgisi olan tüketicinin ye hemen ya da sonra linke tıklaması ile amaç hasıl olmaktadır.

GELENEKSEL REKLAMDAN FARKI: NATİVE REKLAMIN ÖZELLİKLERİ

Native reklam yoluyla verilecek mesaj, zaten konuya eklemlendiği için bilişsel çaba gerektirmeden zaten konunun içinde olan izleyiciyi tutma ve ikna etme çalışmalarında önemli rol oynar. Geleneksel reklam uygulamalarına direnç gösteren izleyici, kendi hür iradesi ile izlediği programda, akışı bozmadan eklemlendirilmiş reklama da olumsuz tepki göstermeyecektir.

Konuyla ilgili olmayan bilgiler/mesajların rahatsız edici bulunması durumunda müdahale olarak algılanması söz konusu olabilmekte ve izleyici buna olumsuz tepki verebilmektedir. Sunulan içerikle ilgisiz görülen reklamlar daha müdahaleci olarak değerlendirileceği, anlamak için daha fazla bilişsel çaba gerektireceği ve olumsuz olarak değerlendirileceği yüksek ihtimaldir (Kononova, Kim, Joo, & Lynch, 2020).

Yerel reklamların ya da tüketicilerin sosyal medya akışında görünen ve çevredeki içerikle uyum sağlayacak şekilde tasarlanmış reklamların, tüketicilerin gezinme deneyimini bozmayacak şekilde reklam karmaşasını aşmanın etkili bir yolu olduğu düşünülmektedir (Evans , Phua , Lim, & Jun, 2017)

Native reklamların temel amacı doğrudan satış arttırmaktan ziyade marka farkındalığı yaratmak ve izleyici/tüketici ile etkileşim oluşturmaktır.

NATİVE REKLAMIN TÜKETİCİ İLGİSİ ÜZERİNDEKİ ETKİLERİ

Native reklam, yayın platformunun doğal içeriğiyle uyumlu bir şekilde tasarlanmış reklamları ifade eder. Bu tür reklamlar, genellikle kullanıcının dikkatini çekmede daha yumuşak bir yaklaşım benimser ve içeriğin akışına daha organik bir şekilde entegre olmaya çalışır.

Native reklam uygulamaları, geleneksel bir pazarlama yaklaşımını benimsemesine rağmen yeni medya ortamlarının yapısal özellikleri doğrultusunda, reklam mesajlarının içerikle doğal bir bütünlük içinde verilmesidir. Bu açıdan bakıldığında, izleyiciye ürünü doğrudan tanıtmak yerine, hikâyenin (içerik, film, dizi vs.) bir parçası haline getirerek daha organik bir tanıtım yapmayı amaçlayan ürün yerleştirmeye benzetilebilir. Temel fark ise native reklamın genel olarak reklamın kendisini içeriğe entegre etmeye odaklanması, ürün yerleştirmenin ise belirli bir ürünün veya markanın içeriğin doğal bir parçası haline getirilmesidir.

Gün içerisinde sayısız reklam mesajına maruz kalan bireylerde görülen reklamdaki kaçınma davranışı, işletmelerin mesajlarının hedef kitleye ulaşmasının önündeki en önemli engellerden

birisidir. Bu engelin aşılması, bireyin reklam kabulüne bağlıdır. Bir kişi reklam kabulü gösterdiğinde, reklamı fark etmiş, içeriği anlamış veya mesajıyla etkileşimde bulunmuş demektir. Reklam kabulü, pazarlamacıların hedef kitlesine ulaşma ve mesajlarını iletmeleri açısından önemlidir. Bu kabul, farkındalık yaratma, ilgi uyandırma, olumlu bir tutum oluşturma ve nihayetinde bir eyleme yönlendirme gibi aşamalarda gerçekleşebilir. Reklam kabulü, tüketici davranışları ve pazarlama stratejileri açısından analiz edilerek, reklam kampanyalarının etkileşim ve başarı düzeyini değerlendirmek için önemli bir ölçüttür. Bu açıdan native reklamlar, reklam kabulünü kolaylaştırıcı formatlar arasında belirgin bir üstünlüğe sahiptir. Doğal reklamcılığın dijital platformlarla kusursuz entegrasyonu, onu geleneksel gizli reklamcılığın yalnızca çevrimiçi bir kopyası olmaktan çıkarmaktadır (Wojdyski B. W., 2016).

Tüketiciye yönelik reklam içeriğinin etkili bir biçimde iletilmesi amacıyla, kullanıcının arama eğilimlerini içeren ve reklam niteliğini taşımadığı şekilde düzenlenmiş bilgiyi sunma amacını taşıyan bir yöntem geliştirilmiştir.

İçeriğin ilgi çekici bulunması durumunda, içeriğe dâhil edilen reklam mesajlarının kullanıcılar tarafından sorun edilmediği ifade edilmiştir (Goldberg, M. akt. Arslan, 2017)

En önemli özelliği, yayınlandığı platformun formatına uyum sağlayabilme olan doğal reklamın etkili olabilmesi için; hangi kanal aracılığı ile iletilecekse o kanala özgü içerik ve format kullanılmasına bağlıdır. Geleneksel medyada verilen bir mesaj aynı şekliyle dijital medyada verilemez. Ya da geleneksel medya içerisinde yer alan gazete, radyo ve televizyon için de ayrı ayrı formatlar gerekmektedir.

SONUÇ

Doğal reklamlarla ilgili bir diğer endişe de, çevredeki içeriğe karışacak şekilde tasarlandıkları için tüketicilerin doğal reklamların ikna edici amacını fark etmemesidir (Boerman , Willemsen, & Van Der Aa, 2017). Bu sayede reklam, hedefine ulaşmasının ilk adımı olan “görünürlük”ü elde edilebilir ve reklama karşı (olan veya olabilecek) direnci kırılabilir. Bu da reklamın sadece yayınlanmış değil aynı zamanda görülebilir olmasını sağlar.

Yapılan araştırmalar, doğal reklamın, tüketicilerin dikkatini çekmede ve kabul etmede etkili bir strateji olduğunu göstermektedir. Doğal reklamın, içerikle organik bir bütünlük içinde tasarlanması ve yayınlanması, izleyicinin reklamı fark etmeden içeriğe entegre olmasına olanak tanır. Bu noktada, reklamın doğal bir parça gibi algılanması, izleyicilerin olumsuz tepkiler

gösterme olasılığını azaltır ve reklamın hedef kitle tarafından daha olumlu bir şekilde algılanmasına katkı sağlar.

Ayrıca, doğal reklamın, tüketicilerin reklamı rahatsız edici bulma eğilimini azalttığı ve reklamdaki kaçınma davranışını engellediği görülmektedir. Geleneksel reklam uygulamalarına direnç gösteren izleyiciler, doğal reklamın içeriğe daha uyumlu bir şekilde yerleştirilmiş olması nedeniyle olumsuz tepki gösterme olasılığı daha düşüktür.

Reklam kabulü, tüketicinin reklamı fark etmesi, içeriği anlaması ve mesajla etkileşimde bulunması anlamına gelir. Bu açıdan doğal reklamlar, içerdikleri formatlar ve içeriklerle tüketicinin reklamı daha kolay kabul etmesini sağlar. Özellikle dijital platformlarda etkili bir şekilde entegre olan doğal reklamcılık, reklam endüstrisinin geleceğinde önemli bir rol oynayabilir. Reklamın, her ortama özgü formatlar kullanarak tüketicilere daha organik ve ilgi çekici bir deneyim sunması, gelecekteki reklam stratejilerinin temelini oluşturabilir.

Reklamcılık ortamı geliştikçe, doğal reklamcılık, özellikle değişen tüketici davranışları ve daha özgün ve ilgi çekici tanıtım yaklaşımlarına duyulan ihtiyaç karşısında hayati bir strateji olarak ortaya çıkmaktadır. Dijital dünyada, doğal reklamcılık çeşitli çevrimiçi platformlara uyum sağlayarak tanıtım içeriğini sunmanın daha az müdahaleci ve daha organik bir yolunu sunmaktadır.

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DEFORMATION BEHAVIOR OF CUALMNZN ALLOY

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Abstract

In this study, Cu-22.42%Al-4.52%Mn-1.65%Zn (at.%) alloy was used. The surface of the alloy was examined by scanning electron microscopy (SEM), and compressive stress tests were performed by Shimadzu 100 Kn servopulser. As a result of SEM observations, it was observed that martensite morphology such as needle, spear-like, zig zag, V-type appeared in the alloy. In addition, it was found that precipitates were formed in the alloy and they were uniformly distributed between the martensites. Since the importance of martensitic transformation in copper-based alloys is known, the alloy in the martensite phase was subjected to compressive stress until the alloy was ruptured and the maximum stress was evaluated. From the compression tests; the maximum strain was calculated as 0.37 ± 1 (%). The alloy showed strength up to 260.32 ± 5 MPa, but could not withstand this stress and fractured under compressive stress.

Keywords: Cu-based alloys, SEM, Deformation, Martensite.

1. Introduction

The solid that conducts electricity well under the influence of an applied electric field is called "metal", and the substance that consists of two or more elements, at least one of which is metal, and has metal properties is called "alloy". Metals and alloys have many different types of superior properties, and these properties can be increased severalfold by cold forming and heat treatment. For this reason, metals and alloys today constitute the basic group of materials needed in many fields from daily life to transportation, from industry to medical science, and the types of metal alloys used today are thousands. Each of them has been developed for a specific purpose and has been the subject of many researches to understand their properties and to increase their usage areas due to their increasing requirements. In these researches, it has been aimed to improve the quality of metals and alloys by applying various chemical and physical effects. For this reason, metals and alloys today constitute the basic group of materials needed in many fields from daily life to transportation, from industry to medical science, and the types of metal alloys used today are thousands. Each of them has been developed for a specific purpose and has been the subject of many researches to understand their properties and to increase their usage areas due to their increasing requirements. In these researches, it has been aimed to improve the quality of metals and alloys by applying various chemical and physical effects [Askeland, 1990; Nishiyama, 1978; Funakubo, 1987].

Copper-based Shape-memory alloys, in particular, are technologically important and are used in many areas of industry due to their easily correctable deformations and lower cost. Due to their low cost, shape-memory Cu-Al-Ni and Cu-Al-Zn alloys are attractive alloys with a wide range of production applications. However, the large grain, polycrystalline and highly ordered structures of these alloy systems make their production difficult [Sutou and et al, 1999]. In martensitic transformation, the force-effect not only changes the transformation temperature, but also the type of martensite. In martensite phase transformations, austenite-martensite transformations can be observed as well as martensite-martensite transformations [Wayman, 1964]. The effect of force in β -phase alloys is better understood on the force-temperature graph (Figure 1) for Cu-Al-Ni single crystal.

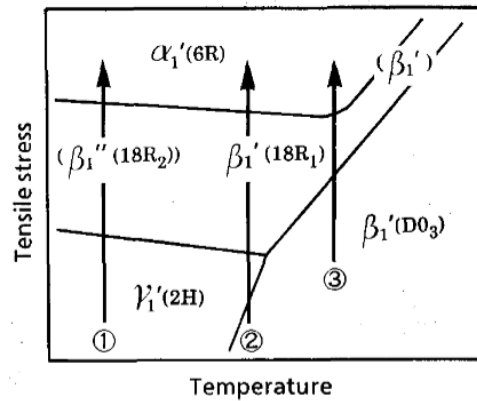


Figure 1. Schematic phase diagram of Cu-Al-Ni alloy.

In this graph, line 1 $\gamma_1'[2H(1 \bar{1})] \rightarrow \beta_1''[18R_2(1 \bar{1}3 \bar{1})_3] \rightarrow \alpha_1'[6R(1)_6]$ consecutive transformations are observed. In this case the transformation order is crystallographically irreversible. When the force is removed $\alpha_1'[6R(1)_6] \rightarrow \beta_1'[18R_1(2 \bar{1})_6] \rightarrow \gamma_1'[2H(1 \bar{1})]$ consecutive transformations are observed. Line 2 shows an irreversible $\beta_1(DO_3) \rightarrow \gamma_1' \rightarrow \beta_1' \rightarrow \alpha_1'$ sequential transformation. The line 3 $\beta_1 \rightarrow \beta_1' \rightarrow \alpha_1'$ shows reversible transformation. While $\gamma_1' \rightarrow \beta_1'$ transformation is mechanically difficult, $\gamma_1' \rightarrow \beta_1''$ transformation is easier. According to the phase diagram; γ_1' , β_1' (or β_1'') and α_1' phases occur with increasing difficulty. The consecutive $\gamma_1' \rightarrow \beta_1'' \rightarrow \alpha_1'$ transformation under the force effect is caused by the sliding of parallel layers in the alloy. In addition, it is insufficient to explain the reversibility of the $\beta_1 \rightarrow \beta_1' \rightarrow \alpha_1'$ successive transformation when the force effect is removed. This phase diagram for Cu-Al-Ni single crystal does not say that this type of transformation will occur only in this alloy. Other β -phase alloys also exhibit this type of successive transformation [Nishiyama, 1978; Wayman, 1964; Miyazaki, 1989].

Deformation effect is important in copper based alloys. Therefore, in this study, the effect of deformation on the transformation of Cu-22.42%Al-4.52%Mn-1.65%Zn (at.%) alloy was investigated. The sample obtained from the alloy was pressed hard until it broken and information about the strength of the alloy was obtained.

2. Experimental

CuAlMnZn alloy, which is the subject of this thesis, was prepared by using 99.9% pure Cu, Al, Zn, and Mn elements, melted in an argon gas atmosphere in an arc furnace at the Gebze Institute of Technology Materials Laboratories and cast into cylindrical rods with a diameter of 1 cm and a length of 10 cm. Quanta 450 SEM systems Energy Dispersive Spectrometry (EDS)

technique was used to determine the percentage (atomic %) of the alloy. The chemical composition of the determined alloy is given in table 1. Arc melting was used to fabricate the alloys. After the homogenizing annealing at 850 °C for 40 min., the alloy sample was subsequently cooled into water at room temperature. To prevent oxidation of the material at high temperatures during heat treatment, the sample was placed in a silica tube that can withstand high temperatures. Different physical experimental measurement techniques were used to study the effect of heat treatment on the sample obtained from the alloy.

Element	(wt.%)	(at.%)
Cu	82.51	71.40
Al	11.00	22.42
Mn	4.52	4.52
Zn	1.97	1.65

Table 1. Chemical composition of the alloy.

In order to examine the effect of deformation on the phase transformations obtained by thermal processing on the samples obtained from the alloy, rectangular prism-shaped pieces of 4 x 4 x 8 mm³ were cut from the samples with diamond blade cutters. Then, these specimens were compressed at room temperature by Shimadzu 100 Kn servopulser. Compression-Tensile test machine at a speed of 0.2 mm/min. and compressive stress was applied on them.

3. Results

3.1. SEM Experiments

SEM images of CuAlMnZn alloy were taken to investigate the phase transformations that occurring in CuAlMnZn alloy due to thermal effect. SEM images of the alloy are given in Figure 2. When the SEM photograph of the alloy was examined, it was observed that the alloy was completely martensite phase at room temperature. In Figure 1; grains and grain boundaries are clearly observed. Martensite plates occurred in different morphologies in each grain. In addition, the martensite plates are sharply cut at the grain boundaries. Martensite plates were observed as groups of plates compatible with each other. Martensite plates are formed as V-

type, zig-zag and rod-shape (Aldirmaz and et. al, 2014; Aldirmaz and et. al, 2018; Aldirmaz and et. al, 2019; Aldirmaz and et. al, 2021; Canbay, 2016).

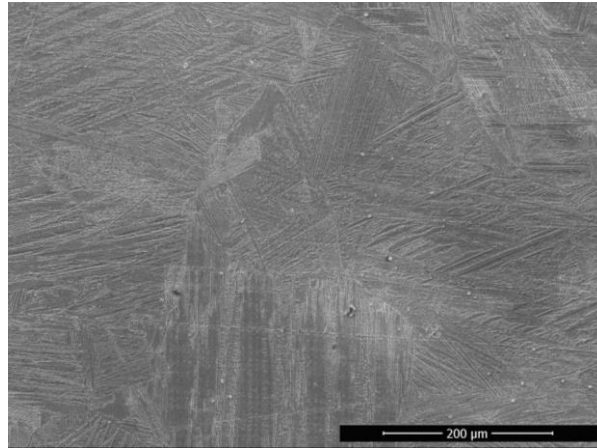


Figure 2. SEM micrograph of the worked alloy.

In our previous XRD studies, it was determined that two types of martensite structures, β_1' (18R) and γ_1' (2H), formed in Cu-based shape-memory alloys. The formation of two different types of martensite structures is due to the composition of the alloy. In the literature, it has been observed that both γ_1' and β_1' two different types of martensite phase coexist depending on different amounts of manganese and aluminum (Aldirmaz and et. al, 2017; Aldirmaz and et. al, 2021; Canbay, 2016).

3.2. Stress-Strain Experiments

The stress-strain curve showing the compressive stress behavior of the alloy is given in Figure 3. The sample in the martensite phase was subjected to compressive stress until rupture. The maximum strain was then evaluated.

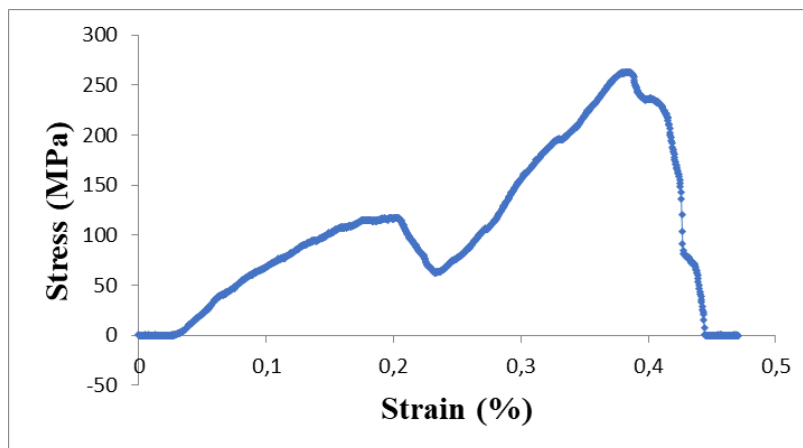


Figure 3. Stress-strain curves.

The fracture strain was found to be about 260.32 ± 5 MPa for the martensite phase. The alloy showed elasticity up to a deformation rate of about 0.2%. It was observed that the elasticity limit was exceeded when the strain exceeded about 120 MPa. When the elasticity limit is exceeded, the material exhibits plastic behavior. With the increase in force, dislocations start to move and shear occurs. The shape change caused by sliding is permanent. The point where slippage starts is the point that separates elastic and plastic behavior. The alloy showed strength up to around 300 MPa, but could not withstand 0.3% stress and fractured under compressive stress. When compared our study with the literature; the Zn element added to the Cu-Al-Mn alloy reduced the tensile strength and strain values (Aldirmaz, 2014). In another deformation study we conducted, the mechanical parameters we found were higher. This result was attributed to the composition of the alloys (Aldirmaz, 2014; Aldirmaz, 2022).

4. Results

In this study, we have investigated the influence of mechanical on the structural properties of the Cu-22.42%Al-4.52%Mn-1.65%Zn (at.%) alloy.

We can draw the present findings as the following:

1. From stress-strain experiments; the maximum strain was calculated as 0.37 ± 1 (%). The alloy showed strength up to 260.32 ± 5 MPa, but could not withstand this stress and fractured under compressive stress.
2. Rapid cooling from high temperatures to below the martensitic transformation temperature resulted in the formation of martensite plates with different orientations. At the end of the surface investigations; it was found that the thermally induced martensites in this sample appeared in different martensite morphologies.
3. As results, the shape memory alloy can be used in applications that do not require high strength.

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**STRUCTURAL AND NMR PROPERTIES OF THE
(Tetramethylethylenediamine)COPPERBIS(Acetylacetonate) COMPOUND WITH
THEORETICAL METHOD**

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Abstract

Tetramethylethylenediamine (TMEDA) is widely used as a ligand for metal ions. Pentane-2,4-dionate (acac) is widely used chelate ligands in transition metal chemistry. (TMEDA)metal(acac)₂ complexes are used as valuable starting materials for the preparation of organometallic and coordination compounds. (TMEDA)Cu(acac)₂, geometry parameters (bond length and bond angle), electronic and NMR properties are studied by DFT calculations, all structures have been optimized on the Becke3LYP/6-31G(d,p) level of theory without simplifications. Studied compound is C₁₆H₃₀N₂O₄Cu chemical formula. It's optimized energy value is found -72888 eV. ¹H and ¹³C NMR chemical shifts are calculated by using GIAO method with CDCl₃ solvent.

Keywords: Copper, NMR, electronic, DFT.

1. Introduction

Tetramethylethylenediamine (TMEDA) is widely used as a ligand or cosolvent in organic syntheses, particularly when organolithium reagents are involved. TMEDA forms stable complexes with many metal halides, e.g. zinc chloride and copper(I) iodide, giving complexes that are soluble in organic solvents. It is known from the literature that TMEDA increases product yields and reaction rates and even changes product distributions by dissolving lithium cations [1].

Additionally, TMEDA is also used as an influence on increasing reaction concentration and ambient reaction temperature on a molar scale. The thermochemistry of metal complexes involving the pentane-2,4-dionate (or acetylacetonate = acac) ligand has been the subject of numerous studies [2-5]. Some TMEDA-derived metal complexes are used as starting materials in the preparation of organometallic and coordination compounds. We present DFT calculations on geometry parameters (bond length and bond angle), electronic and NMR properties of (TMEDA)Cu(acac)₂ compound.

2. METHODS

Gaussian 09 software package has been used to perform geometry optimizations and total energy calculations by DFT (B3LYP) method with the 631G(d,p) basis set [6]. Visualization of the structure and the analysis of the outputs have been carried out with Gauss-View software [7].

3. RESULTS AND DISCUSSION

3.1. Structural Properties

(TMEDA)Cu(acac)₂, studied compound is C₁₆H₃₀N₂O₄Cu chemical formula. The initial molecular geometry of ligand compound was taken cif. [8] and added Cu atom by using Gauss-View. We figure out geometry optimizations as seen Fig. 1.

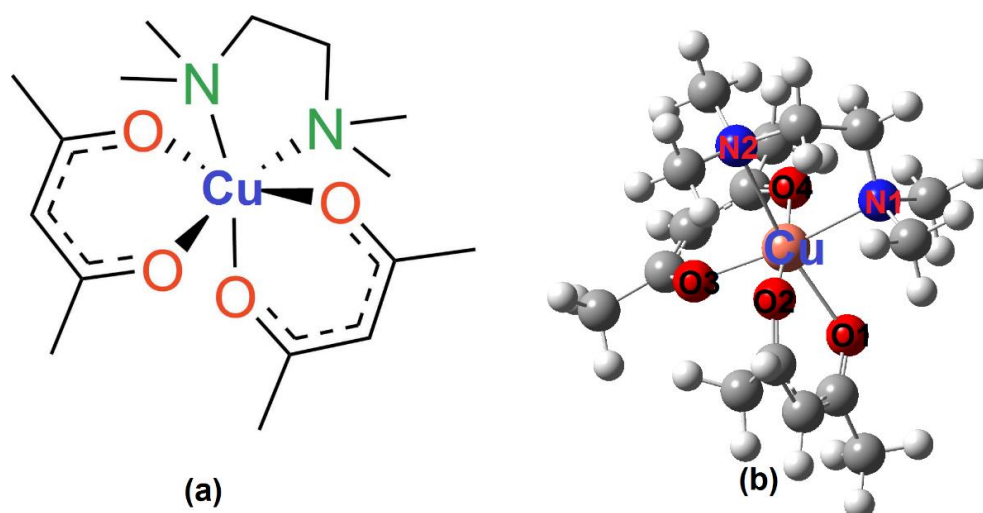


Fig. 1. (a) Chemical structure [8] and (b) theoretical optimized structure.

Optimized energy values of studied compound is found -72888 eV for DFT(B3LYP/631G(d,p) method. The optimized bond length and bond angles were obtained by same method for title compound were listed in Table 1. These values were in agreement with the similar compound experimental values [8]. As can be seen, most of the bond distances are slightly longer than the experimental distances. For the bond angles, there are difference. As known, the biggest differences of bond lengths and bond angles mainly occur in the groups involved in the nitrogen bonds [i.e.,] for the title compound, which is related to intra and intermolecular interactions present in the crystal.

Table 1. Comparative bond lengths and bond angles.

Parameters	Exp [Fe].	B3LYP	Parameters	Exp [11].	B3LYP
<i>Bond lengths (Å)</i>			<i>Bond angles (°)</i>		
Cu—O1	2.0876 (10)	2.2152	O2—Cu—O3	95.84 (4)	87.7282
Cu—O2	2.0497 (10)	1.9529	O2—Cu—O4	174.85 (4)	172.695
Cu—O3	2.0970 (10)	1.9745	O2—Cu—N1	91.04 (5)	92.3164
Cu—O4	2.0520 (9)	1.9456	O2—Cu—N2	84.18 (4)	84.1401
Cu—N1	2.3021 (12)	2.1538	O3—Cu—O4	86.00 (4)	91.1917
Cu—N2	2.3184 (12)	2.5985	O3—Cu—N1	170.93 (4)	172.5095
O1—Cu—O2	85.58 (4)	87.8195	O3—Cu—N2	95.43 (4)	93.252
O1—Cu—O3	93.98 (4)	98.1439	O4—Cu—N1	86.66 (4)	87.8151
O1—Cu—O4	99.11 (4)	99.4855	O4—Cu—N2	90.87 (4)	88.7104
O1—Cu—N1	92.44 (4)	89.3419	N1—Cu—N2	79.35 (4)	79.3062
O1—Cu—N2	166.73 (4)	165.7761			

Table 2. The measured electronic parameters of molecules.

Parameters (eV)	B3LYP
E_{LUMO}	-0.656
E_{HOMO}	-5.218
$\Delta E = E_{LUMO} - E_{HOMO}$	4.562
$I = -E_{HOMO}$	5.218
$A = -E_{LUMO}$	0.656
$\chi = (I+A)/2$	3.087
$\mu = -\chi$	-3.087
$\eta = (I-A)/2$	2.281
$S = 1/2\eta$	0.219
$w = \mu^2 / 2\eta$	2.087
μ_D (Debye)	2.405

Molecular Electrostatic Potential (MEP) mapping is very useful in understanding sites for electrophilic attack and nucleophilic reactions as well as hydrogen bonding interactions.

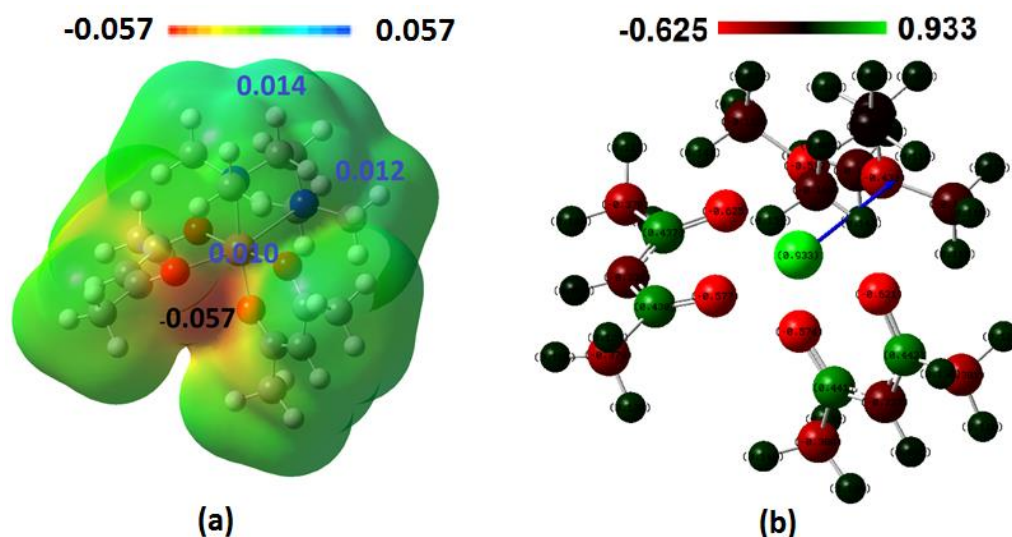


Fig. 3. (a) Total electron density mapped of the compound and (b) Mulliken charge values in gases phase.

The MEP clearly indicates that the electron rich centres were found around the O atoms, and slightly H atoms. For O atoms, the max. negative $V(r)$ values are $-0.057, a.u.$ and H atoms the max. $V(r)$ values are $0,014 a.u.$ for B3LYP method (Fig. 3 (a)). Atomic charges affect the dipole moment, electronic structure and many other properties of molecular systems. The Mulliken populations provide the simplest picture of the charge distribution, and Mulliken charges render “net” atomic populations in the molecule (Fig. 3 (b)).

3.2. NMR spectra

Gauge including atomic orbital (GIAO) ^1H and ^{13}C chemical shifts were calculated using the DFT/B3LYP method with 6-31G(d,p) basis set [10, 11]. The chemical shifts were converted into the TMS scale by subtracting the calculated absolute chemical shielding of TMS. The values of ^1H and ^{13}C are 31.76 and 191.81 ppm for B3LYP/6-31G(d,p) respectively [12]. The calculated results were given in Table 3 along with the experimental chemical shift values of similar compound [8].

^1H chemical shift values are calculated to be 1.16–5.19 ppm at B3LYP/6-31G(d,p) level, while the experimental results are observed to be 1.85–5.15 ppm. The (CH₃)₂N signals were observed to be 2.31 ppm. The methyl with oxygen of the compound (CH₃C(O)) gave nearly at 1.85 ppm at B3LYP level.

Table 3. ^1H and ^{13}C chemical shift values

^1H	Atom	Exp. (Fe)	B3LYP (scaled 31,76)	^{13}C	Atom	Exp. (Fe)	B3LYP (scaled 191,81)
C(O)CHC(O)	H14, H26	5.15	5.19,5.17	C(O)CHC(O)	C13, C25	98.4	97.1,98.59
	H9-H11	1.85	2.03,2,28,1.75		C8, C16	28.3	28.85,28.83
CH ₃ C(O)	H17-H19	1.85	1.69,1.54,1.32	CH ₃ C(O)	C20	28.3	27.61
	H21-H23	1.85	1.86,1.81,1.5		C28	28.3	27.53
Me ₂ N-CH ₂	H29-H31	1.85	1.75,1.63,1.41	Me ₂ N-CH ₂ (CH ₃) ₂ N)	C32, C50	56.5	57.34,47.57
	H33,H34	2.49	3.2,2		C38, C42	46.6	47.31,44.41
(CH ₃) ₂ N)	H36,H37	2.49	3.57,2.5	C(O)	C46, C50	46.6	42.69,47.57
	H39-H41	2.31	3.09,2.65,1.55		C12	190.9	184.65
	H43-H45	2.31	2.59,1.89,1.16		C15	190.9	178.38
	H47-H49	2.31	3.06,2.49,1.86		C24	190.9	182.99
	H51-H53	2.31	3.67,2.82,2.39		C27	190.9	180.15

^{13}C NMR spectra of the compound show signal at 190.9 ppm due to the C12, C15, C24 and C27 atoms of the C-O group. This signals were calculated at 184.65, 178.38, 182.99 and 180.15 ppm. As can be seen from Table 3 the theoretical ^1H and ^{13}C chemical shift results for the title compound are generally closer to the experimental data.

4. CONCLUSION

The (TMEDA)Cu(acac)₂ compound investigated. The calculated geometric parameters are good agreement with the experimental data. The MEP map indicates that hydrogen atoms is positive while the O atom is the negative. These sites give information about the region from where the molecule can have intermolecular interactions and metallic bonding. NMR properties are studied by DFT method.

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HALKLA İLİŞKİLERDE KÜLTÜREL DUYARLILIK VE ÇEŞİTLİLİK YÖNETİMİ: STRATEJİK YAKLAŞIMLAR

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Özet

Bu çalışmada, kültürel çeşitliliğin ve kültürel duyarlılığın halkla ilişkiler alanındaki önemi vurgulanmaktadır. Çalışma, halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetimi kavramını ele almakta ve halkla ilişkiler profesyonellerine bu konuda stratejik yaklaşımlar sunmaktadır. Ayrıca çalışmada; günümüzdeki çok kültürlü toplumlarda, halkla ilişkilerin kültürel duyarlılık ve çeşitlilik yönetimi açısından ele alınması gerekliliği vurgulanmaktadır. Farklı kültürlere mensup bireylerin bir arada yaşadığı bu ortamlarda, iletişim stratejilerinin kültürel farklılıklara duyarlı olması gerektiği önemle belirtilmektedir. Halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetiminin neden önemli olduğu ayrıntılı bir şekilde açıklanmış ve kültürel farklılıkların dikkate alınmamasının, halkla ilişkiler faaliyetlerinin başarısını olumsuz etkileyebileceği üzerinde durulmuştur. Kültürel duyarlılığın ve çeşitliliğin halkla ilişkiler faaliyetleri üzerindeki etkisi incelenmiş ve halkla ilişkiler süreçlerinde kültürel faktörlerin başarıya olan katkısı vurgulanmıştır. Halkla ilişkiler çalışanlarının kültürel duyarlılık ve çeşitlilik konularında eğitimi ve liderlik rolünün önemi ele alınmakta ve çalışanların kültürel farkındalığının artırılmasının ve çeşitliliği yönetme becerilerinin geliştirilmesinin önemine vurgu yapılmaktadır. Çalışmanın son bölümünde, halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetiminin etik boyutu ele alınmaktadır. Kültürel farklılıklara dayalı etik zorlukların ve bu zorlukların nasıl üstesinden gelinmesi gerektiğinin tartışıldığı bu bölümde, etik açıdan doğru yaklaşımların benimsenmesinin önemi vurgulanmaktadır. Çalışma, halkla ilişkiler alanında çalışanlara kültürel duyarlılık ve çeşitlilik yönetimi konularında yol gösterici olmayı amaçlamaktadır. Küreselleşmenin arttığı günümüzde, başarılı ve etkili halkla ilişkiler stratejileri geliştirebilmek için bu konuların göz ardı edilmemesi gerektiği vurgulanmaktadır. Halkla ilişkilerde kültürel çeşitliliği anlamak ve uygun stratejilerle yönetmek, topluluklar arasında anlayışı artırıcı ve uzlaşmacı bir rol oynamaktadır.

Anahtar Kelimeler: Halkla ilişkiler, kültürel duyarlılık, çeşitlilik yönetimi, stratejik yaklaşım.

CULTURAL SENSITIVITY AND DIVERSITY MANAGEMENT IN PUBLIC RELATIONS: STRATEGIC APPROACHES

Abstract

This study emphasizes the importance of cultural diversity and cultural sensitivity in public relations. It discusses the concept of cultural sensitivity and diversity management in public relations and offers strategic approaches to public relations professionals. In addition, it is emphasized that in today's multicultural societies, public relations should be handled in terms of cultural sensitivity and diversity management. In such environments where individuals from diverse cultural backgrounds coexist, it is underlined that communication strategies should be sensitive to cultural differences. The importance of cultural sensitivity and diversity management in public relations is explained in detail and it is highlighted that ignoring cultural differences can negatively affect the success of public relations activities. The impact of cultural sensitivity and diversity on public relations activities is examined and the contribution of cultural factors to the success of public relations processes is stressed. The importance of training and leadership role of public relations employees on cultural sensitivity and diversity issues is discussed and the importance of increasing the cultural awareness of employees and developing their skills in managing diversity is stated. The final part of the study discusses the ethical dimension of cultural sensitivity and diversity management in public relations. Discussing ethical challenges based on cultural differences and how to overcome them, this chapter highlights the importance of adopting ethically correct approaches. The study aims to provide guidance to public relations professionals on cultural sensitivity and diversity management. In today's world of increasing globalization, it must be noted that these issues are of vital importance to develop successful and effective public relations strategies. Understanding cultural diversity in public relations and managing it with appropriate strategies can increase understanding and reconciliation between communities.

Keywords: Public relations, cultural sensitivity, diversity management, strategic approach.

Giriş

Günümüzde küreselleşme, göç ve teknolojik gelişmeler gibi etmenler dünyanın dört bir yanındaki toplumları bir araya getirmekte ve etkileşimi artırmaktadır. Bu süreçler, farklı kültürlerle mensup bireylerin bir arada yaşadığı çok kültürlü toplumları giderek daha yaygın hale getirmiştir. Bu kültürel çeşitlilik, toplumların kozmopolit yapılarını zenginleştirirken, halkla ilişkiler alanında önemli bir konu olarak karşımıza çıkmaktadır.

Halkla ilişkiler, bireyler, kurumlar ve toplumlar arasındaki etkileşimi ve iletişimi kolaylaştırmak, olumlu ilişkiler inşa etmek ve sürdürmek için stratejik bir disiplindir. Bu disiplinin temel amacı, organizasyonların ve halkın birbirini anlamasını ve etkileşimlerin sorunsuz bir şekilde gerçekleşmesini sağlamaktır. Günümüzde halkla ilişkiler profesyonelleri kültürel çeşitliliğin arttığı toplumlarda çalışırken, kültürel duyarlılık ve çeşitlilik yönetimi konularına odaklanma gerekliliği ile karşı karşıyadır.

1.Çok Kültürlülük, Kültürel Duyarlılık ve Çeşitlilik Yönetimi Kavramı

Çok kültürlülük, aynı coğrafyadaki ortak yaşantı ve inançları olan insanların çoksesli düşünce sistemine sahip olabilecekleri ve farklı değerleri savunabilecekleri düşüncesinin bir ürünü olarak tanımlanmaktadır (Kervan, 2017: 19). Bunun yanında çok kültürlülük, aynı coğrafyada yaşayan farklı kültür ve yaşam biçimlerinin birlikte saygı içinde varoluşu anlamına gelmektedir (Akkaya vd. 2018:312).

Kültürel duyarlılık ise, farklı kültüre sahip insanların birbiriyle olan iletişiminde etkili ve uygun dili destekleyen, kültürler arasındaki farklılıkları anlayıp hoşgörülü tavır sergileyebilecek olumlu davranışları destekleyici bir kabiliyet (Chen, 1997) olarak tanımlanmıştır. Ayrıca kültürel duyarlılığı, kültürlerarası iletişimin bir parçası olarak görüp kültürlerarası farklılıkları anlamada, kabul etmede ve takdir etmede kendi motivasyonunu sağlamak için gerekli olan aktif istek (Bulduk vd. 2017:74) olarak da tanımlamak mümkündür.

Bunun yanında çeşitlilik yönetimi kavramı ise, farklı özelliklere sahip her bir çalışanın kendini değerli hissettiği, yeteneklerini değerlendirdiği ve örgütsel amaçlara katkıda bulunduğunu düşündüğü, birlikte verimli bir şekilde çalışacakları çevre yaratmak (Strachan, vd. 2004) olarak tanımlanmaktadır. Ayrıca çeşitlilik yönetimi, işletmedeki işgücü çeşitliliğinin anlaşıldığı ve değer verildiği, her bir kişinin sahip olduğu yetenekleri tam olarak kullanabileceği bir organizasyon kültürü oluşturma süreci (Danullis ve Dehling, 2004: 21) olarak da ifade edilmektedir.

Halkla ilişkiler, bir organizasyonun hedeflediği toplumsal kesimlerle aktif olarak iletişim kurmak, onlarla etkileşimde bulunmak ve uyum içinde çalışmak için kullanılan bir araçtır

(Kurtuldu ve Poyraz, 2022). Halkla ilişkiler, toplumsal değerleri anlama ve kurumun itibarını korumak için etkili iletişim tekniklerini yoğun olarak kullanır. Kültürel güvenlik ve çeşitlilik yönetimi (kültürel çeşitlilik yönetimi) halkla ilişkilerin dikkate aldığı önemli bir alandır. Çünkü bir kurumun hedef kitlesinin inançları, değerleri, normları, gelenekleri ve günlük yaşam tarzları, halkla ilişkilerin başarısında önemli bir rol oynar (Koçak ve Akdağ, 2021). Halkla ilişkilerin kültürel güvenlik ve çeşitlilik yönetimiyle ilişkisi, toplumların farklı kültürel arka planlarına sahip olduğu günümüzün küresel dünyasında giderek daha önemli hale gelmektedir.

Kültürel duyarlılık, iletişim yoluyla aktarılan bir anlayış olup etkili halkla ilişkiler stratejisi için kültürel farklılıkları anlamak ve saygı duymak önemlidir (Bitirim Okmeydan, 2019). Bunun yanında çeşitlilik yönetimi, kurumların farklı kültürel gruplara mensup insanları hoşgörüyü karşılayarak ve katılımlarını sağlayarak topluluk içinde daha geniş bir kabul ve itibar görmelerine katkıda bulunur (Koçak ve Akdağ, 2021). Çeşitlilik yönetimi, kurumsal düzeyde kültürel farklılıkların anlaşılmasını ve saygı gösterilmesini teşvik ederken aynı zamanda kurumun başarısını ve toplumsal etkisini artırabilmektedir.

Halkla ilişkilerin kültürel güvenlik ve çeşitlilik yönetimiyle ilişkisi toplumun genel çıkarları, ortak hassasiyetleri ve ortak müşteri görüşlerine dayalıdır (Uyanık, 2021). Bu açıdan halkla ilişkiler profesyonelleri toplumun farklı kültürel gruplarını temsil etmek ve etkileşimde bulunmak için çeşitlilik yönetimi ve kültürel hassasiyet stratejilerini kullanırlar (Koçak ve Akdağ, 2021). Böylece kurumlar kendi içinde bulunana topluluklarında daha iyi bir itibar inşa etmeye, etkili iletişim kurmaya ve uzun süreli başarıya ulaşmaya yardımcı olur (Bitirim Okmeydan, 2019). Bu nedenle halkla ilişkiler profesyonelleri kültürel farklılıkları anlamak, saygı duymak ve çeşitlilik yönetimi stratejilerini benimsemek için sürekli olarak kendilerini geliştirmelidirler.

2. Halkla İlişkilerde Kültürel Duyarlılık ve Çeşitlilik Yönetimi

Halkla ilişkiler alanında kültürel duyarlılık, bireylerin ve toplulukların kültürel çeşitliliğini anlamayı ve saygı duymayı içerdiği için önemli bir rol oynar ve bu nedenle halkla ilişkilerde kültürel duyarlılığın önemi tanımlanmalı ve kabul edilmelidir (Koçak ve Akdağ, 2021). Halkla ilişkiler uygulayıcılarının farklı hedef kitlelerle iletişim ve etkileşimlerinde kültürel açıdan duyarlı olma ihtiyacı vardır. Fakat halkla ilişkilerde kültürel duyarlılığın teşvik edilmesini engelleyen zorluklar ve engeller de bulunmaktadır. Halkla ilişkilerin yönetim alanına yönelik tanımlarda genellikle kültürel yönü gözden kaçırılmaktadır. Halkla ilişkiler ve kültür ilişkisine yönelik çalışmaların 2000 li yıllardan sonra yoğunluk kazandığı görülmektedir (Özoran, 2020). Halkla ilişkilerde kültürel duyarlılığın teşvik edilmesini engelleyen zorluklar,

dil engelleri, kültürel ön yargılar ve iletişim eksiklikleri şeklinde sıralanabilir. Ayrıca, kültürel farkındalığın yetersiz olması ve kurum içinde çeşitlilik konusunda yeterli desteğin sağlanmaması da bu engellere dahil olabilir. Bu zorlukların üstesinden gelmek için bir zihniyet değişikliğine ve halkla ilişkiler alanında kültürel duyarlılığı teşvik eden stratejilerin uygulanmasına ihtiyaç vardır.

Halkla ilişkilerde kültürel duyarlılığı artırmak için çeşitli stratejiler belirlemek önemlidir. Her şeyden önce halkla ilişkiler alanında kültürel duyarlılığın önemini vurgulayan eğitim ve öğretim faaliyetleri temel bir stratejik yaklaşım olarak görülebilir (Koçak ve Akdağ, 2021). Bu yaklaşım, uygulayıcıların farklı hedef kitlelerle etkili bir şekilde etkileşim kurmak için gerekli beceri ve bilgileri geliştirmelerine yardımcı olabilir. Bunun yanında, kültürel çeşitlilik ve katılımı örgütsel politika ve uygulamalara dahil etmek, farklı kültürlere değer veren ve saygı duyan bir ortam yaratabilir. Çeşitli araştırmalar yapmak, kültürel eğilimler ve sorunlar hakkında güncel verilere sahip olmak, halkla ilişkiler uzmanlarının farklı kitlelerin ihtiyaç ve beklentilerini daha iyi anlamalarına ve bunlara yanıt vermelerine yardımcı olabilir (Özoran, 2020). Bu stratejileri uygulamak suretiyle halkla ilişkiler, çeşitli paydaşlarla olumlu ilişkileri ve etkili iletişimi teşvik ederek kültürel açıdan daha hassas ve kapsayıcı bir alan haline gelebilir. Çeşitlilik yönetimi, farklı kültürel geçmişlere ve değerlere sahip olan insanların bir araya geldiği bir yapıda etkili iletişim kurmayı ve bilgileri yönetmeyi içerir. Bir halkla ilişkiler profesyonelinin, hedef kitleyle etkili bir iletişim kurabilmesi için inançları, değerleri, normları, gelenekleri ve günlük yaşam tarzlarını anlaması önemlidir (Koçak ve Akdağ, 2021). Halkla ilişkilerde çeşitlilik çok yönlü bir kavram olarak karşımıza çıkar. Temel olarak çeşitlilik yönetimi sayesinde bir organizasyon, farklı kültürel gruplara hitap edebilir ve onların isteklerini daha iyi anlayabilir (Kurtuldu ve Poyraz, 2022). Bu sayede daha etkili bir iletişim ve ilişki kurulmasına imkan tanır. Ayrıca çeşitlilik yönetimi, bir organizasyonun itibarını artırır ve toplumda daha geniş bir kitleye ulaşmasını sağlar.

Halkla ilişkilerde çeşitlilik yönetiminin uygulanmasının bazı zorlukları vardır ve bazı stratejiler uygulamayı zorunlu kılar. Genellikle, kültürel farklılıkların farkında olmak ve bunları anlamak önemli olup araştırmalar yapmak, eğitim almak ve kültürel danışmanlarla çalışmak hedefleri gerçekleştirmek için önemlidir. Çeşitlilik yönetimi için etkili stratejiler geliştirme ve uygulama, halkla ilişkilerin kültürel zorlukları başarılı bir şekilde yönetmesini sağlar (Çelebi, 2019).

2.1. Kültürel Duyarlılık ve Çeşitlilik Yönetiminin Halkla İlişkiler Faaliyetlerine Etkisi

Halkla ilişkiler faaliyetleri kültürel çeşitlilik yönetimi ile başarılı bir şekilde yürütülebilir. Özellikle yerel ve uluslararası halkla ilişkiler faaliyetlerini yürütürken hedef kitle

analizi yapmanın temel nedenlerinden biri de kültürel farklılıkları anlayabilmektir (Koçak ve Akdağ, 2021). Kurumlardaki etkili bir halkla ilişkiler yönetimi, genel anlayış ve faydayı teşvik ederek verdiği mesajlarda kurum ve hedef kitle arasındaki ilişkilere odaklanan bir perspektif sunar (Boztepe, 2013). Bu nedenle kültürel duyarlılık ve çeşitlilik yönetimi, halkla ilişkilerin temel bir bileşeni haline gelmiştir.

Başarının elde edilmesinde hedef kitlenin inançları, değerleri, normları, gelenekleri ve günlük yaşam tarzları gibi unsurların dikkate alınması bu başarının önemli bir kısmını oluşturur (Koçak ve Akdağ, 2021). Kültürel duyarlılık ve çeşitlilik yönetimi anlayışına sahip olmak, halkla ilişkiler kampanyalarının hedef kitleye uygun bir şekilde tasarlanması ve iletişiminin sağlanması için gereklidir (Özoran, 2020).

Halkla ilişkilerin temel amacı, kurumlar ve toplum arasında güven inşa etmek ve etkili iletişim kurmaktır. Bu bağlamda hedef kitlenin kültürel inançları, değerleri, normları, gelenekleri ve günlük yaşam tarzları gibi unsurları dikkate almak, halkla ilişkiler kampanyalarının etkisini artırır ve başarı şansını yükseltir. Kültürel duyarlılık ve çeşitlilik yönetimi, halkla ilişkiler faaliyetlerinin çeşitli kültürel gruplarla daha iyi etkileşim kurmasına ve onlarla uyum içinde çalışmasına yardımcı olur. Hedef kitleye uygun mesajlar ve içerikler oluşturmak iletişimin daha anlamlı ve etkili olmasını sağlar. Aynı zamanda halkla ilişkiler uzmanlarının çeşitli kültürel grupların beklenti ve ihtiyaçlarını anlaması, hatalı yargılardan ve kültürel yanlış anlamalardan kaçınmalarına yardımcı olur.

Ayrıca kültürel duyarlılık ve çeşitlilik yönetimi halkla ilişkilerin topluluklarla daha güçlü bağlar kurmasına ve toplumda daha geniş bir kabul ve itibar elde etmesine katkıda bulunur. Bu, kurumlar için sürdürülebilir bir başarı ve uzun vadeli bir etki yaratma açısından önemlidir. Bunun yanında kültürel çeşitlilik ve duyarlılık, küreselleşen dünyada uluslararası halkla ilişkiler faaliyetlerinin başarılı bir şekilde yürütülmesi için de kritik bir rol oynar.

2.2. Halkla İlişkilerde Kültürel Duyarlılık ve Çeşitlilik Yönetiminde Eğitim ve Liderlik

Halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetimi, eğitim ve öğretim faaliyetleri ile birlikte yürütüldüğünde daha etkili olmaktadır. Halkla ilişkilerde eğitim ve öğretim kültürel, siyasi, ekonomik ve diğer yapılar hakkında bilgi sahibi olmayı içerir ve böylece daha geçerli ve etkili iletişim kurmaya katkı sağlar (Şardağı ve Öztürk, 2018). Halkla ilişkiler uygulamaları iç ve dış hedef kitlelerle iletişim kurmak amacıyla iyi niyetle harekete geçirilen faaliyetlerdir (Bitirim Okmeydan, 2019). Günümüzde hem kamu kurumları hem de özel kurumlar, farklı kültürel geçmişlere sahip hedef gruplarla etkili iletişim kurmak için halkla ilişkilerden yararlanmaktadır (Kurtuldu ve Poyraz, 2022). Bu nedenle kültürel duyarlılık ve çeşitlilik

yönetimi konularını içeren eğitim programlarının halkla ilişkiler eğitim programlarına dahil edilmesi önemlidir (Bitirim Okmeydan, 2019). Bu durum stratejik bir anlayışı gerekli kılar.

Halkla ilişkiler eğitim programlarına kültürel duyarlılık ve çeşitlilik yönetimini dahil etmeye yönelik stratejiler, halkla ilişkiler profesyonellerinin kültürel farklılıkları anlamalarını ve yönlendirebilmelerini sağlamayı hedeflemektedir. Bu stratejiler, kültürel çeşitlilik konusunda bilinçlendirme, kültürel duyarlılık eğitimi, kültürel iletişim becerileri geliştirme gibi unsurlardan yararlanır (Bitirim Okmeydan, 2019). Ayrıca, kültürel çeşitliliklerle ilgili pratik deneyimler sunan saha çalışmaları ve staj programları da bu stratejiler arasında yer alabilir. Böylece halkla ilişkiler profesyonelleri, çeşitli kültürel geçmişe sahip kişilerle etkili iletişim kurabilme becerilerini geliştirebilirler.

Kültürel duyarlılık ve çeşitlilik yönetimi konusunda etkili eğitim programlarına sahip örnek olay incelemeleri diğer kuruluşlar için yol gösterici nitelik taşıyabilir. Bu incelemeler, başarılı halkla ilişkiler stratejileri ve uygulamalarıyla ilgili gerçek dünya örneklerini içerir. Halkla ilişkiler profesyonellerine kültürel zeka ve çeşitlilik yönetimi konusunda başarılı olabilmeleri için pratik bilgiler sunabilir. Halkla ilişkiler, eğitim programlarını kültürel duyarlılık ve çeşitlilik yönetimi ile ilgili yapılan araştırma sonuçlarına, örnek olay incelemelerine ve gerçek dünya deneyimlerine dayandırmalı ve uygulamaları pratik öğelerle zenginleştirmelidir.

Etkili bir liderlik, halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetimini geliştirmek için önemlidir. Kültürel farklılıkları anlamak, çeşitli gruplara saygı göstermek ve onları kapsayıcı bir dil kullanmak, halkla ilişkilerin başarılı bir şekilde gerçekleştirilmesinde kritik bir role sahiptir. Bu liderlik yaklaşımı, halkla ilişkilerin topluluklarla güçlü ve olumlu bağlar kurmasına, ihtiyaçları anlayışla karşılmasına ve toplumun çeşitli kesimlerine etkili bir şekilde ulaşmasına yardımcı olur. Ayrıca liderlerin kültürel duyarlılık ve çeşitlilik yönetimi konusunda örnek olmaları, halkla ilişkiler çalışanlarının da aynı değerlere sahip olmalarını teşvik eder ve bu da kurumun itibarını ve toplum nezdindeki algısını olumlu yönde etkiler. Bu nedenle liderlerin kültürel duyarlılık ve çeşitlilik konusunda bilinçli olmaları ve bu değerleri kurum kültürüne yansıtılmaları başarılı halkla ilişkiler stratejilerinin temelini oluşturur.

Halkla ilişkilerde etkili liderlerin belirli niteliklere sahip olması da son derece önemlidir. İyi bir lider, kültürel farklılıkları anlamak ve değer vermek için açık bir zihniyete sahip olmalıdır. Ayrıca iletişim becerileri güçlü olmalı ve çeşitli gruplar arasında etkili iletişim kurabilmelidir. Liderlik takım çalışması ve iş birliği becerilerini gerektirir çünkü kültürel duyarlılık ve çeşitlilik yönetimi, farklı perspektifleri bir araya getirmek ve ortak bir amaca ulaşmak için ortak çabaya dayanır.

Kültürel duyarlılık ve çeşitlilik konusunda güçlü liderliğe sahip olan kuruluşlar başarılı yönetim örnekleri sunmaktadırlar. Araştırmalar kültürlerarası iletişim politikalarına duyarlı bir yönetim profili oluşturmanın etkili ve sürdürülebilir bir halkla ilişkiler stratejisi olduğunu göstermektedir. Farklı kültürler arasında etkili iletişim tekniklerini uygulayan ve çeşitli perspektifleri içeren kuruluşlar daha kapsayıcı ve başarılı halkla ilişkiler faaliyetleri yürütmektedir (Bitirim Okmeydan, 2019). Bunun yanında kültürel duyarlılık ve çeşitlilik yönetiminde liderlerin rolü, kurum içinde kültürel farkındalığı teşvik etmek ve çeşitliliği desteklemektir. Başarılı bir lider, çalışanlara kültürel çeşitliliği kabul eden bir ortam yaratır ve herkesin görüşlerine saygı duymasını sağlar. Aynı zamanda liderler farklı kültürlerden gelen çalışanların becerilerini ve deneyimlerini takdir eder ve onlara eşit fırsatlar sunar. Bu, çalışanların motivasyonunu artırır, işbirliğini teşvik eder ve kurumun çeşitli bakış açılarından faydalanmasını sağlar.

Etkili liderler aynı zamanda kültürel farklılıklara duyarlı bir iletişim ve karar verme süreci oluştururlar. Karar alma süreçlerine farklı kültürlerden gelen çalışanları dahil eder ve onların perspektiflerini dikkate alır. Böylece halkla ilişkiler stratejileri daha kapsayıcı ve topluluklarla uyumlu bir şekilde geliştirilir. Liderler ayrıca, halkla ilişkiler projelerinde kültürel açıdan hassas ve uygun mesajlar kullanmak suretiyle iletişim kurmaya özen gösterirler böylece topluluklarda daha iyi bir anlayış oluşturulur ve güven inşa edilir.

Ayrıca liderlerin kültürel duyarlılık ve çeşitlilik konusunda kendilerini sürekli geliştirmeleri de önemlidir. Eğitim ve bilinçlendirme programlarına katılarak kültürel farkındalıklarını artırabilirler ve çeşitlilik yönetimi becerilerini geliştirebilirler. Bu, liderlerin daha etkili ve başarılı halkla ilişkiler stratejileri geliştirmesine yardımcı olur ve kurumun kültürel açıdan zengin ve çeşitli bir çalışma ortamı oluşturmasına katkı sağlar.

3. Halkla İlişkilerde Kültürel Duyarlılık ve Çeşitlilik Yönetiminde Etik Konular

Halkla ilişkilerde kültürel sorumluluklar etik zorlukları da beraberinde getirmektedir. Kültürel duyarlılık, farklı kültürel değerlere saygı gösterme ve bu değerlere uygun iletişim kurma becerisi gerektirir. Halkla ilişkiler uygulayıcıları farklı kültürel gruplarla etkileşim halindeyken kültürel duyarlılık konusunda dikkatli olmalı ve etik sorunlarla karşılaşmamak için azami özen göstermelidirler (Koçak ve Akdağ, 2021). Kurumların halkla ilişkiler anlayışı içerisindeki halkla bütünleşme misyonu, kültürel farklılıkları anlama ve bu farklılıklara uygun iletişim kurma yolunu geliştirme becerisini içermelidir (Özoran, 2020). Bu sayede kurumun etik sorunlarla başa çıkma yeteneği artacak ve daha etkili bir iletişim kurma imkanı yaratılmış olacaktır (Bitirim Okmeydan, 2019).

Halkla ilişkilerde çeşitlilik yönetimi etik hususları içeren önemli bir konudur. Bu yönetim farklı kültürel, etnik ve sosyal grupların bir arada çalıştığı ve etkileşimde bulunduğu adil ve eşitlikçi bir çalışma ortamı sağlamayı hedefler. Halkla ilişkiler faaliyetleri çeşitlilik yönetimi çerçevesinde herkesin haklarına saygı gösterme, tüketiciyi yanıltmama ve topluma fayda sağlama gibi etik ilkeleri benimsemelidir. Bu şekilde halkla ilişkiler çalışmaları çeşitliliği destekleyen, etik değerlere saygı gösteren ve toplumsal uyumu güçlendiren bir şekilde gerçekleştirilebilir.

Kültürel duyarlılık ve çeşitlilik yönetimindeki etik gereksinimlerin ele alınması için stratejiler geliştirmek önemlidir. Halkla ilişkiler kültürel yapılar ve çeşitlilik konusunda duyarlı bir iletişim stratejisi oluşturmalı ve bu stratejiyi uygulamak için eğitim programlarından yararlanmalıdır. Bu şekilde halkla ilişkiler çalışmaları etik değerlere uygun, kültürel olarak duyarlı ve toplumun çeşitliliğini destekleyen bir şekilde yürütülebilir.

Halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetimi konusunda etik sorunlardan bazıları aşağıdaki şekilde ifade edilebilir.

Stereotip ve Önyargılar: Halkla ilişkiler çalışmalarında farklı kültürel gruplara yönelik stereotip ve önyargılar kullanılması etik bir sorun teşkil eder. Stereotipler, bir kültürü veya grubu yanlış ve genellemeci bir şekilde temsil etmeye yönelik önyargılı inançlardır. Bu tür yaklaşımlar toplumu yanıltabilir ve çeşitliliğe zarar verebilir.

Kültürel Sapmalar: Bir organizasyonun kültürel farkındalığı yeterli düzeyde olmadığından kültürel olarak uygun olmayan mesajlar ve uygulamalar ortaya çıkabilir. Bu durum halkla ilişkiler faaliyetlerinin başarısını olumsuz etkileyebilir ve topluluklarla arasındaki ilişkileri zedeleyebilir.

Dil ve Görsel Hatalar: Çeşitli kültürel gruplara yönelik iletişimde dil ve görsel materyallerin yanlış veya hassas bir içeriğe sahip olması etik problemlere yol açabilir. Bu tür hatalar kurumun itibarını zedeleyebilir ve güvenilirliğini sarsabilir.

Kültürel İhlaller: Halkla ilişkiler faaliyetlerinde, bir kültürün değerlerine veya geleneklerine saygısızlık edecek veya kültürel olarak uygun olmayan mesajlar kullanılması etik bir ihlal olarak değerlendirilir.

Eşitsizlik ve Ayrımcılık: Halkla ilişkiler çalışmalarında, çeşitli gruplar arasında ayrımcılık yapacak veya bir grup lehine diğerini ihmal edecek şekilde eşitsizlik yaratacak uygulamaların yer alması etik bir sorun olabilir.

Kültürel İstismar: Halkla ilişkiler faaliyetlerinde bir kültürü veya kültürel sembolleri maddi kazanç sağlamak veya özendirici amaçlarla istismar etmek, etik açıdan ciddi bir problem oluşturabilir.

Bu nedenle, halkla ilişkiler profesyonelleri kültürel duyarlılık ve çeşitlilik yönetimi konusunda dikkatli olmalı ve etik değerlere uygun iletişim stratejileri geliştirmeye özen göstermelidir. Toplumun çeşitliliğini anlamak, saygı göstermek ve farklı kültürel gruplarla etkileşimde adil ve eşitlikçi bir yaklaşım benimsemek etik ve başarılı bir halkla ilişkiler çalışması için önemlidir.

Sonuç

Bu çalışma, günümüzde küreselleşme, göç ve teknolojik gelişmeler gibi etmenlerin dünyanın dört bir yanındaki toplumları bir araya getirerek etkileşimi artırdığı ve çok kültürlü toplumları giderek daha yaygın hale getirdiği gerçeğine dikkat çekmektedir. Bu süreçler toplumların kozmopolit yapılarını zenginleştirirken, halkla ilişkiler alanında da önemli bir konu olarak karşımıza çıkan kültürel çeşitliliği vurgulamaktadır. Yapılan çalışma halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetiminin öne çıkan bir konu olduğunu açıkça ortaya koymaktadır. Çok kültürlülük, halkla ilişkiler çalışmalarının temelinde yer alan ve üzerinde durulması gereken bir kavramdır. Halkla ilişkiler profesyonelleri, farklı kültürlere mensup bireylerin bir arada yaşadığı toplumlarda kültürel duyarlılık ve çeşitlilik yönetimi perspektifinden çalışmalarını sürdürmelidirler. Çalışma kültürel duyarlılığın ve çeşitliliğin, halkla ilişkiler faaliyetleri üzerinde belirgin bir etkisi olduğunu göstermektedir. Bu etkinin müşteri ilişkilerinden medya iletişimine ve kriz yönetimine kadar halkla ilişkiler süreçlerini kapsadığı anlaşılmaktadır. Kültürel faktörlerin bu süreçlerde başarı üzerindeki olumlu etkisi, halkla ilişkilerin güçlü ve sürdürülebilir ilişkiler inşa etme amacını desteklemektedir.

Aynı şekilde halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetiminin, eğitim ve liderlik ile desteklenmesinin önemi de anlaşılmaktadır. Halkla ilişkiler çalışanlarının kültürel farkındalığını artırmak için eğitime ve liderlik rolünü anlamak başarılı iletişim stratejilerinin geliştirilmesine katkı sağlamaktadır. Eğitim ve liderlik, halkla ilişkiler alanında çalışanların kültürel farkındalığını artırmalarına ve çeşitliliği etkin bir şekilde yönetmelerine yardımcı olmaktadır.

Halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetiminin etik boyutu ise halkla ilişkiler profesyonellerinin karşılaşılabilecekleri çeşitli etik zorluklarla başa çıkarken topluluklar arasında sağlam ve saygın ilişkiler inşa etmeleri açısından büyük önem taşır. Etik değerlere uygun davranışlar sergilemek, profesyonellerin güven ve itibar kazanmalarını ve uzun vadeli başarılı ilişkiler kurmalarını sağlar.

Halkla ilişkiler alanında çalışan profesyoneller, çeşitli kültürel gruplarla etkileşim halinde olabilirler ve bu süreçte etik açıdan hassas durumlarla karşılaşabilirler. Örneğin, farklı kültürlerin değerleri, normları ve iletişim tarzları arasında farklılıklar olabilir ve bu durum yanlış anlamalara ve olumsuz algılara yol açabilir. Bu nedenle halkla ilişkiler profesyonelleri, kültürel farklılıklara duyarlılık göstererek iletişim süreçlerini doğru ve saygın bir şekilde yönetmelidirler.

Ayrıca, halkla ilişkilerde kültürel duyarlılık ve çeşitlilik yönetimi, kamuya hizmet veren kurumlar veya şirketler için toplum nezdinde bir ahlaki sorumluluk taşır. Toplumlardaki kültürel çeşitliliği ve farklılıkları anlamak buna saygı göstermek ve uygun bir şekilde yönetmek, profesyonellerin etik standartlara uygun hareket etmelerini sağlar. Bu durum, kurumların itibarını korumak ve toplumla güvene dayalı ilişkiler inşa etmek için hayati önem taşır.

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**A SPECTROSCOPIC ANALYSIS OF THE [(Tmeda)Zn(acac)₂] COMPOUND USING
THEORETICAL METHOD**

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Abstract

[(TMEDA)Zn(acac)₂], (tetramethylethylenediamine)zincbis(acetylacetonate), has a crystal structure consisting of mixed complexes and contains two types of ligands. In this study, (TMEDA)Zn(acac)₂, vibrational frequency analysis and NMR chemical shifts are studied using DFT method. Studied compound is C₁₆H₃₀N₂O₄Zn chemical formula. The geometry optimization and all calculations is computed with DFT-B3LYP/631G(d,p) basis set. The comparison between computed and experimental data in the crystal structure shows a good agreement.

Keywords: Zinc, NMR, vibration, DFT.

Introduction

The metal complexes involving the pentane-2,4-dionate (or acetylacetonate = acac) ligand has been the subject of numerous studies [1,2,3,4]. Tetramethylethylenediamine (TMEDA) is widely used as a ligand or cosolvent in organic syntheses, particularly when organolithium reagents are involved. It is known from the literature that TMEDA increases product yields.

In this study we analyzed (tetramethylethylenediamine)zincbis(acetylacetonate), [(TMEDA)Zn(acac)₂], compound consisting of mixed complexes and contains two types of ligands [5].

We present DFT calculations on geometry parameters (bond length and bond angle), vibrational frequency analysis and NMR chemical shifts of (TMEDA)Zn(acac)₂ compound.

METHODS

Gaussian 09 software package has been used to perform geometry optimizations and total energy calculations by DFT (B3LYP) method with the 631G(d,p) basis set [6]. Visualization of the structure and the analysis of the outputs have been carried out with Gauss-View software [7]. ¹H and ¹³C NMR chemical shifts are calculated by using GIAO method with CDCl₃ solvent. The calculated harmonic vibrational frequencies were scaled by 0.96 for B3LYP/6-31G(d,p) level [8].

RESULTS AND DISCUSSION

Structural Properties

(TMEDA)Zn(acac)₂, studied compound is C₁₆H₃₀N₂O₄Zn chemical formula. The initial molecular geometry of ligand compound was taken cif [5] and figured by using Gauss-View. We figure out geometry optimizations as seen Fig. 1.

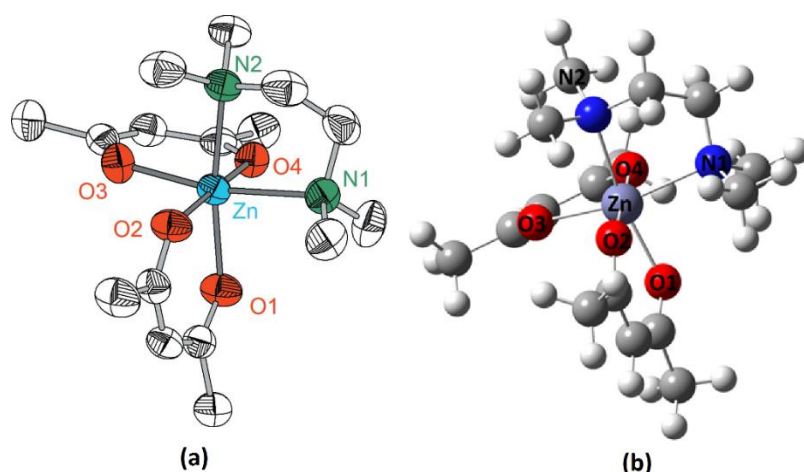


Fig. 1. (a) Molecular structure of complex 2 showing the labeling scheme. Displacement ellipsoids drawn at 50% probability level, H atoms are omitted [5]. b) optimized structure of the C₁₆H₃₀N₂O₄Zn compound is shown.

Optimized energy values of studied compound is found -76667 eV for DFT(B3LYP/631G(d,p) method. The optimized bond length and bond angles were obtained by B3LYP method combining with 6-31G(d,p) basis set for title compound were listed in Table 1. These values were in agreement with the experiment values [5]. As can be seen, most of the bond distances are slightly longer than the experimental distances.

Table 1. Comparative bond lengths and bond angles.

Parameters	Exp [Fe].	B3LYP	Parameters	Exp [11].	B3LYP
<i>Bond lengths (Å)</i>			<i>Bond angles (°)</i>		
Zn—O1	2.0876 (10)	2.05861	O2—Zn—O3	95.84 (4)	92.27062
Zn—O2	2.0497 (10)	2.06723	O2—Zn—O4	174.85 (4)	179.53121
Zn—O3	2.0970 (10)	2.05864	O2—Zn—N1	91.04 (5)	93.36004
Zn—O4	2.0520 (9)	2.06727	O2—Zn—N2	84.18 (4)	86.99581
Zn—N1	2.3021 (12)	2.29781	O3—Zn—O4	86.00 (4)	87.43755
Zn—N2	2.3184 (12)	2.29754	O3—Zn—N1	170.93 (4)	168.05342
O1—Zn—O2	85.58 (4)	87.43950	O3—Zn—N2	95.43 (4)	89.58851
O1—Zn—O3	93.98 (4)	101.19464	O4—Zn—N1	86.66 (4)	86.99407
O1—Zn—O4	99.11 (4)	92.25673	O4—Zn—N2	90.87 (4)	93.36827
O1—Zn—N1	92.44 (4)	89.58140	N1—Zn—N2	79.35 (4)	80.20036
O1—Zn—N2	166.73 (4)	168.04983			

Vibrational Properties

The IR spectra contain some characteristic bands of the stretching vibrations of the C-H, Zn-O, Zn-C, C=O, C=C, C-C, Zn-N and C-N groups. In Table 2, especially experimental C-N and carbonyl group (C=O) values are agree theoretical values.

Table 2. Selected some experimental Ref.[5] and calculated vibrational frequencies (cm⁻¹).

Assignments ^a	Exp. [5]	B3LYP scaled	B3LYP unscale
ν (C-H) s	—	3082	3210
ν (C-H) as	3071	3081	3209
ν (C-H ₃)as	3001	3016	3142
ν (C-H ₂) as	2975	3001	3126
ν (C-H ₂)s + ν (C-H ₃) s	2881	2874	2994
ν (C=O)	1615	1599	1666
ν (C=C)	1515	1501	1564
γ (C-H ₃)	1469	1477	1539
α (C-H ₃)	1455	1433	1493
ω (C-H ₃)	1390	1390	1448
ν (CCC)+ β (CCC)	1252	1241	1293
γ (C-H)	1190	1181	1230
γ (C-H)	1128	1112	1158
ν (C-N)	1032	1039	1082
ν (C-N)	936	934	973
ω (C-H ₂)	754	752	783
γ (C-O)	649	625	651
τ (C-C-O)	543	549	572

^a ν , stretching; α , scissoring; δ , twisting; γ , rocking; ω , wagging; τ , torsion; β , in-plane bending; s, symmetric; as, asymmetric.

Electronic Properties

The energy gap between HOMO and LUMO is a critical parameter in the determination of molecular electrical transport properties. An electronic system with a larger energy difference between HOMO–LUMO orbital (E_{gap}) should be less reactive than one having a smaller gap [9]. The energy gaps (E_{gap}) is calculated 4.999 eV for DFT method (Fig. 2 (a)).

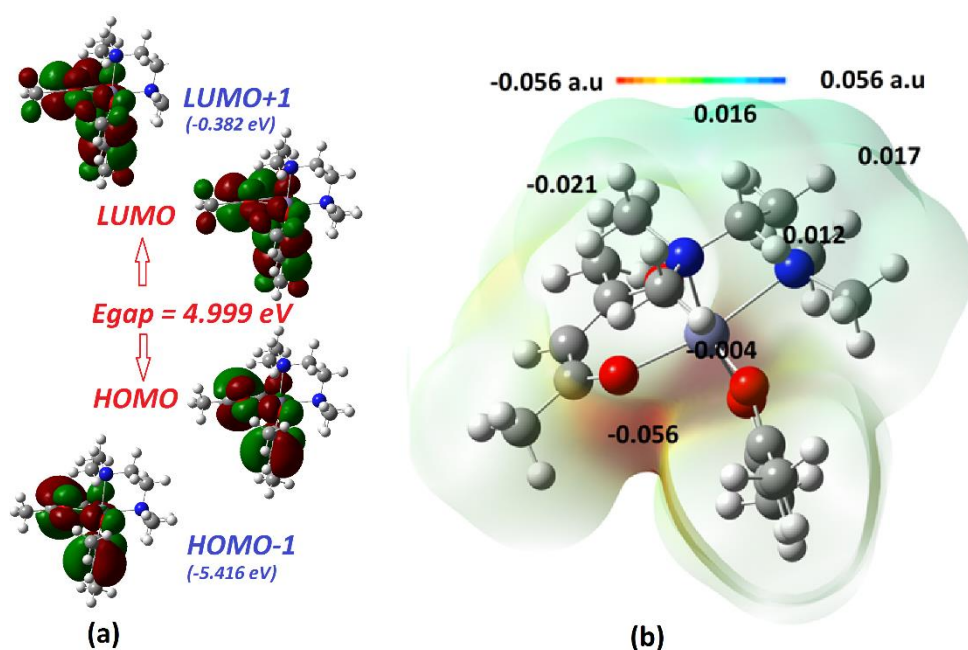


Fig. 2. (a) FMO analysis and (b) total electron density mapped of the compound.

I is the ionization potential, A is the electron affinity, χ is electronegativity. It should be noted that, as the electronic chemical potential (μ) difference increases the global electron density transfer will have a lower polar character. The resistance of a molecule to exchange electron density with the environment is defined as the chemical hardness(η).

Table 3. The measured electronic parameters of molecules.

Parameters (eV)	B3LYP
E_{LUMO}	-0.391
E_{HOMO}	-5.390
$\Delta E = E_{LUMO} - E_{HOMO}$	4.999
$I = -E_{HOMO}$	5.390
$A = -E_{LUMO}$	0.391
$\chi = (I+A)/2$	2.891
$\mu = -\chi$	-2.891
$\eta = (I-A)/2$	2.499
$S = 1/2\eta$	0.200
$w = \mu^2 / 2\eta$	1.672
μ_D (Debye)	2.6359

A large HOMO–LUMO gap (ΔE_{H-L}) indicates a harder molecule and small a ΔE_{H-L} indicates a softer molecule. It is possible to relate the stability of the molecule to η , which indicates that the molecule with least ΔE_{H-L} means it is more reactive and less stable (as seen Table 3).

Molecular electrostatic potential (MEP) surface helps to predict the reactivity of molecules in electrophilic and nucleophilic reactions and hydrogen bonding interactions. It also provides

visual understanding of relative polarity of the molecule. The electrostatic potential increases in the order red < orange < yellow < green < blue [10]. As seen Fig 2. (b), negative region is mainly localized over the oxygen atoms. The maximum positive region is localized on the hydrogen atoms of TMEDA indicating a possible site for nucleophilic attack.

3.4. NMR spectra

Gauge including atomic orbital (GIAO) ^1H and ^{13}C chemical shifts were calculated using the DFT/B3LYP method with 6-31G(d,p) basis set. The chemical shifts were converted into the TMS scale by subtracting the calculated absolute chemical shielding of TMS. The values of ^1H and ^{13}C are 31.76 and 191.81 ppm for B3LYP/6-31G(d,p) respectively [11]. The calculated results were given in Table 4 along with the experimental chemical shift values [5].

^1H chemical shift values are calculated to be 1.16–5.19 ppm at B3LYP/6-31G(d,p) level, while the experimental results are observed to be 1.85–5.15 ppm. The (CH₃)₂N signals were observed to be 2.31 ppm. The methyl with oxygen of the compound (CH₃C(O)) gave a singlet at 1.85 ppm. This was calculated nearly 1.85 ppm at B3LYP level. respectively.

Table 4. ^1H and ^{13}C chemical shift values

^1H	Atom	Exp.	B3LYP	^{13}C	Atom	Exp.	B3LYP
		(Fe)	(scaled 31,76)			(Fe)	(scaled 191,81)
C(O)CHC(O)	H14,H26	5.15	5.21	C(O)CHC(O)	C13, C25	98.4	98.23,98.22
	H9-H11	1.85	1.9,1.43,1.74		C8, C16	28.3	28.3,28.43
CH3C(O)	H17-H19	1.85	1.98,1.71,1.47	CH3C(O)	C20	28.3	28.3
	H21-H23	1.85	1.9,1.74,1.43		C28	28.3	28.43
	H29-H31	1.85	1.98,1.47,1.71	Me2N-CH2	C32, C50	56.5	55.28,47.55
Me2N-CH2	H33,H34	2.49	3.1,1.89	(CH3)2N)	C38, C42	46.6	47.54,43.64
	H36,H37	2.49	3.1,1.89		C46, C50	46.6	43.65,47.55
(CH3)2N)	H39-H41	2.31	3.53,2.76,1.69	C(O)	C12	190.9	183.21
	H43-H45	2.31	1.22,2.22,2.92		C15	190.9	181.31
	H47-H49	2.31	2.92,1.22,2.21		C24	190.9	183.21
	H51-H53	2.31	1.69,3.53,2.76		C27	190.9	181.31

^{13}C NMR spectra of the compound show signal at 190.9 ppm due to the C12, C15, C24 and C27 atoms of the C-O group. This signals were calculated at 183.21, 181.31, 183.21 and 181.31 ppm. As can be seen from Table 4 the theoretical ^1H and ^{13}C chemical shift results for the title compound are generally closer to the experimental data.

4. CONCLUSION

The (TMEDA)Zn(acac)₂ compound investigated. The calculated geometric parameters are good agreement with the experimental data. Detailed vibrational assignments of the title compound are ascribed to their structural vibrations, which show that the theoretical harmonic frequencies are in good agreement with their observed spectral features. The MEP map indicates that hydrogen atoms is positive while the O atom is the negative. These sites give information about the region from where the molecule can have intermolecular interactions and metallic bonding. NMR properties are studied by DFT calculations.

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**ELECTRONIC AND SPECTROSCOPIC PROPERTIES OF THE
(TETRAMETHYLETHYLENEDIAMINE)IRONBIS (ACETYLACETONATE)
COMPOUND WITH DFT METHOD**

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Abstract

(TMEDA)Fe(acac)₂, optimized geometry, electronic and IR properties are studied using quantum mechanical methods. Studied compound is C₁₆H₃₀FeN₂O₄ chemical formula. Optimized energy value (-62638 eV), HOMO (E_{HOMO}= -3.78 eV) and LUMO (E_{LUMO}= -0.25 eV) energies are also performed. The HOMO–LUMO gap (ΔE_{H-L}) is found 3.53 eV. Considering the chemical hardness, small HOMO–LUMO gap means a soft molecule and large ΔE_{H-L} means a hard molecule.

Keywords: Iron, IR, DFT, electronic.

Introduction

Tetramethylethylenediamine (TMEDA) serves as an inexpensive and easily removable ligand in the iron-catalyzed coupling of alkyl Grignard reagents and activated aryl chlorides. The use of TMEDA allows for low ligand and iron catalyst loading as well as an increased reaction concentration and an ambient reaction temperature on a mole scale. There is intense interest in metal complexes containing the pentane-2,4-dionate (or acetylacetonate = acac) ligand. [1,2,3,4]. Pentane-2,4-dionate (acac) and ethylenediamine derivatives are amongst the most widely used chelate ligands in transition metal chemistry. The crystal structures of mixed complexes [(TMEDA)Fe(acac)₂] (tetramethylethylenediamine)ironbis(acetylacetonate) containing both types of ligands has been reported for Fe metal [5]. In this study, the structural properties and vibration values of (TMEDA)Fe(acac)₂ compound, such as bond length and bond angles, were examined by DFT.

METHODS

Gaussian 09 software package has been used to perform geometry optimizations and total energy calculations by DFT (B3LYP) method with the 631G(d,p) basis set [6]. Visualization of the structure and the analysis of the outputs have been carried out with Gauss-View software [7]. The calculated harmonic vibrational frequencies were scaled by 0.96 for B3LYP/6-31G(d,p) level [8].

RESULTS AND DISCUSSION

Structural Properties

Studied compound, (TMEDA)Fe(acac)₂, is C₁₆H₃₀FeN₂O₄ chemical formula. The initial molecular geometry of ligand compound was taken cif [5] and figured by using Gauss-View. We figure out geometry optimizations as seen Fig. 1. Optimized energy values of studied compound is found -62638 eV for DFT(B3LYP/631G(d,p) method.

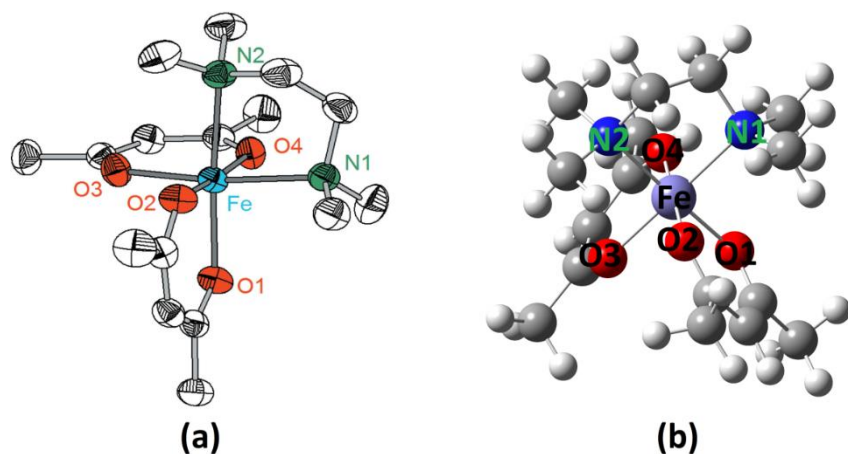


Fig. 1. (a) Molecular structure of complex 2 showing the labeling scheme. Displacement ellipsoids drawn at 50% probability level, H atoms are omitted [5] and b) optimized structure of the C₁₆H₃₀FeN₂O₄ compound is shown.

The optimized bond length, bond angles and dihedral angles were obtained by same method for title compound were listed in Table 1. These values were in agreement with experimental values [5]. As can be seen, most of the bond distances are slightly longer than the experimental distances. Comparing the experimental and calculated bond lengths for the molecule, the theoretical values bigger than experimental values.

Table 1. Comparative bond lengths and bond angles.

Parameters	Exp [5].	B3LYP	Parameters	Exp [5].	B3LYP
<i>Bond lengths (Å)</i>			<i>Bond angles (°)</i>		
Fe—O1	2.0876 (10)	1.93811	O2—Fe—O3	95.84 (4)	86.88828
Fe—O2	2.0497 (10)	1.95124	O2—Fe—O4	174.85 (4)	179.95157
Fe—O3	2.0970 (10)	1.93807	O2—Fe—N1	91.04 (5)	91.98781
Fe—O4	2.0520 (9)	1.95125	O2—Fe—N2	84.18 (4)	87.97737
Fe—N1	2.3021 (12)	2.11772	O3—Fe—O4	86.00 (4)	93.15086
Fe—N2	2.3184 (12)	2.11767	O3—Fe—N1	170.93 (4)	178.26418
O1—Fe—O2	85.58 (4)	93.14692	O3—Fe—N2	95.43 (4)	91.94464
O1—Fe—O3	93.98 (4)	89.43276	O4—Fe—N1	86.66 (4)	87.97240
O1—Fe—O4	99.11 (4)	86.88211	O4—Fe—N2	90.87 (4)	91.99272
O1—Fe—N1	92.44 (4)	91.95084	N1—Fe—N2	79.35 (4)	86.69145
O1—Fe—N2	166.73 (4)	178.26821			

Vibrational Properties

The IR spectra contain some characteristic bands of the stretching vibrations of the C-H, Fe-O, Fe-C, C=O, C=C, C-C, Fe-N and C=N groups. Calculated FT-IR spectra are presented in Fig. 2. For comparison, scaled theoretical and experimental FT-IR wavenumbers are summarized in Table 2 along with detailed vibrational assignments. The calculated IR intensities, the theoretically computed wavenumbers matched well with the experimental ones. In Table 2, especially experimental C-N and carbonyl group (C=O) values are agree theoretical values.

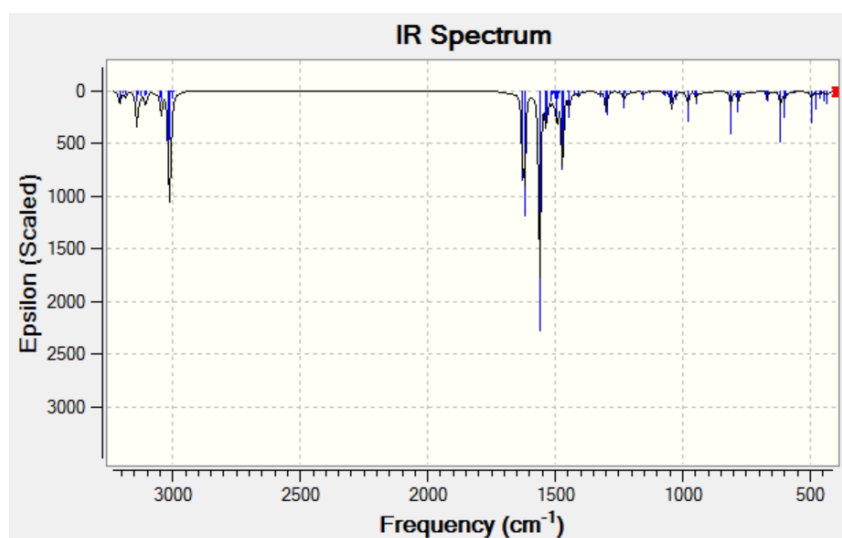


Fig. 2. Calculated theoretical vibrational spectrum in DFT.

Table 2. Selected some experimental [5] and calculated vibrational frequencies (cm⁻¹).

Assignments ^a	Exp. [5]	B3LYP scaled	B3LYP unscale
ν (C-H) s		3080	3208
ν (C-H) as	3074	3080	3208
ν (C-H ₃)as		3016	3142
ν (C-H ₂) as	3001	3001	3126
ν (C-H ₂)s + ν (C-H ₃) s	2869	2894	3015
ν (C=O)	1583	1563	1628
ν (C=C)	1510	1499	1561
γ (C-H ₃)	1455	1468	1529
α (C-H ₃)	1411	1431	1491
ω (C-H ₃)	1382	1386	1444
ν (CCC)+ β (CCC)	1256	1249	1301
γ (C-H)	1188	1180	1229
γ (C-H)	1127	1107	1153
ν (C-N)	952	939	978
ν (C-N)	793	778	810
ω (C-H ₂)	762	751	782
γ (C-O)	583	577	601
τ (C-C-O)	543	539	561

^a ν , stretching; α , scissoring; δ , twisting; γ , rocking; ω , wagging; τ , torsion; β , in-plane bending; s, symmetric; as, asymmetric

4.1. Electronic Properties

Frontier molecular orbitals (FMO), represented with High Occupation Molecular Orbital (HOMO) and Light Unoccupation Molecular Orbital (LUMO), play an interesting role in describing physical and chemical activities of molecules. HOMO–LUMO analysis helps to elucidate charge transfer occurring in the molecule. Compounds containing small energy gap ($E = E_{\text{HOMO}} - E_{\text{LUMO}}$) present higher chemical reactivity, more polarized and low kinetic stability, and vice versa for compounds possess high energy gap [9,10].

The energy value of the band gap is calculated as $E = E_{\text{HOMO}} - E_{\text{LUMO}} = -3.53 \text{ eV}$, this means that the compound has quite stable feature [11]. As seen Fig. 3, green and red colors distributions signify negative and positive phase in molecular orbital wave function, respectively [12].

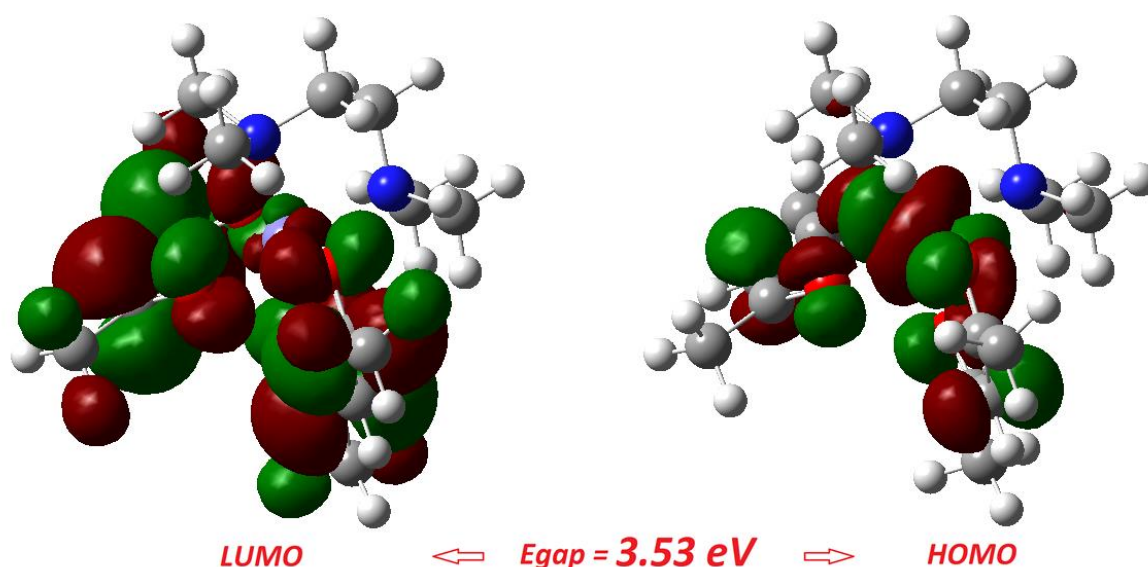


Fig. 3. FMO of the compound.

An electronic system with a larger energy difference between HOMO–LUMO orbital (E_{gap}) should be less reactive than one having a smaller gap [10]. Optimized energy value (-62638 eV), HOMO ($E_{\text{H}} = -3,78 \text{ eV}$) and LUMO ($E_{\text{L}} = -0,25 \text{ eV}$) energies are also performed. The HOMO–LUMO gap ($\Delta E_{\text{H-L}}$) is found $3,53 \text{ eV}$ (Fig. 3). Considering the chemical hardness, small HOMO–LUMO gap means a soft molecule and large $\Delta E_{\text{H-L}}$ means a hard molecule.

The ionization potential (I), the electron affinity (A), electronegativity (χ), chemical potential (μ), chemical hardness (η), softnes (s), electrophilicity index (w) and dipol moment (μ_{D}) values is calculated using HOMO and LUMO energies (as seen Table 3). A large HOMO–LUMO gap ($\Delta E_{\text{H-L}}$) indicates a harder molecule and small a $\Delta E_{\text{H-L}}$ indicates a softer molecule.

Table 3. The measured electronic parameters of molecules.

Parameters (eV)	B3LYP	Parameters (eV)	B3LYP
E_{LUMO}, E_{HOMO}	-0.25, -3.78	$\mu = -\chi$	-2.015
$\Delta E = E_{LUMO} - E_{HOMO}$	3.53	$\eta = (I-A)/2$	1.765
$I = -E_{HOMO}$	3.78	$S = 1/2\eta$	0.283
$A = -E_{LUMO}$	0.25	$w = \mu^2/2\eta$	1.150
$\chi = (I+A)/2$	2.015	μ_D (Debye)	2.6359

CONCLUSION

In this study the (TMEDA)Fe(acac)₂ compound characterized theoretically. The calculated geometric parameters are good agreement with the experimental data. Detailed vibrational assignments of the title compound are ascribed to their structural vibrations, A good agreement between experimental and calculated vibrations normal modes has been found.

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TRANSGENİK BİTKİLER

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Özet

Transgenik bitkiler, gen teknolojisi ile bir organizmadan diğer organizmalara istenilen özelliği ifade eden genin aktarılması olarak ifade edilmektedir. Bu yöntemle hastalık ve zararlılara dayanıklı, kaliteli ve verimli bitkiler elde etmek için çalışmalar yapılmaktadır. Bitkiler üzerinde yapılan bu çalışmaları destekleyen, çalışmalara karşı çıkan veya tarafsız kalan farklı görüşler ortaya çıkmıştır. Tartışmaların günümüzde de devam ettiği transgenik bitkiler hızla gelişmeye devam etmektedir. 1996 yılında 1,7 milyon hektar alanla başlayan transgenik bitki tarımı 2017 yılında 190 milyon hektar alana kadar çıkmıştır. Gelecekte daha da artacağı tahmin edilmektedir. Diğer taraftan transgenik bitki ve ürünlerinin avantajları ve risklerinin bütün insanlığı ve çevreyi etkileyeceği düşünüldüğünde risk araştırması yapılarak, kamuoyuna bilimsel araştırmalar sonucu hakkında bilgi verilmesi gereklidir. Bu bildiride transgenik bitkiler geçmişten günümüze değerlendirilerek avantaj ve riskleri hakkında bilgi verilmektedir.

Anahtar Kelimeler: Transgenik bitki, gen teknolojisi, modern ıslah

TRANSGENIC PLANTS

Abstract

Transgenic plants are defined as the transfer of the gene expressing the desired feature from one organism to other organisms through gene technology. With this method, studies are carried out to obtain quality and productive plants that are resistant to diseases and pests. Different opinions have emerged that support, oppose or remain neutral regarding these studies on plants. Transgenic plants, where discussions continue today, continue to develop rapidly. Transgenic plant farming, which started with an area of 1.7 million hectares in 1996, increased to an area of 190 million hectares in 2017. It is estimated that it will increase further in the future. On the other hand, considering that the advantages and risks of transgenic plants and products will affect all humanity and the environment, it is necessary to conduct risk research and inform the public about the results of scientific research. In this paper, transgenic plants are evaluated from past to present and information is given about their advantages and risks.

Keywords: Transgenic plant, gene technology, modern breeding

Giriş

Dünyada gün geçtikçe su kaynakları tükenmekte, tarım alanları azalmaktadır. Nüfusun da artması ile çevre sorunları ve nüfusa yeterli besin sağlama endişesi ortaya çıkmıştır. Nüfusa yeterli besini sağlamak, daha ucuza daha iyi bir yaşam kalitesi sağlamak, gelir düzeyi düşük ülkelere yeterli besini sağlamak ve yabancı otlarla mücadelede kullanılan ilaçların azaltılmasına yönelik çevreye dost yöntemler bulmak amacıyla araştırmacılar birçok çalışma yürütmektedir (Atsan ve Kaya, 2008). Bu çalışmaların çoğunun neticesinde gen teknolojileri kullanılarak transgenik bitkiler geliştirilmiştir (Şen ve Altınkaya, 2014). Transgenik bitkiler, biyoteknolojik yöntemler kullanılarak bitkiye gen aktarılması veya var olan gen bölgesinin çıkarılması sayesinde bitkiye yeni bir özelliğinin kazandırılması veya o özelliğin inhibe edilmesi olarak tanımlanmaktadır. Örneğin, kutuplarda yaşayan bir tür balıktan donmayı engelleyen antifreeze geni alınıp, domates ve çilek gibi bitkilere aktarılarak soğuğa karşı dirençli transgenik bitkiler geliştirilmiştir (Yeşilbağ, 2004). Bitkilere aktarılan gen kendi türünden bir bitkiden alınabildiği gibi bitki ile melezlenemeyen başka bir türden de alınabilmektedir. Ayrıca gen aktarımı için hayvan veya bakteri gibi bitkiler alemi dışındaki organizmalar da kullanılabilir (Hatipoğlu, 2016). Bitkiye aktarılan genin bitkiyle aynı türde olması veya bitkinin yakın akrabasından alınması ile elde edilen bitkiye ‘cisgenik’ denilmektedir (Hatipoğlu, 2016). Cisgenik bitkiye örnek olarak ‘kara leke hastalığına dayanıklı malus floribunda çeşidi elmadan alınan genin farklı bir elma çeşidinde aktarılarak o çeşidinde hastalığa dayanıklı olması’ verilmektedir. Islah yöntemleri kullanılarak 50 yıla kadar süren çalışmanın ‘cisgenik’ yöntem kullanılarak 10 yılda gerçekleştirilebileceği öngörülmektedir. Bitkinin gen bölgesinden Talens ve Crispr gibi genom düzenleme yöntemleri kullanılarak gen çıkartılması ile elde edilen bitkilere ‘subgenik’ bitki adı verilmektedir (Hatipoğlu, 2016). Buğdayın külleme hastalığına karşı geliştirdiği savunma mekanizmasını baskılayan protein kodlayan gen bölgesinin Talens ve Crispr gibi yöntemlerle çıkarılarak hastalığa dayanıklı hale getirilmeye çalışılması Subgenik bitkiye bir örnektir.

Günümüzde yaygınlaşan transgenik bitki üretiminin en iyi örneklerinden birisi altın pirinçtir. Yeterli besin takviyesi alamayan insanlarda yaşanan A vitamini eksikliği görme kaybına sebep olmaktadır. “Altın pirinç”, A vitamini eksikliğinden kaynaklanan sorunlar ile savaşmak için ortaya çıkarılmıştır. Provitamin A (β -karoten) oluşmasını sağlayan enzimleri kodlayan 4 adet genin *Narcissus pseudonarcissus* bitkisi ve *Erwinia uredovora* bakterisinden alınarak pirince aktarılması ile altın pirinç elde edilmektedir (Şen ve Altınkaya, 2014). Transgenik bitkilerin arazide ilaç kullanımını azaltması ve bitkilerde hastalık ve böceklerle karşı

dayanıklı olması gibi avantajları bulunmaktadır. Avantajları olduğu kadar kültür bitkilerinde çeşitliğin azalması, süper otların ortaya çıkması gibi riskleri de bulunmaktadır. Yaşanabilecek risklerden dolayı farklı görüşler ortaya çıkmakta ve bu konuyla ilgili tartışmalar devam etmektedir (Yıldız ve ark., 2005).

2. Transgenik Bitki Tarımının Mevcut durumu

Transgenik bitki alanında yapılan çalışmalar 1980’li yıllardan itibaren hızlanmış, transgenik bitkilerin ilk tarla denemelerine ise 1985 yılında başlanmıştır (Çetiner ve Tuzla, 2005). 1994 yılında “Flavr Savr” adlı tescil edilmiş transgenik domates ile ilk transgenik bitki tarımına başlanılmıştır (Çetiner ve Tuzla, 2005). Ticari anlamda bitkisel üretime ise 1996 yılında başlanmış ve ticarileşmesinden kaynaklı ön plana çıkarak transgenik bitki tarımı yaygınlaşmaya başlamıştır. 1996 yılında 1,7 milyon hektar alana sahip olan transgenik bitki tarımı, 2005 yılında 90 milyon hektarlık bir alana yayılmıştır (Tablo 1). 2017 yılında ise 190 milyon hektara kadar çıkmıştır. Tablo 1’de dünyadaki transgenik bitki ekim alanlarının yıllara göre değişimi verilmiştir.

Tablo 1. Dünyada transgenik bitki ekim alanları (Süllü, 2018)

Yıllar	Ekili Alan (Milyon ha)
1996	1,7
1997	11
1998	27,8
1999	39,9
2000	44,2
2001	52,6
2002	58,7
2003	67,7
2004	81
2005	90
2006	102
2007	114,3
2008	125
2009	134
2010	148
2011	160
2012	170,3
2013	175,2
2014	181,5
2015	179,7
2016	185,1
2017	190

3. Transgenik Bitki Tarımı Yapan Ülkeler

Transgenik bitkilerin 2016 yılında dünyada toplam ekim alanı 185,1 milyon hektardır. 2016 yılında dünyada en fazla transgenik bitki ekim alanına sahip olan ülke 72,9 milyon hektar ile ABD olmuştur (Tablo 2). İlk transgenik bitki tarımını başlatan ülke olan ABD, ticari katma değere önem vererek zamanla çalışmalarını hızlandırmıştır. Transgenik bitki tarımında ABD'yi Brezilya, Arjantin gibi ülkeler takip etmektedir. Tablo 2'de 2016 yılında dünyada transgenik bitki tarımı yapan ülkeler, ekim alanları ve yetiştirdiği bitkiler verilmiştir.

Tablo 2. 2016 yılında dünyada transgenik bitki tarımı yapan ülkeler, ekim alanları ve yetiştirdiği bitkiler (Süllü, 2018)

Ülke	Ekim Alanı (milyon hektar)	Yetiştirildiği Transgenik Bitki
ABD	72,9	Soya, Mısır, Pamuk, Kanola, Papaya, Kabak, Yonca, Şeker Pancarı, Patates
Brezilya	49,1	Soya, Pamuk, Mısır
Arjantin	23,8	Soya, Pamuk, Mısır
Kanada	11,6	Mısır, Soya, Şeker Pancarı, Yonca, Kanola
Hindistan	10,8	Pamuk
Paraguay	3,6	Soya, Pamuk, Mısır
Pakistan	2,9	Pamuk
Çin	2,8	Pamuk, Kavak, Papaya
Güney Afrika	2,7	Soya, Pamuk, Mısır

4. Dünyada Tarımı Yapılan Transgenik Bitkiler

Dünyada halen beş bitkinin transgenik çeşidinin tarımı yapılmaktadır. Bunlardan ilki transgenik çeşitlere ayrılan alanın %50'sini kapsayarak en fazla ekim alanına sahip olan soya fasulyesidir. Daha sonra %33'lük alana sahip olan mısır gelmektedir. Diğer önemli alana sahip olan bitkiler pamuk, kanola ve şeker pancarıdır (Süllü, 2018).

5. Gen Aktarım Yöntemleri

Transgenik bitkilere gen aktarma yöntemleri doğrudan gen aktarım sistemleri ve dolaylı gen aktarım sistemleri olmak üzere ikiye ayrılmaktadır.

5.1. Doğrudan gen aktarım sistemleri

Biyolistik: Balistik ve biyolojik sözcüklerinin kısaltması ile adlandırılan bu yöntem tabancaya benzer bir cihazın kullanılması ile gerçekleştirilmektedir. DNA ile kaplı mikro taşıyıcılar ile hücrelerin aktarımında kullanılan yöntemdir (Korkut ve Soysal, 2013).

Elektroporasyon ve Kimyasal Maddeler Kullanılarak Gen Aktarımı: Yüksek elektrik voltajı ve kimyasal maddeler ile (polietilen glikol (PEG)) hücre zarından gen aktarımını kolaylaştıran bir

yöntemdir. Bu yöntem kullanılarak DNA hücre içerisine daha kolay girebilmektedir (Özgül Arvas, 2019).

Mikroenjeksiyon: Enjektör veya hususi ince kılcal pipetler kullanılarak DNA özel mikroskoplar ile hücrelere aktarılmaktadır. Bu yöntem hayvan hücrelerine gen aktarımında daha fazla kullanılmaktadır. Mikroenjeksiyon yöntemini kullanan kişinin deneyimli olması ve yavaş yapılması bu yöntemin dezavantajlarıdır (Korkut ve Soysal, 2013).

Sonikasyon: Sonik ses dalgaları kullanılarak hücre zarında boşluk açılıp DNA 'nın hücre içerisine girmesini sağlayan bir yöntemdir (Korkut ve Soysal, 2013).

5.2. Dolaylı gen aktarım yöntemleri

Toprakta yaşayan, sporsuz, gram negatif bakterilere *agrobacterium* denilmektedir. *Agrobacterium tumefaciens* ve *Agrobacterium rhizogenes* gen aktarım çalışmalarında kullanılan iki suştur. *Agrobacterium* yöntemleri ile gen aktarım çalışması yapılması nispeten kolaydır. *Agrobacterium tumefaciens* gen aktarım yöntemlerinde en çok kullanılan bakterilerdir. Bitkinin yaralanmış dokusundan organizmaya girerek tümör oluşmasına neden olmaktadır. Araştırmacılar gen aktarım çalışmalarında *agrobacterium tumefaciens* bakterilerinin virülens etki göstererek bitkinin organizmasına girip DNA ile birleşme yeteneğini kullanmaktadırlar (Korkut ve Soysal, 2013). *Agrobacterium rhizogones* ise bitkilerin köklerindeki fenolik bileşiklerin uyarılarak bakterinin DNA'sının bitkiye aktarılmasını yönlendirmektedir. Bitkinin köklerinde saçaklı çok sayıda oluşan bu köklerin normal köklerden çok daha hızlı geliştikleri gözlenmiştir. Bu köklerden sekonder metabolit üretimi ile ilgili çalışmalar yapılmaktadır (Korkut ve Soysal, 2013).

6. Transgenik Bitki Üretiminin Avantajları ve Riskleri

6.1. Transgenik bitkilerin tarımsal avantajları

Yabancı ot ve zararlılara dayanıklı bitkilerin yetiştirilmesi ile verimde yaşanan kayıpların önlenmesi ve verimde artış yaşanması sağlanırken çiftçilerin üretim maliyetlerinin azalması beklenmektedir (Süllü, 2018). Elde edilen ürünlerin raf ömrünün uzatılması ile depolama ortamından kaynaklı yaşanan sorunlar önlenmektedir (Atsan ve Kaya, 2008). Bitkilerin besin kalitesi ve bileşenlerinin geliştirilmesi gibi avantajları bulunmaktadır.

6.2. Transgenik bitkilerin sağlık açısından yararları

Transgenik ürünler kullanılarak daha güvenli ve maliyeti az ilaç ve aşılardan üretilmesi beklenmektedir. Hepatit, kuduz ve veba gibi hastalıklara mısır, kolza, patates gibi bitkiler kullanılarak aşı geliştirilmesi için deneyler başlamıştır. İnsülin alımı için iğne yapılması yerine transgenik ürünlerden gerekli insülinin alınması için çalışmalar yapılmaktadır (Haspolat, 2012).

6.3. Transgenik bitkilerin çevre açısından avantajları

Yabancı ot ve zararlılara karşı dayanıklı çeşit geliştirilmesi ile daha az pestisit kullanılması sonucu çevrede oluşan kirliliğin azalması beklenmektedir (Süllü, 2018). Herbisite dayanıklı çeşitlerin yetiştirilmesi toprak işlemez tarımı mümkün kılarak traktör kullanımının azalması ile yakıt tasarrufu sağlamaktadır. Traktör kullanımının azalması ile yakıtın yanması sonucu oluşan gazların salınımının azalması ile atmosfere karışan gaz miktarı da azalarak çevreye fayda sağlamaktadır (Hatipoğlu, 2016).

6.4. Transgenik bitki yetiştirilmesinin riskleri

6.4.1. Sağlık açısından riskler

Transgenik bitkiyi tüketen kişilerde alerjik ve toksik reaksiyonlara sebep olması: Transgenik bitki yetiştirilmesinin birçok avantajı bulunduğu gibi bitkinin gen diziliminin değiştirilmesinden dolayı farklı risklerde ortaya çıkmaktadır. Ortaya çıkabilecek risklerden birincisi alerjik etki bırakmasıdır. 1996 yılında yapılan bir çalışmada Brezilya kestanesinde "2S" geni izole edilerek soya fasulyesine aktararak transgenik ürün elde edilmiştir. Elde edilen ürün kullanan kişilerde alerjik reaksiyonlara sebep olduğu için marketlerden toplanmıştır (Özgen ve ark., 2015). Ayrıca transgenik bitkiler yeni genlerin aktarılmasından kaynaklı sekonder metabolitleri içerdiği için toksik etkiye sahiptir (Süllü, 2018).

Besin kalitesinin bozulması ile ortaya çıkan riskler: Bitkilere aktarılan yeni genler nedeniyle bitkinin içerdiği besin ve kalite öğelerinde azalma olabileceği belirlenmiştir. Örneğin, kalp hastalıklarına ve kansere karşı önemli bir koruyucu madde olan "phytoestrogen" bileşiklerinin, orijinal bitkiye oranla transgenik bitkilerde daha az olduğu bilinmektedir (Özgen ve ark., 2015).

6.4.2. Ekolojik riskler

Toprak ve su kirliliği: Transgenik bitkiler sonucu oluşan toksik maddelerin suya ve toprağa geçme riski bulunmaktadır. Toprağa ve suya geçen toksik maddelerin diğer canlıların yaşamını da etkilemesi söz konusudur (Özgen ve ark., 2015).

Kültür bitkilerinde çeşitliliğin azalması: Transgenik bitki çeşitlerinin yaygınlaşması ile kültür bitki çeşitliliğinin azalması beklenmektedir.

Süper yabancı otların ortaya çıkışı: Transgenik bitkilerin çevrede floranın bozulmasına neden olacağı düşünülmektedir. Herbisite dayanıklı transgenik bitkilerin genlerinin yabancı akraba olan otlara geçmesi ile oluşan süper otlar tarımda mücadeleyi zorlaştırmaktadır (Süllü, 2018).

6.4.3.Sosyo-ekonomik riskler

Tohumların pahalı olması ve her yıl yenilenme zorunluluğu: Transgenik bitkilerin tohumları orijinal bitkilere göre %25 ile %100 arası oranla daha pahalı olmaktadır. Ayrıca transgenik bitkilerin içerdiği 'terminatör gen' nedeniyle tohumların her yıl yenilenme zorunluluğu olduğundan üreticilerin bu konuda sıkıntı yaşayabileceği belirtilmiştir (Özgen ve ark., 2015).

Tek tip çeşit ve ilaç kullanımı: Tarımsal üretimde transgenik bitkilerin öne çıkması, geleneksel tarımda kullanılan yerel çeşitlerin kullanımında azalmaya sebep olurken, dışa bağımlılık problemi de ortaya çıkacaktır (Süllü, 2018).

Çeşit karışımı: Üreticilerin istedikleri ürün çeşidi elde etmesi zorlaşacaktır. Bunun nedeni aynı alanda yetiştirilen transgenik ve klasik çeşitlerin birbirine karışma riskinden kaynaklanmaktadır (Demir ve ark., 2006).

7.Transgenik Bitkilerin Türkiye'deki Durumu

Transgenik bitki denemeleri 1999 yılında Niğde'de patates üretimi ile başlamıştır. Daha sonra Devlet Planlama Teşkilatı (DPT) tarafından 5 yıllık kalkınma planı amacıyla "Biyoteknoloji ve Biyogüvenlik Komisyonu" adı altında bir komisyon oluşturulmuştur (Güngör ve Demiryürek, 2021). Transgenik ürünler ile ilgili yasaları Tarım ve Orman Bakanlığı yürütmektedir. Türkiye, 2000 yılında Cartagena Protokolünü imzalamış ve 2003 yılında yürürlüğe girmiştir. Cartagena protokolünün amacı biyolojik çeşitliliği zengin olan ülkeleri biyoteknolojik çalışmalardan kaynaklanan zararlara karşı korumaktır (Özgen ve ark., 2015).

Transgenik ürünlerin ithalatı, ihracatı, kontrol ve denetimi ile ilgili usul ve esasları belirlemek amacıyla 2009 yılında "Gıda ve Yem Amaçlı Genetik Yapısı Değiştirilmiş Organizmalar ve Ürünlerinin İthalatı, İşlenmesi, İhracatı, Kontrol ve Denetimine Dair Yönetmelik" yürürlüğe girmiştir. Daha sonra 2010 yılında Biyogüvenlik Kanunu ile genetiği değiştirilmiş hayvan ve bitkilerin üretimi yasaklanmıştır (Kaynar, 2009). Transgenik bitki üretimi çevre sorunları ve insan sağlığı risklerinden dolayı Türkiye'de yasaklanmıştır (Güngör ve Demiryürek, 2021). Fakat Türkiye, transgenik bitki üreten önemli ülkelere soya ve mısır gibi bitkileri ithal ettiği için ülkeye giren bu bitkilerin transgenik bitki olup olmadığı halen tartışılmaktadır (Güngör ve Demiryürek, 2021).

8.Transgenik Bitki Hakkındaki Görüşler ve Gelecekteki Durumu

Transgenik bitkilerin avantajları olduğu kadar risklerinin de bulunması nedeniyle bu konu hakkında farklı görüşler bulunmaktadır. Bu görüşleri üç gruba ayıracak olursak:

Birinci grup, uluslararası şirketlerin bulunduğu ve bu şirketleri destekleyen bilim adamlarının olduğu gruptur. Bu grup “Transgenik bitki üretimi ile ortaya çıkabilecek risklerin klasik ıslah yöntemleriyle üretilen bitkilerden farklı değildir” görüşünü savunmaktadır (Hatipoğlu, 2016). Çevre örgütlerinin oluşturduğu ikinci grup, “Transgenik bitki üretiminin daha ileriye taşınması ve yaygın yapılması sonucunda çevre sorunları ortaya çıkacak ve insan sağlığı olumsuz etkilenecek” görüşünü savunmaktadır (Hatipoğlu, 2016).

Bağımsız bilim insanlarının yer aldığı üçüncü grup ise iki farklı görüşün arasında yer alarak “Transgenik bitki yetiştirilecek alan riskler açısından değerlendirilmeli ve tüketicinin bu konuda söz hakkının olması için etiketleme yapılmalıdır” görüşünü savunmaktadır (Hatipoğlu, 2016).

Nüfusun artması ve tarım alanlarının azalması büyük tehlike arz etmektedir. Bu yüzden alternatif yöntemlerin de değerlendirilmesi gereklidir. Alternatif yöntemlerden transgenik bitkilerin de gelecekte daha fazla üstünde durulması beklenmektedir.

Gelecekte hızlı büyüyen, hastalık ve zararlılara karşı dayanıklı, kaliteli ve verimli bitkilerin olması beklenmektedir (Özgen ve ark., 2015). Gelecekte genetik özellikleri belli bazı hedef bitkiler aşağıda verilmiştir.

- Şekerpancarı, buğday ve yonca gibi bitkilerin pestisitlere karşı dayanıklı olması,
- Domates, soya fasulyesi, kolza gibi bitkilerin zararlılara karşı dayanıklı olması,
- Şeker pancarının düşük kalorili şeker oranına sahip olması,
- Kolzada beta karoten oranının artırılması,
- Kahvede kafein oranının azaltılması,
- Muzun ishal aşısı içermesi ve mısırın kuduz aşısı içermesi,
- Bitkiden çıkarılan gen bölgesine, gen aktarımı yapılarak yeni özellikler eklenmesi,
- Birden fazla dayanıklılığa sahip özellikte bitkilerin olması (Tiryaki ve Zeki 2005).

9.Sonuç ve Öneriler

Nüfus artışı ve tarım alanlarının azalması ile insanların gıda ihtiyacının karşılanmasına yönelik yeni yöntemler araştırılmaktadır. Bu kapsamda geçmişten günümüze kadar tarımsal üretimde bitki, hayvan ve mikroorganizmaların kullanıldığı biyoteknolojik yöntemler ön plana çıkmaktadır. Biyoteknolojik yöntemler kullanılarak transgenik bitki üretimi yapılmaya başlanmıştır. Transgenik bitki üretiminin amacı nüfusa yeterli besini sağlayarak, daha verimli daha kaliteli ve maliyeti az yöntemler kullanılarak çevreyi ve insan sağlığını koruyan ürünler elde etmektir. Transgenik bitki tarımı 1996 yılında 1,7 milyon hektar alan iken 2017 yılında 190 milyon hektara kadar yükselmiştir. Bunun nedeni transgenik bitki tarımının ticarileşerek

daha fazla deęer görmeye başlamasından kaynaklıdır. Zamanla önem kazanan gen teknolojisini reddetmek yerine olumsuzluklarını yok edecek çalışmalar yapılmasına özen gösterilmelidir. Transgenik bitki yetiştirilmesinin insan sağlığına ve çevreye karşı avantajları olduğu kadar riskleri de bulunmaktadır. Yaşanabilecek risklerden dolayı birçok farklı görüş ortaya atılmıştır ve bu konu hakkında tartışmalar sürmektedir. Tartışmaların ön plana çıkan gerekçeleri gelecekte bilinmeyen nedenlerden insan sağlığına zarar vermesi, transgenik bitkinin alerjisi olan insanlarda keşfedilemeyen yeni sorunlar çıkarması, çevreye zarar vermesi, kültür bitki çeşitlerinde azalma yaşanması ve farklı sebeplerle transgenik bitki tüketmek istemeyen insanların söz hakkının elinden alınması şeklindedir. Sonuç olarak gen teknolojisi hızla gelişmektedir. Nüfusun çoğalması ile bu teknolojinin geliştirilmesi ve uygulanması yadsınamaz bir gerçektir. Bu nedenle ülkemizin de gen teknolojisindeki uygulamaların hızına yetişmesi gereklidir. Tamamen yasaklamak yerine ülkemizin kendi koşulları ve transgenik bitkilerin riskleri de dikkate alarak çalışmalar yapılmalıdır. Transgenik bitki üretimi, ithalatı, ihracatı, kontrol ve denetiminde mevcut yasaların uygulanmasındaki aksaklıklar düzeltilmelidir. Transgenik bitki üretiminde etiketleme yapılarak insanların da bu konuda söz sahibi olması sağlanmalıdır.

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**ELİT BOKSÖRLERİN SPORDA MÜKEMMEL PERFORMANSLARININ FARKLI
DEĞİŞKENLER AÇISINDAN İNCELENMESİ**

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Özet

Çalışmanın amacı, elit seviyede boks branşı ile ilgilenen aktif sporcuların sporda mükemmel performanslarının farklı değişkenler arasındaki ilişkiyi ortaya çıkarmaktır. Çalışmaya 75' i kadın ve 169' u erkek olmak üzere toplam 244 kişi katılmıştır. Araştırmada veri toplama aracı olarak Kişisel Bilgi Formu ve Sporda Mükemmel Performans Ölçeği" kullanılmıştır. Veriler analizinde tanımlayıcı istatistik, güvenilirlik analizi, ikili değişkenler için bağımsız örneklem t testi, ikiden fazla değişkenler için Anova testi yapılmıştır. Araştırma sonucunda cinsiyet, milli sporcu olma, eğitim düzeyi, yaş, spor yaşı, kaç yıl boks branşını yapma durumuna göre ölçek ortalama puanı açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Anahtar Kelimeler: Boks, spor, mükemmel performans

**EXAMINATION OF ELITE BOXERS' EXCELLENT PERFORMANCE IN SPORT
IN TERMS OF DIFFERENT VARIABLES**

Abstract

The aim of the study is to reveal the relationship between different variables and excellent performance in sport of active athletes who are interested in boxing at elite level. A total of 385 people, 75 women and 169 men, participated in the study. Personal Information Form and Excellent Performance in Sport Scale" were used as data collection tools in the study. Descriptive statistics, reliability analysis, independent sample t test for binary variables and Anova test for more than two variables were used in data analysis. As a result of the research, there is no statistically significant difference in terms of scale mean score according to gender, being a national athlete, education level, age, sport age, and number of years of boxing.

Keywords: Boxing, sport, excellent performance

Giriş

Sağlıklı bir toplum olmakta, evren ile bütünleşmekte, ilerlemekte, toplumsal adaletli, aydınlık çevreli bir toplum olmakta sporun yeri ve önemi yadsınamaz (Yazıcı, 2014). İnsanların fiziksel ve ruhsal gelişimine katkı sağlayan spor sosyal açıdan ele alındığında organizasyonlar dâhilinde kültürlerin kaynaşmasına, sorumluluk alabilen, takım çalışmasına yatkın ve etik değerlere sahip sağlıklı bireylerin yetiştirilmesine katkı sağladığı da görülmektedir (Tiryaki & Yetim, 2017). Sporda rekabet ortamının olması ve kazanmanın her zaman ön planda yer alması sporcuların fiziksel ve psikolojik güçlerinin de geliştirilmesi gerekmektedir (Yazıcı vd., 2018). Spor ve fiziksel aktivite bağlamına uygulanan insan davranışı çalışması olarak spor psikolojisi, (Turkay & Demir, 2021) sporun içerisinde yer alan bireylerin psikolojik özelliklerinin değerlendirilerek gerek takım sporlarında gerekse bireysel sporlarda performanslarının en tepeye nasıl çıkarılabileceği ile ilgilenir (Azboy vd., 2012). Spor psikolojisinin yönelimlerinden biri olan bilişsel-davranışçı yaklaşımı; sporcunun bilişsel ve davranışsal yönüne vurgu yaparak bir sporcunun ne düşündüğüne; kendisini ne kadar güvende, rahat veyahut stresli hissettiğine ve bunların performansını nasıl etkilediğine odaklanır (Biddle & Mutrie, 2006).

Alan yazında performans ile ilgili birçok tanıma rastlanmaktadır (Savaş, 2005). Performansa farklı bir açıdan bakacak olursak çalışan kişi verilen vazifeyi ne oranda yaptığı ve yapılış şekliyle hedeflere ulaşma noktasında ortaya çıkan orandır (Doğan, 2004). Bu tanımlamadan hareketle, değerlendirme için performansın bileşenlerini, belirleyen ve etkileyen tüm faktörleri göz önünde bulundurmaya gereğini de beraberinde getirmektedir.

Sportif performansın karmaşık yapısının sebebi, sonucu etkileyen faktörlerin sayısının çokluğu ve çeşitliliğidir. Bu faktörler, performansı olumlu ve olumsuz etkileyebilirler ve oluşum kaynaklarına göre içsel ve dışsal faktörler olarak ikiye ayrılırlar. İçsel faktörler; genel anlamda insanda mevcut olan, kısmen kalıtsal gelen, zaman içinde küçük değişikliklerle farklılaşabilen ve dışarıdan üzerine etki imkânı çok sınırlı olan veya hiç etki yapılamayan etkenlerdir. Yaş, cinsiyet, anatomik yapı, genetik, zekâ, lokomotor sistemin durumu, psikolojik denge, otonom sinir sistemi, salgı bezlerinin fonksiyonları, metabolizma, enerji kullanım mekanizmaları, organ sistemlerinin durumu, allerji, nöromüsküler ileti hızı, kardiyovasküler yapı özellikle içsel faktörlerin en başlıcalarıdır. Bu listeyi uzatmak ve detaylandırmak çok mümkündür.

İçsel faktörleri objektifleştirmek oldukça zor olduğundan performans üzerine etkilerini hesaplayabilmek ve yapılabilecek değişiklikleri tümüyle öngörebilmek neredeyse imkansızdır.

Dışsal faktörler; ise adından da anlaşılacağı gibi insanın vücudundan ve yapısından kaynaklanmayan dışarıdan gelen ve bu nedenle de dolaylı yolla sportif performansı fiziksel veya psişik bileşen üzerinden etkileyen faktörlerdir. Dışsal faktörler üzerine olan etkimiz, içsel olanlara göre çok daha fazladır. Birçoğunu uygun şartlar ve müdahaleler ile değiştirmek ve geliştirmek mümkündür (Bayraktar & Kurtoğlu, 2004).

Fiziksel aktivitenin dayanıklılığı artırma da sporcunun performansı açısından çok önemlidir. Bunun yanında zihinsel olarak da eğitilmeli ve dayanıklılık performansına katkı sağlamalıdır. Özellikle sporcular spor performanslarını fizyolojik, biyomekanik ve psikolojik verimliliği artırılması yönünde yapılacak aktivitelerin sıralanması tanımlanmış olması gerekmektedir. Optimum ve üstün bir sonuca ulaşmak için performans her ikisinin de gelişimine bağlıdır. Sporcunun psikolojik ve fizyolojik yetenekleri ve amaca göre belli bir seviyeye yükseltilmesi gerekmektedir (Konter, 2003).

Yarayan ve İlhan'a (2018) günümüz sporunda kazanmakla kaybetmek arasındaki çizgiyi inceleyerek performans yoğunluğunu artırarak sporcular üzerinde büyük bir baskı oluşturduğunu dile getirmişlerdir. Hazırlıksız yakalanan sporcu ve antrenörler ise birçok baskıya maruz kalıp bu durumla başa çıkmak için arayış içine girmişlerdir. Bu nedenle kişilerin psikolojik farkındalıkları arttıkça son yıllarda yapılan psikolojik çalışmalara verilen önemde artmıştır. Bu hem bireysel hem de takım sporları için geçerlidir. Sporcuların hazırlık süreçlerinde zihinsel eğitim kavramlarının verilmesi ve öğretilmesi, zihinsel dayanıklılığın bireylerin içsel ve dışsal, zihinsel ve fiziksel davranışlar ve deneyimler edinmektedir (Unestahl, 1982).

Bireysel dövüş sporlarından biri olan boks, yüksek düzeyde fiziksel ve zihinsel yetenek gerektiren, mevcut yapısı ve uygulaması gereği performansı, vücut temasının ve dövüşün en çok yaşandığı yer yoğun bir şekilde yapılmaktadır (Quinna, 1994). Boks sporu savunma ve hücum yapma, tempoyu artırma gibi maç sırasında temponun düşürülmesi gerekli stratejiler içermektedir. Bu nedenle zihinsel antrenman uygulamaları beden eğitiminin yanı sıra spor da yapılması gereken maçlara hazırlanmalıdırlar (Luthans, 2002).

Boks sporu bireyin kendisini savunma ve atak gibi yeteneklerini ön planda olduğu, galip gelebilmek için vurulan yumruğun alınan net puandan daha fazlası olmasını gerektiren, teknik ve taktik özelliklerin müsabaka sonucunu etkilediği olimpik bir spor branşıdır. Boks sporu karakteristik özelliklerinin yanı sıra temasa dayalı, güç, hız, çeviklik ve spora özgü becerilerin

bir kombinasyonunu gerektirdiği bir spor dalı olarak görülmektedir (Ağgön vd., 2020). Her branşta olduğu gibi öncelikli olarak yapılan branşa özgü yetenek ön plana çıkmakla birlikte bu yeteneğin kuvvet, zekâ ve beceri ile bütünleştirilmesi boksta elde edilecek yüksek performansın öncelikli etkenidir. Bununla birlikte, yaratıcılık, kurallarına uygun beslenme, bilimsel çalışma, anında karar verme, inanç, kötü alışkanlıklardan uzak durma, kurallara uyma, yenme hırsı, mücadele, dayanıklılık, kuvvette devamlılık, hızlilik, kendine güven, düzenli yaşam, ruhsal üstünlük, deneyim kazanma, esneklik, belirli bir hedefe yönelme gibi özellikler boksta başarıyı pekiştirecek önemli faktörler olarak karşımıza çıkmaktadır (Zorba vd., 1999).

Herkes için spor anlayışının temelinde de yatan spor yapan bireylerin mükemmelliğe ulaşma çabası içerisinde ulaşılabilen hedefin kendilerinin en iyi yapabildiğine ulaşmasıdır. Bu bağlamda mükemmeliyetçilik, kişinin davranışını aşırı derecede değerlendirilmesine yönelik eğilimlerinin yanı sıra kusursuz bir performans sergilemek için yüksek standartlar belirlemek ve çabalamak ile karakterize edilen kişilik özelliği olarak görülürken (Flett & Hewitt, 2002), Burns ise mükemmeliyetçiliği; kişinin kendisine koyduğu standartların ulaşılabilir olanın ve mantığın ötesinde olması, zorla ve aralıksız olarak imkânsız hedefler için çabalaması ve kişinin kendi değerlerini belirlerken bunu yalnızca verimli ve başarılı olma üzerinden yapması olarak tanımlamaktadır (Burns, 1980). Mükemmeliyetçilik sosyal psikoloji ve klinik dallarında sıklıkla yapılan bir başlık olarak araştırmacıların 1970'den beri ilgisini çekmiştir. Mükemmeliyetçilik geleneksel olarak, normalin dışında standartlar koymak ve buna ulaşmak için aşırı derece de çaba göstermektir (Slade vd.,1998).

Sporadaki mükemmeliyetçilik ise 1990 yılından beri çalışılmaya başlanılmıştır. Çoğu spor psikoloğu mükemmeliyetçiliğin büyük yarışlarda olumlu bir rol oynadığını kabul etmiştir. Hardy ve ark kendi alanlarında en iyi olan sporcuların mükemmeliyetçi olduğunu ve bu özelliklerin kendilerini geliştirme noktasında olumlu yönde olduğunu ve bu özelliklerinin performanslarını artırdığını söylemişlerdir (Hardy, 1996).

Yöntem

Bu araştırma genel tarama modeli kullanılarak tasarlanmış ve planlanmıştır. Tarama modelleri geçmişte ya da halen var olan bir durumu var olduğu şekli ile betimlemeyi amaç edinen araştırmalar için uygun bir modeldir. Betimsel tarama modelleri kendi içinde iki bölüme ayrılmaktadır. Bu bölümler; genel tarama ve örnek olay taramalarıdır. İlişkisel tarama modeli genel tarama yöntemi içine giren bir yöntemdir.

Genel tarama modelleri; çok sayıda elemandan oluşan bir evrende, evren hakkındaki genel yargıya varmak amacı ile evrenin tümü ya da ondan alınacak bir grup örnek ya da örneklem üzerinde yapılan tarama düzenlemeleridir (Karasar, 2006).

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Evren/Örneklem

Araştırmanın örneklem seçiminde gelişigüzel örnekleme yöntemi kullanılmıştır. Araştırmacının saptanan örneklem büyüklüğüne göre herhangi bir şekilde evrenin bir parçasını seçmesidir. Herhangi bir okula gidip saptanacak sayıda (100 öğrenci gibi) rastlanan öğrenciyi olasılıklı olmadan örnekleme alma gelişigüzel örneklemedir (Dawson & Trapp, 2001).

Çalışmanın evrenini 2022-2023 yılında boks branşında yarışlara katılan sporcular oluşturmaktadır. Araştırmanın örneklemi ise; gelişigüzel 75 kadın, 169 erkek olmak üzere toplam 244 sporcu oluşturmaktadır. Çalışmaya gönüllü katılan her bir sporcuya demografik bilgi toplama formu verilerek, sporcular çalışma içeriği hakkında bilgilendirilmiştir.

Veri Toplama Araçları

Bu araştırmada kişisel bilgi formu ve “Sporda Mükemmel Performans Ölçeği (PPS-S)” uygulanmıştır. Araştırma kullanılan kişisel bilgi formu ve ölçeklere ilişkin bilgiler aşağıda açıklanmıştır.

Kişisel bilgi formu

Kişisel bilgi formu 6 maddeden oluşmaktadır ve katılımcıların cinsiyet, yaş, eğitim durumu, spor yaşı, milli sporcu ve kaç yıldır boks branşı ile uğraşıyorsunuz değişkenleri gibi bilgileri toplamak amacıyla hazırlanmıştır.

Sporda Mükemmel Performans Ölçeği (PPS-S)

Çalışmada Hewitt ve Flett'in (1991) mükemmeliyetçiliğin boyutları ile ilgili ortaya konulan modelden esinlenerek Hill, Appleton ve Mallinson (2016) tarafından geliştirilen bir ölçektir. Çocuk ve yetişkin sporcular için geçerlik ve güvenilirliğinin incelenmesi ise Esentaş vd., 2020 yılında yapılmıştır. Ölçek kendine yönelik performans mükemmeliyetçiliği (SOPP), sosyal olarak belirlenmiş performans mükemmeliyetçiliği (SPPP) ve diğerlerine yönelik performans mükemmeliyetçiliği (OOPP) olmak üzere 3 alt boyuttan oluşmaktadır. Ölçeğin

derecelendirilmesinde (1) kesinlikle katılmıyorum (2) katılmıyorum, (3) kısmen katılmıyorum, (4) kararsızım, (5) kısmen katılıyorum, (6) katılıyorum, (7) kesinlikle katılıyorum olmak üzere 7’li Likert tipi bir derecelendirme sistemi kullanılmıştır.

Verilerin Analizi

Araştırmada elde edilen verilerin analizi SPSS 21 paket programında yapılmıştır. Veriler analiz edilirken tanımlayıcı istatistik, güvenilirlik analizi, ikili değişkenler için bağımsız örneklem t testi, ikiden fazla değişkenler için Anova testi yapılmıştır. Tüm istatistiksel işlemler için güven aralığı 0.05 kabul edilmiştir.

Bulgular

Tablo 1. Örneklem grubuna ilişkin demografik dağılımı

Değişkenler	n	min.	mak.	x	s.s.
Lise	244	1,00	4,00	2,59	,93
Yaş	244	15,00	18,00	16,47	1,02
Cinsiyet	244	1,00	2,00	1,69	,46
Spor_deneyim_suresi	244	1,00	3,00	2,12	,87
Milli_sporcu	244	1,00	2,00	1,80	,39
Kaç yıldır boks yapıyorsunuz	244	1,00	3,00	2,03	,86
Ölçek_ort	244	1,00	7,00	2,89	1,16

Tablo 1’de araştırmada katılımcı grubuna ait demografik dağılım görülmektedir.

Tablo 2. Katılımcılardan elde edilen betimsel istatistikler

Değişkenler		n	%
Eğitim Düzeyi	Lise 1	34	13,9
	Lise 2	73	29,9
	Lise 3	94	38,5
	Lise 4	43	17,6
	Toplam	244	100,0
Yaş	15	55	22,5
	16	62	25,4
	17	84	34,4
	18	43	17,6
	Toplam	244	100,0
Cinsiyet	Kadın	75	30,7
	Erkek	169	69,3
	Toplam	244	100,0
Spor Deneyimi	1 ve 2 yıl	79	32,4
	3 ve 4 yıl	55	22,5
	5 yıl ve üstü	110	45,1
	Toplam	244	100,0
Milli Sporcu	Evet	48	19,7
	Hayır	196	80,3
	Total	244	100,0
Boks deneyimi	0-2 yıl	86	35,2
	3-4 yıl	64	26,2
	5 yıl ve üzeri	94	38,5
	Toplam	244	100,0

Tablo 2'deki veriler incelendiğinde 75 (%30,7) kadın, 169 (%69,3) erkek olmak üzere toplam 244 kişi katıldığı görülmektedir. Katılımcıların eğitim düzeyleri incelendiğinde ise 34'ünün (%13,9) lise 1. sınıf, 73'ünün (%29,9) lise 2. sınıf, 94'ünün (%38,5) lise 3.sınıf ve 43'ünün (%17,6) lise 4. sınıf düzeyinde olduğu görülmektedir. Katılımcıların yaş değişkeni incelendiğinde ise 55'inin (%22,5) 15 yaşında, 62'sinin (%25,4) 16 yaşında, 84'ünün (%34,4) 17 yaşında ve 43'ünün (%17,6) 18 yaşında olduğu tespit edilmiştir. Spor deneyimi durumuna göre incelendiğinde ise katılımcıların 79'unun (%32,4) 1-2 yıl, 55'inin (%22,5) 3- 4 yıl ve 110'unun (%45,1) 5 yıl ve üstü olduğu görülmüştür. Milli sporcu olup olmadığı durumuna bakıldığında katılımcıların 48'inin (%19,7) evet ve 196'sının (%80,3) hayır olduğu tespit edilmiştir. Katılımcıların boks deneyimi değişkeni incelendiğinde ise; 86'sının (%35,2) 0-2 yıl, 64'ünün (%26,2) 3-4 yıl ve 94'ünün (%38,5) 5 yıl ve üzeri olduğu görülmektedir.

Tablo 3. Cinsiyet Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

	Cinsiyet	n	x	s.s.	t	p
Ölçek_ort	Kadın	75	2,8800	1,09889	-,127	,899
	Erkek	168	2,9006	1,19903		

Tablo 3'de cinsiyet değişkeni ile ölçek ortalama puanı ($t=-127;p>0.05$), açısından anlamlı bir farklılık görülmemektedir.

Tablo 4. Milli Sporcu Olma Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		n	x	s.s.	t	p
Milli Sporcu Olma Durumu	Evet	48	3,0333	1,13613	,921	,358
	Hayır	196	2,8602	1,17471		

Tablo 4'de milli sporcu değişkeni ile ölçek ortalama puanı ($t=921;p>0.05$), açısından anlamlı bir farklılık görülmemektedir.

Tablo 5. Eğitim Düzeyi Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Eğitim Düzeyi	Gruplar arası	32,327	27	1,197 ,835	1,434	,084
	Grup içi	180,312	217			
	Toplam	212,639	243			

Tablo 5'deki veriler incelendiğinde eğitim düzeyi değişkeni ile ölçek ortalama puanı [(F 27.216) 1,434; $p > 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Tablo 6. Yaş Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Yaş	Gruplar arası	36,544	27	1,353 1,020	1,327	,138
	Grup içi	220,255	217			
	Toplam	256,799	243			

Tablo 6' ya göre yaş değişkeni ile ölçek ortalama puanı [(F 27.216) 1,327; $p > 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Tablo 7. Spor Yaşı Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Spor yaşı	Gruplar arası	14,709	27	,545 ,789	,691	,873
	Grup içi	170,352	217			
	Toplam	185,061	243			

Tablo 7' deki veriler incelendiğinde spor deneyim süresi değişkeni ile ölçek ortalama puanı [(F 27.216) 691; $p > 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Tablo 8. Kaç Yıldır Boks Yapıyorsunuz Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Kaç yıldır boks yapıyorsunuz?	Gruplar arası	17,052	27	,632	,839	,698
	Grup içi	162,686	217	,753		
	Toplam	179,738	243			

Tablo 8'e göre kaç yıldır boks yapıyorsunuz değişkeni ile ölçek ortalama puanı [(F 27.216) 839; $p > 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Sonuç ve Tartışma

Araştırmamızda elit boksörlerin sporda mükemmel performanslarının farklı değişkenler açısından incelenmesi amacıyla yapılmıştır.

Araştırmada katılımcıların sporda mükemmel performans düzeyleri ile cinsiyetleri arasındaki farklılık değerlendirildiğinde kadın ve erkek boksörler arasında istatistiksel olarak anlamlı farklılık olmadığı belirlenmiştir. Alan yazın incelendiğinde araştırmamızla aynı doğrultuda olmayan çalışmalara rastlanılmıştır. Abdioğlu vd., (2022) ve erkek tenisçilerin performans mükemmeliyetçiliğinin, kız tenisçilerin performans mükemmeliyetçiliğinden daha yüksek olduğu belirlenmiştir. Yine Gönülateş ve İmamoğlu (2019) araştırmasında erkeklerin kadınlardan daha yüksek mükemmeliyetçilik puanlarına sahip olduğu bildirilmiştir. Bu bulgular araştırmamızla paralellik göstermemektedir. Bu durum profesyonel sporcular için genellikle kendilerini mükemmeliyetçi olarak tanımlamalarından (Hill vd., 2016) kaynaklandığı düşünülmektedir. Yine Kangotan (2020) de yapmış olduğu çalışmada sporcuların cinsiyetlerine göre spora ait mükemmeliyetçilikleri arasında istatistiksel olarak anlamlı farklılık olmadığını ortaya çıkarmıştır. Bu bulgu araştırmamız ile aynı doğrultudadır.

Araştırmada sporda mükemmel performans düzeyleri ile spor yaşı arasındaki farklılık değerlendirildiğinde ölçek ortalama puanı açısından istatistiksel olarak anlamlı farklılık olmadığı belirlenmiştir. Özen (2019) yılında yapmış olduğu araştırmada Taekwondocuların spor yaşlarına göre anlamlı fark bulmuştur. Bu çalışma araştırmamızla paralellik göstermemektedir. İlgili literatür incelendiğinde sporda mükemmel performans üzerine çalışmalar yetersiz olduğu görülmüştür. Sonuç olarak araştırmada cinsiyet, milli sporcu olma,

eđitim dzeyi, yař, spor yařı, ka yıl boks branřını yapma durumuna gre lek ortalama puanı aısından istatistiksel olarak anlamlı bir farklılık grlmemektedir.

neriler

1. Arařtırmanın rnekleme grubunu sadece Boks branřındaki elit dzeydeki sporcuların oluřturması bir sınırlılık meydana getirdiđi iin diđer branřlarla ilgilenen elit sporcular zerinde de uygulanabilir.
2. alıřma bařka leklerle kullanılarak geniřletilebilir. (rn. stres, kaygı dzeyi, atılganlık vb.... gibi)
3. Arařtırma sonularımız benzer bilimsel alıřmaların yrtlmesinde kullanılabilir.
4. Elit dzeyde sporda konusunda literatrde ok fazla arařtırma bulunmamaktadır. Bu kavramın farklı deđiřkenlerle iliřkisi zerine arařtırmalar yapılabilir.

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THE EFFECT OF CORRECT TILLAGE ON SUSTAINABLE AGRICULTURE

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Abstract

Soil tillage is closely linked to the concept of sustainability due to its effective role in environmental and agricultural practices. The significance of sustainable agriculture, prioritising unit area yield and food security, has become a necessity amid climate and food crises of the future. This study aims to investigate the practical implementation of correct and conscious tillage methods to reduce soil degradation, enhance soil health and organic matter, promote long-term soil sustainability, and increase crop productivity while reducing environmental impacts. Tillage has recently become increasingly important in the context of land management, resulting in ongoing research in this field. Tillage and land management are integral components in determining the physical, chemical, and biological properties of soil that affect crop yields. It is essential to note that the effects of tillage and land management can be short, medium, or long-term in sustainable agricultural practices. Therefore, it is critical to employ correct management principles to optimize agricultural practices. Proper management of these components can lead to improved soil quality and productivity in agriculture, while simultaneously reducing environmental impacts. In addition to these, appropriate and conscious tillage systems offer socio-economic benefits, including decreased costs associated with machinery, equipment, labour, fuel and fertiliser inputs. The tillage approach selected should depend on factors such as the soil and crop variety characteristics, adaptation to the growing location, and similar considerations. Improper tillage practices may result in soil deterioration, erosion, nutrient loss, escalated carbon emission, depletion of soil microbial activity and biodiversity, as well as water pollution and augmented input costs. It is widely believed that using appropriate and conscientious tillage techniques is crucial for promoting sustainable agricultural productivity and mitigating environmental degradation. This is because these methods have positive impacts on soil quality parameters.

Keywords: Tillage, sustainable agriculture, soil quality, organic matter, soil microbial activity.

Introduction

The rise in environmental issues has led to an increase in concerns and expectations regarding the sustainable management of natural resources, particularly soil (Lal, 2020). Agricultural production has become increasingly important due to population growth and changes in geographical boundaries (Roy et al., 2022). The pressures on natural resources are caused by incorrect and unconscious practices. Intensive agricultural practices, such as unconscious tillage and irrigation, excessive fertilisation, and loss of organic matter, can lead to physical and chemical deterioration of the soil, a decrease in biological activity, and a subsequent decrease in crop production (Karlen et al., 2008). Tillage is one of the factors that directly affects soil quality and management, and it can have both positive and negative effects. Further information on this subject will be presented in the following sections (Ozlu et al., 2022).

Tillage has a significant impact on sustainability due to its effects on the environment. These effects include soil degradation, water quality, and greenhouse gas emissions from soil-related processes (Hassan et al., 2022). Sustainable agriculture is especially crucial in soils that experience frequent climatic changes and are under intense pressure.

Tillage can impact agricultural sustainability by affecting soil processes, properties, and crop growth. Tillage methods should aim to conserve soil and water, improve root system development, maintain soil organic matter content, and reverse degradation of soil life support processes (Francaviglia et al., 2023). Additionally, optimum and correct tillage can contribute to food security by increasing crop yields per unit area.

Recent studies have identified several important components of effective conservation tillage systems, including mulch cultivation, reduced tillage systems, the use of cover crops and cultivated fallows, agroforestry, raised beds or ridge tillage, and soil reversal or deep ploughing (Cárceles Rodríguez et al., 2022). The applicability of these components varies greatly due to ecological limits.

In order to ensure agricultural sustainability in the short, medium, and long term, it is necessary to disseminate practices that take into account basin and field-based components in a process where agriculture will be a strategic power (Tambe et al., 2023).

This study aims to determine the impact of correct tillage techniques and practices on sustainable agricultural productivity. It also explores potential measures to reduce environmental degradation through ideal practices.

2. Contributions of Correct Tillage to Soil

Research conducted in various climatic conditions, soil types, and crop rotation systems has demonstrated that soils subjected to reduced tillage and no-tillage practices contain significantly higher amounts of soil organic matter compared to conventionally tilled soils (Alvarez, 2005). Therefore, soil organic matter levels are one of the most important factors that directly affect soil fertility. Crop residues and additives, such as manure and compost, are sources of soil organic matter. They facilitate soil integration with tillage, thus increasing soil fertility and organic matter levels, which improves soil health and fertility (Rahman et al., 2020). Additionally, environmentally and agriculturally friendly applications, such as vermicompost and mycorrhiza (Figure 1), can increase microbial activity in the soil. Mineralisation can be achieved through correct and conscious ploughing techniques (Maji et al., 2017).

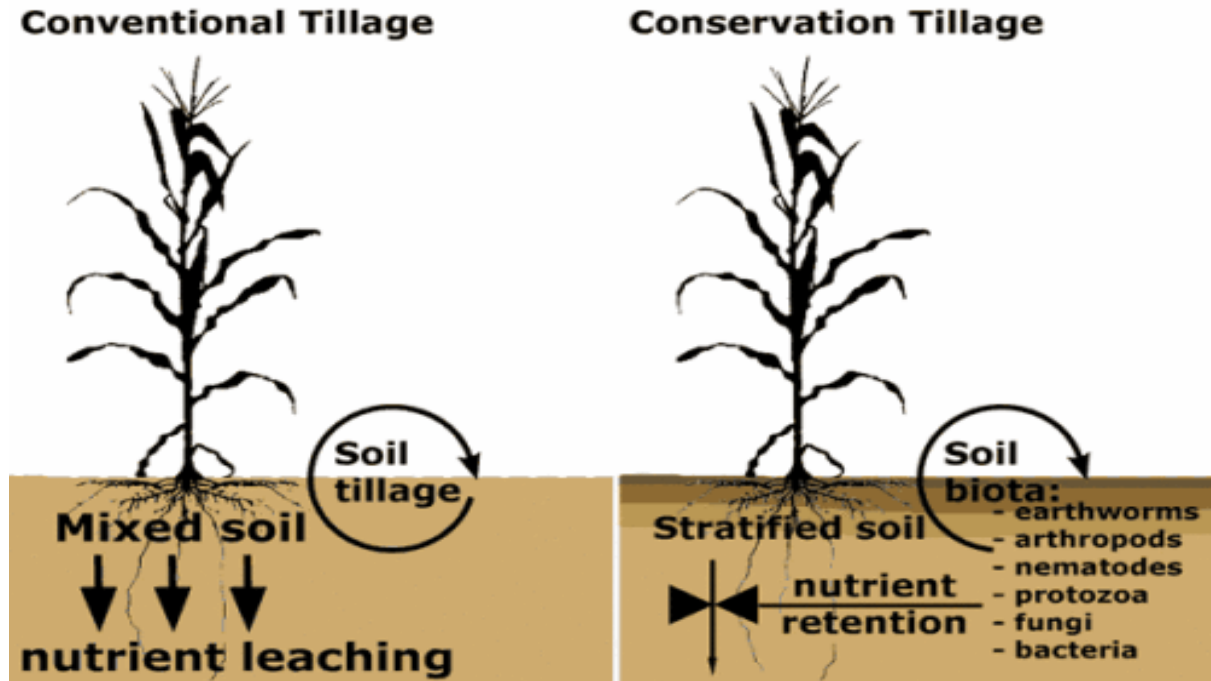


Figure 1. Geleneksel ve koruyucu toprak işlemenin toprak mikroorganizmaları üzerine etkisi (Wander, 2009)

Seed bed preparation is a crucial stage in agricultural production. Tillage plays a significant role in improving seed bed preparation and creating optimal conditions for plant growth and germination. This process can enhance the germination ability of important industrial crops such as maize and soya (Singh et al., 2013).

Post-harvest crop residues and certain additives can aid in weed control, reducing competition for resources between crops and weeds and ultimately leading to increased yields. However, tillage can have negative effects.

In agricultural production, weed control is crucial for both cost and nutrient contribution to the crop. Tillage can support weed management by burying weed seeds and disturbing root systems (Mia et al., 2023) (Figure 2). Incorporating organic matter into the soil is also crucial for sustainable agriculture as it enhances disease and pest control. Conservation tillage practices can reduce the spread of soil-dwelling pathogens and pests by burying them, thereby protecting crops from damage. Reducing reliance on pesticides and promoting sustainable disease and pest management techniques can be achieved through this approach.

Additionally, weed control can be improved by minimising the use of herbicides, promoting more sustainable weed management practices. This not only contributes to lower pesticide and input costs but also plays a crucial role in environmental protection (Bajwa, 2014). Tillage can improve soil structure by breaking up compacted soil, which increases aeration and water infiltration. This promotes root development and nutrient uptake, resulting in healthier crops and higher yields (Schlüter et al., 2018).

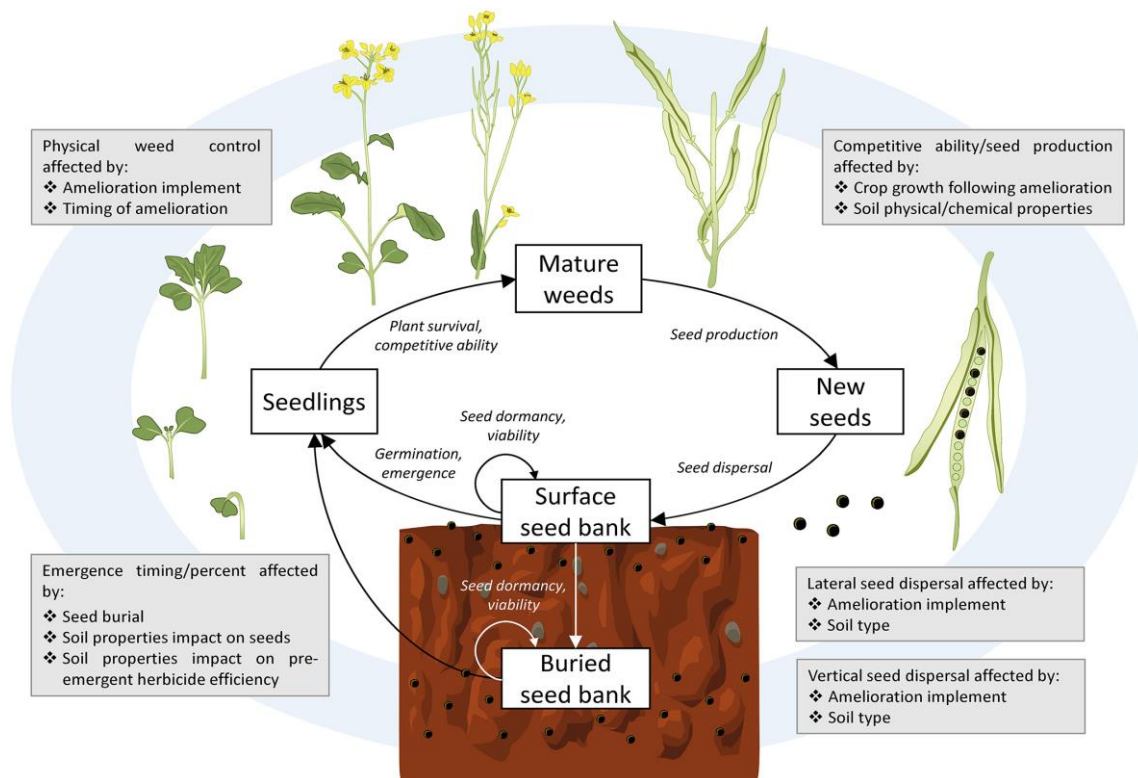


Figure 2. A simplified life cycle of *Sinapis arvensis* L. (wild mustard) as a weed is presented with its corresponding life stages (represented by white text boxes) and the processes involved during the transitions from one stage to another (indicated through text in italics). The impacts of soil amelioration, as they affect each stage, are represented in grey text boxes (Mia et al., 2023).

Planned and conscious tillage can positively contribute to soil structure. Limiting tillage intensity can prevent soil degradation, maintain its structure, and minimise erosion (Mattila et al., 2022). This is commonly referred to as conservation tillage, which advocates reducing tillage frequency as much as possible (Cordeau et al., 2020). Another alternative that has emerged in sustainable agriculture research is no-till farming. According to Somasundaram et al. (2020), the use of herbicides to control weeds and leaving crop residues on the soil surface is reported to be effective in preventing soil degradation, while also promoting soil conservation and carbon sequestration.

3. The Importance of Correct Tillage for Soil Health

Unconscious and improper tillage in agricultural practices can cause soil degradation, including soil compaction, increased water erosion and salinisation, decreased soil organic matter, nutrient content and soil biodiversity. These factors can negatively impact soil fertility and long-term sustainability (Lal et al., 2021; Cárceles Rodríguez et al., 2022).

A healthy soil is a dynamic living system that provides various ecosystem services, including maintaining water quality and plant productivity, controlling nutrient recycling in the soil, and removing greenhouse gases from the atmosphere (Tahat et al., 2020). Soil microbiological activity is affected by tillage intensity in many ways, mainly due to changes in soil organic C (SOC) content. However, changes in soil type and texture, as well as experimental and agronomic factors such as cropping patterns and crop residue management, can significantly impact the magnitude and direction of these changes (Nunes et al., 2020). Tillage intensity has a significant impact on SOC and biological soil health indicators. The application of complementary conservation practices as an integrated system, along with appropriate tillage methods and soil conservation measures, can help reduce the negative impact of tillage on soil health indicators (Veum et al., 2015). The microbiological activity of soil can directly impact the level of organic matter present. Therefore, it is important to ensure that the soil's activities are in harmony with ecosystem services to maintain its positive effects. This paper aims to list the contributions of proper tillage to sustainable agricultural activities and soil health.

- Saving labour and fuel,
- Increase in the level of earnings due to increased yields,
- Reduced fertiliser expenditure,
- Ensuring weed control,
- Lower irrigation needs,

- Control of diseases and pests at a lower level,
- Lower level of CO₂ emissions,
- Reduction of erosion and runoff,
- It increases the mineralisation process of wastes on the soil surface,
- Protection and improvement of soil properties, increase of biological activity in soil,
- It makes significant contributions to microbial activity and increase in organic matter level and similar issues.



Figure 3. Management principles and benefits of soil health (Cárceles Rodríguez et al., 2022).

4. Conclusion and Suggestions

The protection and improvement of soil quality require consideration of short, medium, and long-term productivity levels, as well as sustainability. Use clear, concise, and objective language to explain the necessary actions to be taken to benefit the soil and ecosystem services. Effective soil management practices not only enhance soil health but also promote the

sustainability and multifunctionality of agro-ecosystems, thereby reducing the negative socio-economic and environmental impacts associated with soil degradation.

The world is currently researching, discussing, and adopting vital issues such as food safety and environmental protection. Traditional or unconscious agricultural activities have disadvantages such as inefficient use of natural assets, environmental impacts, and high production costs. In contrast, protected agriculture or conscious soil cultivation and conservation offer advantages such as input savings and increased competitiveness. It is important to consider these factors when making decisions about agricultural activities.

Consequently, the adoption of the right tillage methods, especially soil conservation tillage systems, plays a critical function in sustainable agriculture.

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SOSYAL DEVLET KAPSAMINDA ERDEMLİ MALLARA BAKIŞ

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Özet

Musgrave tarafından ortaya konan bir ifade olan “Erdemli Mallar” kavramı devletin vatandaşlarına bir takım hizmetler sunması neticesinde her geçen gün, hem önemini hem de beraberinde getirdiği tartışmaları arttırmaktadır. Erdemli malların sosyal devlet kapsamında tüketicilere sunulması, beraberinde ciddi bir maliyeti de getirmektedir. Bu maliyetlere vergi gibi yükümlülükler ile katlanmak zorunda bırakılan bireyler, erdemli malların niteliğini sorgulama eğilimine gitmektedirler. Sosyal devlet gereği vatandaşlarının refahını arttırmayı amaçlayan devletler; uyguladıkları bazı yöntemler ile olumlu sonuçlar almayı amaçlarken, direnç ile karşılaşmakta ve bu durumun negatif dışsallıkları da beraberinde getirdiği durumlar ile karşılaşmaktadır. Eğitim ve sağlık temelli uygulamalar, bireyler tarafından sorgulanmakta ve devletin amaçladığı duruma karşı bazen tepkileri de beraberinde getirmektedir. Zorunlu aşı uygulaması, okullarda çocuklara sunulan bazı hizmetlerin veliler tarafından olumlu karşılanmaması bilgi düzeyinin ve eğitim düzeyinin eksik kalması ile açıklanamamaktadır. Kamu gelirlerine katkı sunan bireylerin erdemli mallara karşı, gerektiğinde soru işaretleri ile yaklaşmaları olağan bir durum olarak görülmelidir. Tüketicilerin, zorunlu kılınan durumlar söz konusu olduğunda bu malları istememeleri seçeneği göz ardı edilmemeli ve bu konuda çalışmalar yapılmalıdır.

Anahtar Sözcükler: Musgrave, Erdemli Mallar, Sosyal Devlet

MERIT GOODS WITHIN THE SCOPE OF THE STATE

Abstract

The concept of "Merit Goods", an expression put forward by Musgrave, increases both its importance and the discussions it brings with each passing day, as a result of the state providing a number of services to its citizens. Providing merit goods to consumers within the scope of the social state also brings with it a serious cost. Individuals who are forced to bear these costs through obligations such as taxes tend to question the nature of merit goods. States that aim to increase the welfare of their citizens as a requirement of the social state; While they aim to get positive results with some of the methods they apply, they encounter resistance and situations where this situation brings with it negative externalities. Education and health-based practices are questioned by individuals and sometimes lead to reactions against the situation intended by the state. Compulsory vaccination and the fact that some services offered to children in schools are not welcomed by parents cannot be explained by the lack of knowledge and education level. It should be considered normal for individuals who contribute to public revenues to approach merit goods with question marks when necessary. The option that consumers may not want these goods when there are mandatory situations should not be ignored and studies should be carried out on this issue.

Keywords: Musgrave, Merit Goods, Social State

Giriş

Devletler kendi vatandaşlarının daha iyi şartlarda yaşamaları için çaba sarf ederler. Bu doğrultuda atılan adımlar kimi zaman vatandaşlar tarafından olumlu karşılanırken kimi zaman da belirli ölçüde dirençler meydana gelmektedir. Erdemli mallar devletler tarafından bir nevi sosyal eşitliğin sağlanması için kullanılmaktadır. Yaşlılara, çocuklara, ekonomik olarak daha alt gelir gruplarında bulunan bireylere, kimi zamanlar ise toplumun neredeyse tümüne sağlanan bu hizmetler ile birlikte toplumsal refaha katkı sunulması amaçlanmaktadır. Musgrave tarafından ortaya atılan erdemli mallara karşı eleştiriler de bulunmaktadır. Kamusal harcamaların yapılabilmesine doğrudan veya dolaylı bir biçimde katkıda bulunan bireyler bir takım erdemli malları reddetme sürecine gidebilmektedirler. Bu doğrultuda tepkisel süreçler meydana gelmekte ve bu durum sadece Musgrave'in ortaya attığı gibi bilgi ve eğitim düzeyi seviyesinin düşük olması ile açıklanamamaktadır.

1. Erdemli Mal Kavramı

Erdemli mallar kamu maliyesi içinde önemli bir yere sahiptir. 1950'li yıllarda Richard Musgrave tarafından ortaya konulmuş olup tüketici tercihleriyle birlikte mal ve hizmetlerin kimler tarafından nasıl ortaya konacağı konularının tartışılmasına neden olmuştur. Erdemli mallar, özel ve kamusal mallar ile birlikte üçüncü bir mal grubu olarak ortaya çıkmıştır. Erdemli mallar için örnek olarak okullarda öğrenciler için dağıtılan bedava sütler, emniyet kemeri, sanatsal faaliyetlerin finansmanının sağlanması, zorunlu olarak yapılan aşular, huzurevleri gibi bir takım faaliyetler sayılmaktadır (Yıldırım, Akyol, 2022). Erdemli mallar açıklanırken ortaya çıkan iki husus bulunmaktadır. Bunlardan biri sosyal devlet iken bir diğeri paternalizmdir. Devlet, sosyal devlet olması halinde geliri diğer gruplara göre daha düşük olan bireyler ile bakıma ihtiyaç duyan kişilere sunulan mal ve hizmetler erdemli mal ve hizmetler çerçevesinde düşünülmektedir. Erdemli malların yüksek sosyal faydalarının bulunmasından kaynaklı olarak özel sektörün bu mal ve hizmetleri yeteri kadar sunamayacağı kabul edilmektedir. Bu noktada devlerin “baba” olma özelliği ön plana çıkmaktadır (Zülfüoğlu, Soydan, 2019). Erdemli malların bir diğer önemli özelliği kişisel mal niteliğine sahip olmaları ve tüketimleri engellenebilir mallar olmalarıdır. Özel sektörün erdemli malları üretmelerine olanak sağlandığı takdirde bu malların yeteri kadar tüketilememesi ve negatif dışsallığa sebep olma olasılıkları bulunmaktadır. Bundan kaynaklı olarak erdemli mallar kamu bütçesi tarafından finanse edilen mallar arasında yer almaktadır (Aydın, Çalışkan, 2019). Erdemli mallar ile ilgili bir diğer önemli husus tercih çarpıklığı kavramıdır. Tercih çarpıklığının en önemli sebebi kişilerinin

bilgilerinin eksik olması, gelirlerinin az olması, fayda-maliyet analizi yapma konusundaki eksikleri ve rasyonelliğe aykırı davranışlarının bulunmasıdır. Gelir adaletsizliğinin belirgin bir biçimde görüldüğü ülkelerde devletlerin erdemli mallar konusundaki rolü büyük önem arz etmektedir. Erdemli mallara olan talebi arttırmanın zorlayıcılık, vatandaşlara riskleri göstererek bilgi edinme olanaklarının arttırılması ile sübvansiyon yapmak olmak üzere üç yolu bulunmaktadır (Kirmanoğlu, 2017). Erdemli mallar az üretilen ve yetersiz tüketilen mallar oldukları için devlet müdahalesi gerektirmektedir. Bireylerin uzun vadeli yararlar yerine kısa vadeli yararlarını düşünmeleri yetersiz tüketimlere sebep olmaktadır (Musgrave, 1956, 1987).

2. Sosyal Devlet Kavramı

Sosyal devlet ya da bir diğer ismiyle refah devleti çok eski yıllara ait bir kavram olmakla birlikte yirminci yüzyılda batı demokrasilerinde önemli bir şekilde vurgulanmış ve 1940'lı yıllardan itibaren Avrupa kıtasında yaygınlaşmıştır. 1970'li yıllara gelindiğinde sosyal devlet eleştirileri başlamış olmakla beraber 80'li yıllarda farklı şekilde ele alınmıştır. Bu zaman diliminden itibaren sosyal devlet kavramına yeni anlamlar eklenmiştir (Türkoğlu, 2013).

Genel olarak ifade etmek gerekirse; devlet tarafından, toplumun sosyal refahını arttırmak için müdahalelerde bulunulmasını ifade eden ve bu doğrultuda çalışan devlet modeline sosyal devlet denmektedir (Yay, 2014). Sosyal devlet uygulamalarında tarihsel süreç içerisinde farklı durumlar yaşanmasına rağmen devletlerin değişen yöntemlerle pek çok dönemde sosyal refah uygulamalarına başvurdukları bilinmektedir. Devletler vatandaşları arasında sosyal adaleti tesis etme gayesiyle hareket etme çabaları bu anlayışın temelini meydana getirmektedir (Karaca, Çam, 2019).

3. Sosyal Devletin Erdemli Mallar ile İlişkisi

Toplum içerisinde yaşayan grupların ya da bazı bireylerin ekonomik ve sosyal yaşantılarını daha iyi bir hale getirebilmek için bazı mallar ya bireylere bedelsiz sunulma ve finansmanı vergilerle sağlanmaktadır ya da piyasada var olan fiyatların çok daha altında satılmaktadır. Bu mal ve hizmetler sosyal anlamda gelir dağılımında devlet müdahalesini olanaklı hale getirmektedir (Egeli, Karakoyun, 2019).

Sosyal devlet ilkesi gereği erdemli mal olarak toplumun hizmetine sunulan mallar arasında dinlenme yerleri ve parklar, öğrenci yurtları, toplu konutlar, öğrenciler için okullarda dağıtılan

ücretsiz kitaplar, sosyal tesisler, aşı, vatandaşların yararına sunulan kültür ve sanat hizmetleri sunulmaktadır (Özel, 2014).

3.1 Erdemli Mallara Karşı Oluşan Tepkiler

Tüketicilerin tercihlerinin çarpıklaşması veya bozulması erdemli malların tüketilmesi konusunda sorunları beraberinde getirmektedir. Böyle bir durumda toplum tarafından tüketilmesi arzulanan malların tüketimi sekteye uğramaktadır. Vatandaşların hiç tercih etmedikleri veya çok az tercih ettikleri fakat toplum tarafından tüketilmesi sonucunda büyük fayda getireceği düşünülen mal ve hizmetlerin tüketimi için kamusal müdahalelerin olduğu görülmektedir (Yıldırım, Akyol, 2022).

Kamusal müdahaleler kimi zaman aşılarda olduğu gibi bireylerin hareket kabiliyetinin kısıtlanmasına neden olurken kimi zamanda emniyet kemeri uygulamalarındaki gibi cezai yaptırımlar ile sonuç odaklı uygulanmaktadır.

3.1.1 Sağlık temelli uygulamalar

Erdemli mallar çevresinde oluşan tartışmaların merkezinde tüketicilerin tercihlerinin eksik ve çarpık olması yer almaktadır. Bu problemler Covid-19 aşısı ile birlikte tekrar gündeme gelmektedir. Tüketicilerin tercihlerinin bozulması halinde tüketicilerin toplum için önemli görülen ürünleri tüketmediği haller ile karşılaşılmaktadır (Yıldırım, Akyol, 2022).

Aşı karışıklığı hususu dünyanın pek çok ülkesinde karşılaşılan bir durumdur. Bazı salgınlardan dolayı bağışıklığı olmayan çocukların pek çoğunun ebeveynlerinin aşılarla karşı ön yargılı olmalarından kaynaklı aşı olmadıkları görülmüştür. Yine tüketici tercihlerinin eksik olması hususu ile ilgili bu bireylerde aşının erdemli mal olarak görülmesi ve toplum üzerinde çoğu zaman dayatılması beraberinde bazı sorunları da getirmektedir.

3.1.2 Eğitim temelli uygulamalar

Herhangi bir hizmetin erdemli mal olarak değerlendirilip değerlendirilemeyeceği konusunu Musgrave bazı kriterler belirlemiştir. Bu kriterler; halkın sağlığı için gerekli görülen ama bilgi düzeyinin ve eğitim düzeyinin yeterli olmaması durumunda talebin eksik olması hali olarak ifade edilmiştir. Bilgide eksiklikler ve düşük gelir söz konusu olduğunda istenilen ölçüde talep oluşmamaktadır (Zülfüoğlu, Soydan, 2019).

Türkiye’de okullarda öğrenciler için dağıtılan süt, kuru üzüm veya son dönemde anasınıfı öğrencileri için okullarda dağıtılan kahvaltılık ve öğlen yemeği uygulamaları buna örnek olarak gösterilebilir. Çocukların gelişimi için önemli görülen beslenme biçimlerine bir takım velilerin tepki oluşturduğu örnekler ile karşılaşmaktadır. Dağıtılan sütlerin ve kuru üzümün ne derece sağlıklı olduğu, markaları, son tüketim tarihleri tartışılan hususlardan olmaktadır. Yine özellikle anaokullarında dağıtılan yemeklerin çocuklarının damak tatlarına hitap etmediği, çocuklarının sevmediği yemekler neticesinde aç kaldıkları ve alternatif geliştirilmesi yönünde fikirler beyan edilmektedir.

SONUÇ

Erdemli mallar sosyal devlet anlayışı gereği kamu maliyesinde oldukça önemli bir yer tutmaktadır. Bu doğrultuda devletler toplumsal eşitliğe katkı sunmak adına pek çok mal ve hizmeti daha çok alt gelir gruplarına ulaştırmayı amaçlarlar. Bu doğrultuda yapılan faaliyetler vatandaşların bir kısmı tarafından tepkisel karşılanabilmektedir. Tüm dünyayı etkisine altına alan ve bireylerin hayat tarzları üzerinde değişikliklere sebebiyet veren Covid-19 pandemisi sürecinde getirilen aşı zorunluluğu bu hususta önemli bir örnek olarak karşımıza çıkmaktadır. Aşı konusunda kafasında bazı soru işaretleri bulunan tüketicilerin aşı olmak istememeleri ve bu doğrultuda takındıkları tavır kamu tarafından negatif dışsallık kapsamında algılanmakta iken, bu bireyler tarafından ise kamu gelirlerine sunmuş oldukları katkının sorgulanması anlamına gelmektedir. Buna benzer durumlar, huzurevi, toplu konut ve eğitim kapsamlı erdemli mallar içinde geçerlidir. Sadece alt gelir grubunda bulunan veya eğitim seviyesi düşük olan bireylerin tepkisel davranmadıkları, toplumun pek çok kesiminde farklı hassasiyetlerin olduğu görülmektedir. Bu doğrultuda erdemli mallar olarak görülen mallara olan yaklaşımın yeniden değerlendirilmesi ve tüketicilerin ortaya koydukları irade karşısında alternatiflerin geliştirilmesi gerekmektedir.

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A TECHNICAL SURVEY ON ENERGY POTENTIALS OF POINT FOCUS SOLAR COLLECTOR SYSTEM: A SUSTAINABLE RESOURCE FOR ENERGY MIX AUGMENTATION

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Abstract

The increasing demand for energy and the need to reduce greenhouse gas (GHG) emissions, has led to a growing interest in exploring alternative energy sources. Point focus solar collector (PFSC) systems, have emerged as a promising technology for harnessing solar energy and converting it into electricity or heat. This survey was conducted on the energy potentials of PFSCs including their efficiency, cost-effectiveness, environmental impact, and potentials for integration into the existing energy infrastructure. Findings revealed that PFSC systems involves zero GHG emissions, making them a clean and sustainable energy option that contributes to the reduction of GHG emissions. It was observed that the Levelized cost of electricity (LCOE) from PFSC systems has become competitive with conventional energy sources, such as coal and natural gas. This cost-effectiveness, combined with the potential for long-term savings on fuel costs, makes PFSC systems an attractive option for energy mix augmentation. Considering their power potentials, PFSC systems can be integrated into the grid to provide electricity during peak demand periods or to supplement the energy supply during periods of low solar radiation. Also, they can be combined with thermal energy storage technologies to provide a continuous and reliable energy supply. Conventional studies indicated that the efficiency of PFSC systems depends on various factors, including the type of collector, the concentration ratio, and the tracking mechanism. The high efficiency, cost-effectiveness, and minimal environmental impact make PFSC systems a viable option for large-scale energy production. Thus, with PFSC systems, the energy mix can be augmented to reduce the reliance on conventional energy sources while contributing to a more sustainable and secured energy future.

Keywords: Energy potential, Solar collectors, Energy mix, GHG emissions, sustainability.

Overview of Point Focus Solar Collector

Solar energy has gained significant attention as a renewable and sustainable source of power. Among the various solar technologies, point focus solar collectors have emerged as a promising solution for harnessing solar energy efficiently. The concept of point focus solar collectors can be traced back to ancient civilizations. The ancient Greeks and Romans used concave mirrors to concentrate sunlight for various purposes, including heating water and starting fires (Michael et al., 2016; Szabó, 2017). However, it was not until the 19th century that significant advancements were made in this field. Augustin Mouchot, a French inventor, is credited with developing the first practical point focus solar collector in the 1860s. Mouchot's solar-powered steam engine utilized a parabolic reflector to concentrate sunlight onto a boiler, generating steam for mechanical work. This invention marked a significant milestone in the development of point focus solar collectors (Shreve, 2013; Fernandez, 2019)

Over the years, technological approaches have greatly improved the efficiency and practicality of point focus solar collectors. One notable approach is the use of advanced materials for reflectors and absorbers (Salvi et al., 2018; Lakshmipathy et al., 2020). Initially, mirrors made of polished metal were used, but they were heavy and prone to corrosion. Modern point focus solar collectors employ highly reflective materials such as silvered glass or aluminium-coated polymer films, which are lightweight and durable. Another significant approach is the integration of tracking systems. Point focus solar collectors require precise alignment with the sun to maximize energy capture (Lee et al., 2009; Ahmad et al., 2024). Early designs relied on manual adjustment, but the introduction of automatic tracking systems greatly improved their efficiency. These systems use sensors and motors to continuously orient the collector towards the sun, ensuring optimal sunlight concentration throughout the day.

Furthermore, the development of receiver technologies has enhanced the conversion of concentrated sunlight into usable energy. Initially, point focus solar collectors were primarily used for thermal applications, such as water heating and steam generation. However, advancements in receiver technologies have enabled the conversion of concentrated sunlight into electricity through the use of photovoltaic cells. This integration of solar thermal and photovoltaic technologies has expanded the range of applications for point focus solar collectors (Desideri et al., 2013; Ali and Alabid, 2022).

Point focus solar collectors play a crucial role in the renewable energy sector due to their high efficiency and versatility (Sankar and Muniraja, 2020; Tabassum et al., 2021). Their ability to concentrate sunlight allows for the collection of a large amount of energy in a relatively small

area. This makes them particularly suitable for applications requiring high-temperature heat, such as industrial processes and power generation. Moreover, point focus solar collectors have the potential to contribute significantly to the reduction of greenhouse gas emissions. By replacing fossil fuel-based energy sources, they can help mitigate climate change and promote sustainable development. Additionally, their modular design allows for scalability, making them adaptable to various energy demands.

The historical development and technological advancements of point focus solar collectors have transformed them into a viable and efficient solution for harnessing solar energy. From ancient civilizations to modern times, these collectors have evolved significantly, incorporating advanced materials, tracking systems, and receiver technologies. Their high efficiency and versatility make them a valuable asset in the renewable energy sector, contributing to a sustainable future. As the world continues to prioritize clean energy sources, further research and development in point focus solar collectors will undoubtedly lead to even more efficient and cost-effective solutions (Kalogirou, 2004; Nikolaidis, 2023; Hasan et al., 2023).

2. Theories Governing Point Focus Solar Collector

The Point Focus Solar Collector (PFSC) is a significant technology in the field of solar energy conversion. A comprehensive theories governing the principles of PFSC are presented as follows:

Concentrated Solar Power (CSP) Principle: The PFSC operates on the principle of Concentrated Solar Power (CSP), which involves focusing sunlight onto a small area to generate heat or electricity (Soomro et al., 2019). CSP systems utilize mirrors or lenses to concentrate sunlight onto a receiver, which then converts the solar energy into usable forms. This theory forms the basis for the PFSC's functionality and distinguishes it from other solar energy technologies.

Optical Concentration: Optical concentration is a key theory governing the PFSC. By employing mirrors or lenses, the PFSC concentrates sunlight onto a small focal point, thereby increasing the intensity of solar radiation. Therefore, optical concentration enhances the efficiency of solar energy conversion, making the PFSC a viable option for large-scale power generation (Zhe et al., 2021; Soomar et al., 2022).

Thermal Energy Conversion: The PFSC utilizes thermal energy conversion theory to convert concentrated solar radiation into usable heat or electricity. The concentrated sunlight heats a working fluid, such as water or oil, which then transfers the heat to a power cycle or storage system. This theory highlights the PFSC's potential for various applications, including

electricity generation, desalination, and industrial processes (Obalalu et al., 2023; Dada et al., 2023).

Tracking Systems: Tracking systems theory plays a crucial role in optimizing the PFSC's performance. The PFSC requires precise tracking mechanisms to ensure continuous alignment with the sun's position throughout the day. This theory emphasizes the importance of accurate tracking systems in maximizing solar energy collection and improving overall system efficiency (Chong et al., 2009; Xiao et al., 2017).

The theories governing the Point Focus Solar Collector provide a solid foundation for understanding its functionality and potential applications. The Concentrated Solar Power principle, optical concentration, thermal energy conversion, and tracking systems theory collectively contribute to the PFSC's efficiency and effectiveness. Research and technological advancements are necessary to address these limitations and enhance the overall performance of the PFSC.

3. Operating parameters influencing the Performance of PFSCs

Point focus solar collectors, also known as concentrator solar collectors, are designed to concentrate sunlight onto a small area using mirrors or lenses. This concentration of sunlight increases the intensity of the solar radiation incident on the receiver, which in turn enhances the energy conversion efficiency. However, the performance of point focus solar collectors can be influenced by several factors, which need to be carefully considered during the design and operation of these systems. Operating parameters play a crucial role in determining the performance of point focus solar collector systems (Foulaadvand et al., 2021; Iqbal et al., 2023). These parameters include the solar irradiance, collector temperature, concentration ratio, and tracking accuracy.

Solar irradiance: Solar irradiance is a key factor that affects the performance of point focus solar collector systems. It refers to the amount of solar energy received per unit area. Higher solar irradiance levels result in increased energy collection and conversion. A higher solar irradiance level leads to a higher temperature rise in the collector, resulting in improved system efficiency (Gorjian et al., 2015; Vidyanandan, 2017). Therefore, it is essential to consider the solar irradiance levels when designing and operating point focus solar collector systems. The intensity of solar radiation incident on the collector surface determines the amount of energy that can be converted into usable heat or electricity. Variations in solar irradiance due to factors such as cloud cover, atmospheric conditions, and seasonal changes can significantly impact the

performance of point focus solar collectors. Therefore, accurate measurement and prediction of solar irradiance are essential for optimizing the performance of these collectors (Park et al., 2021; Tscholl et al., 2022; Kosmopoulos et al., 2024).

Collector temperature: Collector temperature is another critical operating parameter that significantly impacts the performance of point focus solar collector systems. The temperature of the collector affects the efficiency of energy conversion. As the collector temperature increases, the efficiency of the system decreases due to increased thermal losses. Maintaining a lower collector temperature can enhance the overall performance of point focus solar collector systems. Therefore, it is crucial to control the collector temperature within an optimal range to maximize system efficiency (Sardeshpande et al., 2021; Wang et al., 2021; Wang et al., 2023).

Concentration ratio: Concentration ratio is a parameter that determines the concentration of solar energy onto the receiver. It is defined as the ratio of the area of the reflector to the area of the receiver. A higher concentration ratio leads to increased energy collection and conversion. A higher concentration ratio improves the system's ability to concentrate solar energy onto the receiver, resulting in enhanced performance. Therefore, it is important to optimize the concentration ratio to achieve higher system efficiency (Supa et al., 2015; Osorio et al., 2019; Ardila et al., 2021).

Tracking accuracy: Tracking accuracy is an operating parameter that influences the performance of point focus solar collector systems. Tracking accuracy refers to the ability of the system to accurately track the movement of the sun. A higher tracking accuracy ensures that the collector is always aligned with the sun, maximizing energy collection. A higher tracking accuracy improves the system's performance by increasing the solar energy incident on the receiver. Therefore, it is crucial to maintain a high tracking accuracy to achieve optimal system efficiency. Point focus solar collectors require precise tracking systems to ensure that the concentrated sunlight remains focused on the receiver throughout the day. Any deviations or errors in tracking can result in reduced performance and efficiency of the collector. Factors such as mechanical wear, control system accuracy, and environmental conditions can affect the tracking accuracy of point focus solar collectors. Therefore, it is crucial to maintain and calibrate the tracking system regularly to ensure optimal performance (Hughes, 1980; Sardeshpande et al., 2011; Ullah and Kang, 2019; Sauerborn, 2021; Liu, B., Zong and Huang, 2023).

Receiver Design: The design of the receiver plays a vital role in the performance of point focus solar collectors. The receiver is responsible for absorbing the concentrated solar radiation and

converting it into usable heat or electricity. Factors such as receiver material, geometry, and thermal properties can significantly impact the efficiency and performance of the collector. The selection of appropriate receiver materials with high thermal conductivity and low emissivity is crucial to minimize heat losses and maximize energy conversion efficiency. Tagle-Salazar et al., 2020; Malwad and Tungikar, 2020a; Malwad and Tungikar, 2020b; Kumar and Gupta, 2022).

Environmental Conditions: Environmental conditions, such as ambient temperature, wind speed, and humidity, can affect the performance of point focus solar collectors. High ambient temperatures can lead to increased thermal losses, while strong winds can cause misalignment of the mirrors or lenses, resulting in reduced concentration and efficiency. Humidity can also affect the optical properties of the collector components, leading to decreased performance. Therefore, it is essential to consider the local environmental conditions during the design and operation of point focus solar collectors (Mustafa et al., 2020; Hasan et al., 2022; Gholami et al., 2022; Lin et al., 2023).

Operating parameters such as solar irradiance, collector temperature, concentration ratio, and tracking accuracy significantly influence the performance of point focus solar collector systems. Higher solar irradiance levels, lower collector temperatures, higher concentration ratios, and higher tracking accuracy lead to improved system efficiency. Therefore, it is essential to consider and optimize these operating parameters to maximize the performance of point focus solar collector systems.

4. Energy Storage for Point Focus Solar Collectors

Point focus solar collectors (PFSCs) have gained significant attention as a promising technology for harnessing solar energy. These collectors concentrate sunlight onto a small area, resulting in higher temperatures and increased energy conversion efficiency. However, the intermittent nature of solar radiation necessitates the integration of energy storage systems to ensure a continuous and reliable power supply (Suman et al., 2015; Hussain and Lee, 2016; Arnaoutakis and Katsaprakakis, 2021). Energy storage for point focus solar collectors are classified as follows:

a. Thermal Energy Storage

Sensible Heat Storage: Thermal energy storage (TES) systems, such as sensible heat storage, utilize the heat capacity of a material to store excess energy generated by PFSCs. Sensible heat storage materials, such as molten salts or rocks, absorb and release heat as their temperature

changes. This method offers high energy density and long-term storage capabilities, making it suitable for PFSCs (Bauer et al., 2012; Alva et al., 2017; Rigui et al., 2022).

Latent Heat Storage: Latent heat storage involves the phase change of a material, such as the melting and solidification of a substance, to store and release energy (Rathod, 2022; Teamah, 2022). Phase change materials (PCMs) exhibit high energy storage density and can store energy for extended periods. However, the limited range of operating temperatures and the need for encapsulation pose challenges for their implementation in PFSCs.

b. Electrochemical Energy Storage

Batteries: Batteries, such as lithium-ion batteries, offer a viable option for energy storage in PFSCs. They provide high energy density, fast response times, and can be easily integrated into existing systems. However, their limited lifespan, high cost, and environmental concerns associated with their production and disposal hinder their widespread adoption.

Supercapacitors: Supercapacitors, also known as ultra capacitors, store energy through the separation of charges at the electrode-electrolyte interface. They offer high power density, rapid charge/discharge rates, and long cycle life. However, their relatively low energy density and high self-discharge rates limit their application in long-term energy storage for PFSCs (Bharti et al., 2021; Ahmed et al., 2022).

c. Chemical Energy Storage

Hydrogen Production: Hydrogen production through water electrolysis offers a promising avenue for energy storage in PFSCs. This method involves using excess electricity generated by PFSCs to split water into hydrogen and oxygen. Hydrogen can be stored and later used in fuel cells or combustion engines to generate electricity. However, challenges related to hydrogen storage, transportation, and safety need to be addressed for widespread implementation. Wang et al., 2021; Tashie-Lewis and Nnabuife, 2021; Nasser et al., 2022).

5. Advancements in Point Focus Solar Collectors

Solar energy has emerged as a promising alternative to conventional energy sources due to its abundance and environmental benefits. Point focus solar collectors, also known as concentrated solar power (CSP) systems, have witnessed significant advancements in recent years. These are enumerated as follows:

High-Efficiency Solar Cells: One of the major advancements in point focus solar collectors is the development of high-efficiency solar cells. Traditional solar cells have limited efficiency in converting sunlight into electricity. However, recent breakthroughs in materials science and engineering have led to the creation of more efficient solar cells, such as multi-junction cells and perovskite cells. These advancements have significantly increased the overall efficiency of point focus solar collectors, making them more economically viable (Hoffschmidt et al., 2012; Tabarhoseini et al., 2022; Parthiban and Ponnambalam, 2022).

Concentrated Solar Power Systems: Point focus solar collectors utilize mirrors or lenses to concentrate sunlight onto a small area, thereby generating high temperatures (John, 2015; Zaboli et al., 2023). The advancements in concentrating technologies have led to the development of more efficient and cost-effective systems. For instance, parabolic trough collectors, heliostat mirrors, and dish-Stirling systems have become more sophisticated, allowing for higher concentration ratios and improved energy conversion.

Thermal Energy Storage: One of the key challenges of solar energy is its intermittent nature. However, advancements in thermal energy storage systems have addressed this issue. Point focus solar collectors can now store excess thermal energy in molten salts or other heat transfer fluids, which can be used to generate electricity during periods of low sunlight. This breakthrough has significantly increased the reliability and dispatchability of point focus solar collectors, making them a more attractive option for large-scale energy production (Salloom et al., 2018; Wang et al., 2020; Modi, 2023; Barrasso et al., 2023).

Hybridization with Other Energy Sources: To further enhance the reliability and efficiency of point focus solar collectors, hybridization with other energy sources has gained attention. By integrating CSP systems with fossil fuel power plants or biomass facilities, the overall energy output can be increased while ensuring a continuous power supply. This hybrid approach allows for the utilization of existing infrastructure and provides a smoother transition towards a renewable energy future (Yousef et al., 2021; Alami et al., 2023; Gutiérrez-Alvarez et al., 2023; Chen et al., 2023).

6. Characteristics of Point Focus Solar Collectors

Point focus solar collectors are a crucial component of solar energy systems due to their unique characteristics enumerated as follows:

Concentration Ratio: One of the primary characteristics of point focus solar collectors is their ability to achieve high concentration ratios. Concentration ratio refers to the ratio of the area of

the collector aperture to the area of the receiver (Kulkarni et al., 2023; Kulkarni, et al., 2020). Higher concentration ratios enable increased energy conversion efficiency by focusing a larger amount of sunlight onto a smaller receiver area. This characteristic makes point focus solar collectors suitable for applications requiring high-temperature heat or electricity generation.

Tracking Mechanism: Point focus solar collectors often incorporate tracking mechanisms to ensure optimal alignment with the sun's position throughout the day (Lee et al., 2009; Racharla and Rajan, 2017; Aghamohammadi and Foulaadvand, (2023). This characteristic allows for maximum utilization of solar energy by continuously adjusting the collector's orientation. Tracking mechanisms can be either single-axis or dual-axis, with the latter providing higher accuracy but at a higher cost. The ability to track the sun's movement enhances the overall performance of point focus solar collectors, especially in regions with varying solar angles.

Thermal Storage: Point focus solar collectors can be integrated with thermal storage systems, enabling the storage of excess thermal energy for later use (Tian and Zhao, 2023; Elkhatat and Al-Muhtaseb, 2023). This characteristic is particularly advantageous for applications requiring continuous energy supply, even during periods of low solar radiation. Thermal storage systems can utilize various materials, such as molten salts or phase change materials, to store and release thermal energy efficiently. The incorporation of thermal storage enhances the flexibility and reliability of point focus solar collectors, making them suitable for both residential and industrial applications.

Optical Efficiency: The optical efficiency of point focus solar collectors plays a crucial role in determining their overall performance. This characteristic refers to the ability of the collector to capture and concentrate sunlight effectively. Factors such as reflector design, receiver material, and tracking accuracy influence the optical efficiency of these collectors. Higher optical efficiency ensures maximum utilization of available solar energy, resulting in improved energy conversion efficiency (Danielli et al., 2011; Belghachi, 2015)

Hybridization with Fossil Fuels: Another advancement is the hybridization of point focus solar collectors with fossil fuel power plants. This integration allows for the utilization of solar energy during peak sunlight hours, reducing the reliance on fossil fuels and decreasing GHG emissions. Hybrid systems can enhance the overall efficiency and reliability of power generation (Hassan et al., 2023; Al-Rawashdeh et al., 2023; León Gómez et al., 2023)

High-Temperature Applications: Point focus solar collectors have also made advancements in high-temperature applications. By using advanced materials and innovative designs, these systems can achieve higher temperatures, enabling the production of hydrogen, synthesis of

fuels, and other industrial processes that require extreme heat (Wang et al., 2019; Arnaoutakis and Katsaprakakis, 2021; Aquilanti et al., 2023)

7. Applications of Point Focus Solar Collectors

Point focus solar collectors are a type of solar energy technology that concentrates sunlight onto a small area, maximizing the amount of energy that can be harvested. These collectors have gained significant attention due to their potential to generate clean and sustainable energy.

Power Generation: One of the primary applications of point focus solar collectors is in power generation. Concentrated solar power (CSP) plants utilize these collectors to focus sunlight onto a receiver, which then converts the solar energy into heat. This heat is used to generate steam, which drives a turbine to produce electricity. CSP plants have the advantage of being able to store excess heat, allowing for continuous power generation even during periods of low sunlight. This makes them a reliable and efficient source of renewable energy (Kurup and Turchi, 2016; Ayaz et al., 2020; Ghodbane et al., 2020).

Industrial Processes: Point focus solar collectors can also be employed in various industrial processes that require high-temperature heat. For instance, in the manufacturing sector, these collectors can be used to provide heat for processes such as metal smelting, drying, and chemical reactions. By utilizing solar energy instead of fossil fuels, industries can significantly reduce their carbon footprint and operating costs (Fortuin and Stryi-Hipp, 2012; Kumar et al., 2022; Tasmin et al., 2022).

Desalination: Another promising application of point focus solar collectors is in desalination. Solar desalination systems utilize the concentrated solar energy to evaporate seawater, leaving behind the salt and other impurities. The vapour is then condensed to produce fresh water. This technology offers a sustainable solution to address the global water scarcity issue, particularly in arid regions where access to freshwater is limited (Xu et al., 2017; Hoque, et al., 2019; Aende et al., 2020; Choong et al., 2020).

Heating and Cooling: Point focus solar collectors can also be used for residential and commercial heating and cooling purposes. Solar thermal systems can provide hot water for domestic use, space heating during colder months, and even cooling through absorption chillers (Helm et al., 2014; Filipowicz et al., 2019). By harnessing solar energy for these applications, buildings can reduce their reliance on conventional energy sources, leading to lower energy bills and reduced greenhouse gas emissions.

8. Advantages of Point Focus Solar Collectors

Solar energy is a renewable and sustainable source of power that has gained significant attention in recent years. Point focus solar collectors, also known as concentrated solar power (CSP) systems, are a type of solar technology that uses mirrors or lenses to concentrate sunlight onto a small area. The various advantages of point focus solar collectors are as follows:

High Efficiency: Point focus solar collectors have the advantage of achieving high levels of efficiency in converting sunlight into usable energy (Sun et al., 2023; Obalalu et al., 2023). By concentrating sunlight onto a small area, these systems can generate higher temperatures, which in turn increases the efficiency of energy conversion. This high efficiency makes point focus solar collectors suitable for large-scale power generation, particularly in regions with abundant sunlight.

Energy Storage: Another advantage of point focus solar collectors is their ability to incorporate energy storage systems. By utilizing thermal energy storage, excess heat generated during peak sunlight hours can be stored and used later when sunlight is not available (Sarbu and Sebarchievici, 2018; Agbo et al., 2021). This feature allows for continuous power generation, even during cloudy periods or at night. Energy storage also enhances the reliability and stability of the power supply, making point focus solar collectors a viable option for meeting energy demands.

Scalability: Point focus solar collectors offer scalability, allowing for the construction of both small and large-scale power plants (Omeiza et al., 2023; Ahmad et al., 2024). These systems can be easily expanded by adding more mirrors or lenses, enabling the generation of higher power outputs as needed. This flexibility makes point focus solar collectors suitable for various applications, ranging from residential and commercial use to utility-scale power generation.

Energy Viability: The energy viability of point focus solar collector systems has improved over the years due to technological advancements and economies of scale. The cost of solar photovoltaic (PV) modules, which are used in many solar energy systems, has significantly decreased, making solar energy more competitive with conventional energy sources (Diemuodeke et al., 2021; Dada and Popoola, 2023). Furthermore, the operational and maintenance costs of point focus solar collector systems are relatively low compared to other renewable energy technologies. These factors make point focus solar collector systems an attractive option for energy mix augmentation.

Environmental Benefits: The use of point focus solar collectors contributes to significant environmental benefits. Firstly, solar energy is a clean and renewable source, resulting in

minimal greenhouse gas emissions compared to fossil fuel-based power generation (Owusu et al., 2016; Agbo et al., 2021; Hussain et al., 2022). Secondly, point focus solar collectors have a smaller land footprint compared to other renewable energy technologies, such as wind or biomass. This makes them suitable for areas with limited available land. Additionally, the use of point focus solar collectors reduces water consumption, as they do not require large amounts of water for cooling, unlike conventional power plants.

Economic Opportunities: The deployment of point focus solar collectors presents various economic opportunities. The construction and operation of solar power plants create jobs, stimulating local economies. Moreover, the use of solar energy reduces dependence on imported fossil fuels, leading to energy independence and improved energy security. Additionally, as the technology advances and becomes more widespread, the cost of point focus solar collectors is expected to decrease, making them more economically competitive with conventional power generation methods (Oyedepo, 2012; Obaideen et al., 2021; Bhuiyan et al., 2022).

Point focus solar collectors offer numerous advantages, including high efficiency, energy storage capabilities, scalability, environmental benefits, and economic opportunities. These advantages make them a promising solution for addressing energy needs while mitigating environmental concerns. As the world continues to transition towards a sustainable energy future, point focus solar collectors have the potential to play a significant role in meeting global energy demands.

9. Disadvantages of Point Focus Solar Collectors

Point focus solar collectors have gained significant attention in recent years due to their ability to concentrate sunlight onto a small area, thereby increasing the efficiency of solar energy conversion. However, despite their advantages, these collectors also possess several disadvantages that need to be considered.

High Cost: One of the primary disadvantages of point focus solar collectors is their high cost. The complex design and advanced technology required for these systems contribute to their expensive nature (Omeiza et al., 2023; Salvi et al., 2018). The manufacturing, installation, and maintenance costs associated with point focus solar collectors can be prohibitive, making them less accessible for widespread adoption, particularly in developing countries or regions with limited financial resources. However, the levelized cost of electricity (LCOE) from PFSC systems is gradually becoming very competitive with conventional energy sources in recent times.

Limited Efficiency: While point focus solar collectors offer higher efficiency compared to other solar technologies, they are still subject to certain limitations. These collectors heavily rely on direct sunlight, making them less effective in cloudy or overcast conditions (Abdul-Rahman and Wang, 2010; Toledo et al., 2016). Additionally, their efficiency is significantly reduced during periods of low solar radiation, such as early mornings, late evenings, or winter months. This limitation restricts their overall energy output and may require additional energy storage systems to compensate for the intermittent nature of solar energy.

Environmental Concerns: Point focus solar collectors often employ reflective surfaces and mirrors to concentrate sunlight onto a small area. The manufacturing and disposal of these materials can have adverse environmental impacts. The production of reflective surfaces may involve the use of toxic chemicals, while their disposal can contribute to landfill waste. Additionally, the large-scale deployment of point focus solar collectors may disrupt local ecosystems and habitats, particularly if not properly planned and managed (Hernandez et al., 2015; Roddis et al, 2020).

Safety Risks: The concentrated solar energy produced by point focus solar collectors can pose safety risks if not handled properly. The intense heat generated by these systems can cause burns or fires if the collectors are not adequately insulated or protected. Moreover, the concentrated sunlight can be harmful to human eyes and may require additional safety measures during installation, maintenance, or repair. (Arnaoutakis and Katsaparakakis, 2021; Hagumimana et al., 2021).

Land and Space Requirements: Point focus solar collectors typically require a significant amount of land or space for installation. This can be a challenge in densely populated areas or regions with limited available land. Moreover, the concentration of solar energy in a small area may lead to localized temperature increases, potentially affecting nearby vegetation or wildlife.

Weather Conditions: Another significant disadvantage is their sensitivity to weather conditions, particularly cloudy or overcast skies. Cloud cover reduces the amount of sunlight reaching the collector, thereby decreasing its energy output (Kejna et al., 2021; Tian et al., 2023). Additionally, the initial cost of installing point focus solar collectors, especially those with advanced tracking mechanisms, can be relatively high. These limitations should be considered when evaluating the suitability of point focus solar collectors for specific applications

While point focus solar collectors offer higher efficiency and concentrated solar energy, they also possess several disadvantages that need to be carefully considered. The high cost, limited efficiency under certain conditions, environmental concerns, safety risks, and land requirements

associated with these collectors highlight the need for a comprehensive evaluation before their widespread adoption. Future research and technological advancements may help address these drawbacks, making point focus solar collectors a more viable and sustainable option for harnessing solar energy.

10. Types of Point Focus Solar Collectors

Solar energy has emerged as a promising alternative to conventional energy sources due to its abundance and environmental benefits. Point focus solar collectors play a crucial role in harnessing solar energy efficiently.

Parabolic Trough Collectors: Parabolic trough collectors (PTCs) are one of the most widely used point focus solar collectors. As shown in Figure 1, these collectors consist of parabolic-shaped mirrors that concentrate sunlight onto a receiver tube located at the focal point (Çağlar, 2016; Ahmad et al., 2024). PTCs offer several advantages, including high efficiency, low maintenance requirements, and the ability to generate high-temperature heat. PTCs can achieve thermal efficiencies of up to 80%, making them suitable for various applications such as electricity generation and industrial processes. However, PTCs also have certain limitations. Parabolic troughs use curved mirrors to focus sunlight onto a receiver tube (Babuje et al., 2020; Lüpfer, 2022). Firstly, their design requires precise alignment with the sun's position, necessitating complex tracking systems (Ramde et al., 2020; Felsberger et al., 2022). Secondly, the receiver tube's high temperatures can lead to thermal losses and material degradation over time. Despite these limitations, PTCs remain a popular choice due to their proven track record and reliability. These collectors can be categorized into two main types: parabolic troughs and solar power towers.

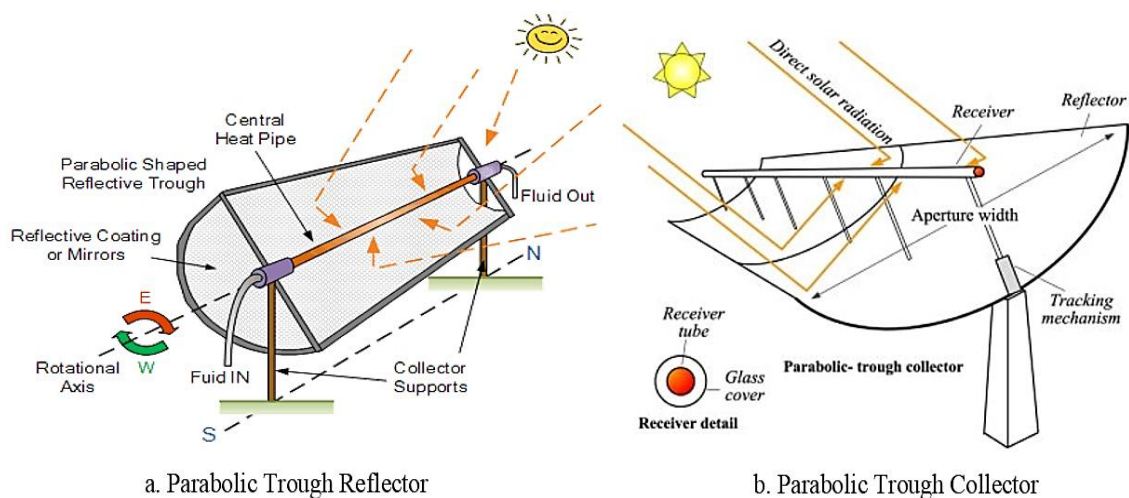


Figure 1: Parabolic trough systems

Dish Stirling Systems: Dish Stirling systems are another type of point focus solar collector that utilizes a parabolic dish to concentrate sunlight onto a receiver at the focal point (Gholamalizadeh and Chung, 2017; Arnaoutakis and Katsaprakakis, 2021) as shown in Figure 2. These systems employ a Stirling engine to convert the concentrated solar energy into electricity. Dish Stirling systems offer several advantages, including high efficiency, modularity, and the ability to generate both electricity and heat simultaneously. Dish Stirling systems can achieve solar-to-electric conversion efficiencies of up to 30%, making them one of the most efficient solar technologies available. Additionally, their modular design allows for easy scalability, making them suitable for both small-scale and large-scale applications. However, the high cost of dish Stirling systems and their complex maintenance requirements pose significant challenges to their widespread adoption (Mancini et al., 2003; Monné, 2014; Singh and Kumar, 2018; Alhawsawi et al., 2023).

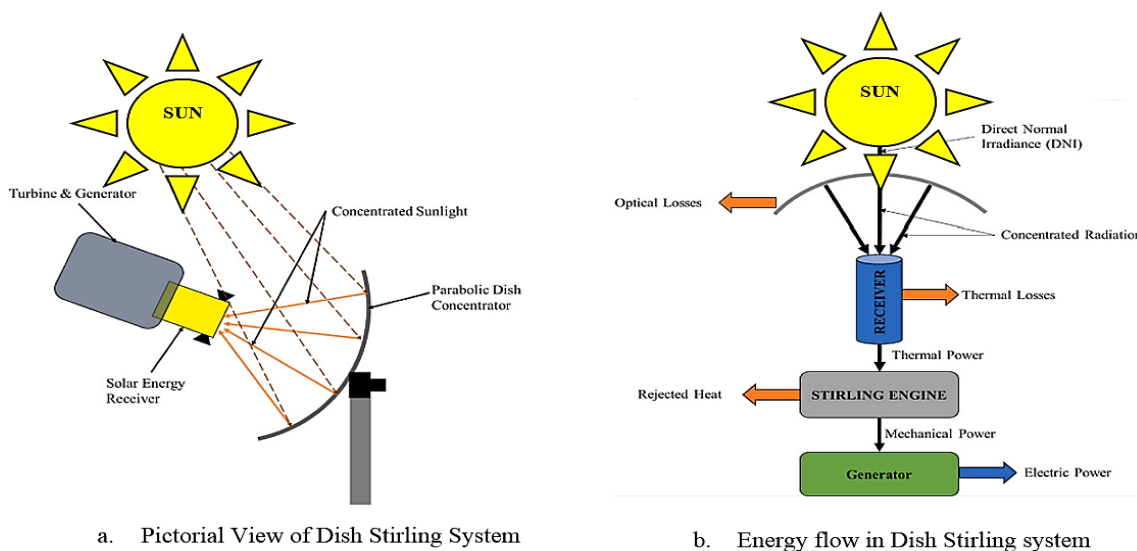


Figure 2: Dish Stirling systems

Fresnel Reflectors: Fresnel reflectors are a type of point focus solar collector that utilizes a series of flat mirrors to concentrate sunlight onto a linear receiver (Breeze, 2016; Breeze, 2019). These collectors consist of a fixed solar collector and a high inverted linear fixed receiver. Direct solar radiation is reflected on several rows of single-axis tracking mirrors. The radiation is reflected and focused on a fixed linear receiver mounted above the mirror, which may or may not be combined with auxiliary concentrators as shown in Figure 3a. This receiver consists of a secondary reflector and a highly efficient selectively coated vacuum tube. The heat is then collected in this absorption tube. The heat is then transferred to industrial processes via a heat carrier as shown in Figure 3b. The secondary reflector increases the optical efficiency of the

collector while also protecting the muffler (Kalogirou, 2014; Murty, 2017). The Fresnel collector is incorporated with high quality solar components such as safety glass mirrors and thermally efficient vacuum tubes.

Fresnel reflectors offer advantages such as low cost, ease of installation, and the ability to generate high-temperature heat. Fresnel reflectors can achieve optical efficiencies of up to 70%, making them a cost-effective option for various applications. However, Fresnel reflectors also have limitations. The linear receiver design can lead to thermal losses and non-uniform heat distribution along the receiver tube. Additionally, the complex mirror arrangement requires precise alignment and tracking systems, increasing the overall system complexity and cost (Bhatia, 2014; Karathanasis, 2019; Singh et al., 2021).

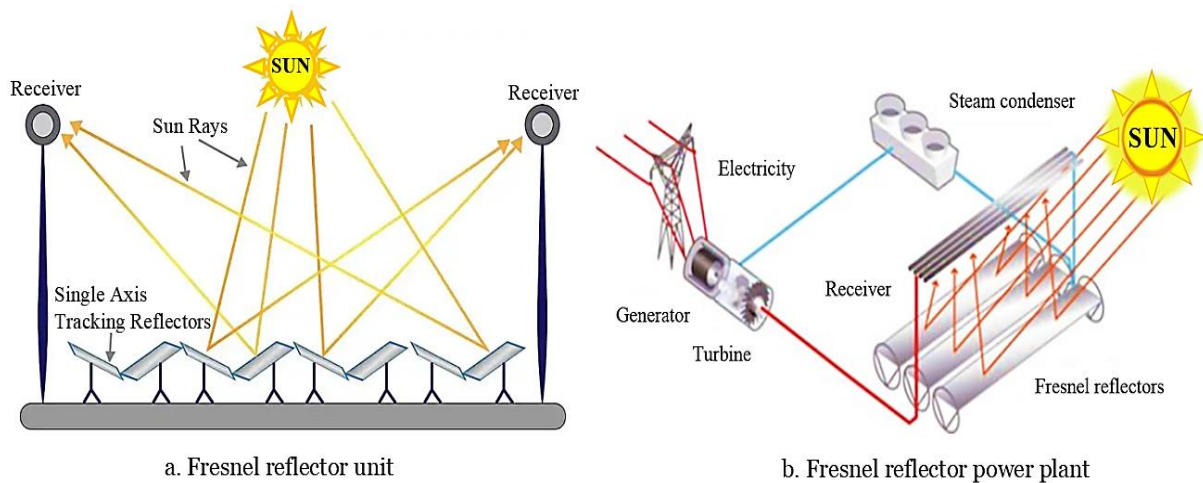


Figure 3: Fresnel reflector systems

Solar Power Towers: Solar power towers use an array of flat sun-tracking mirrors, known as heliostats, to reflect sunlight onto a central receiver located at the top of a tower as shown in Figure 4 (Alrwashdeh, 2018; Behar et al., 2020; Hamanah et al., 2023). The receiver absorbs the concentrated solar energy and transfers it to a heat transfer fluid, which is then used to generate electricity through a conventional steam turbine system. Solar power towers use an array of mirrors to direct sunlight towards a central receiver located on a tower (Khosravi, et al., 2021; Telsnig and Ferrán, 2016; Silva-Pérez, 2017).

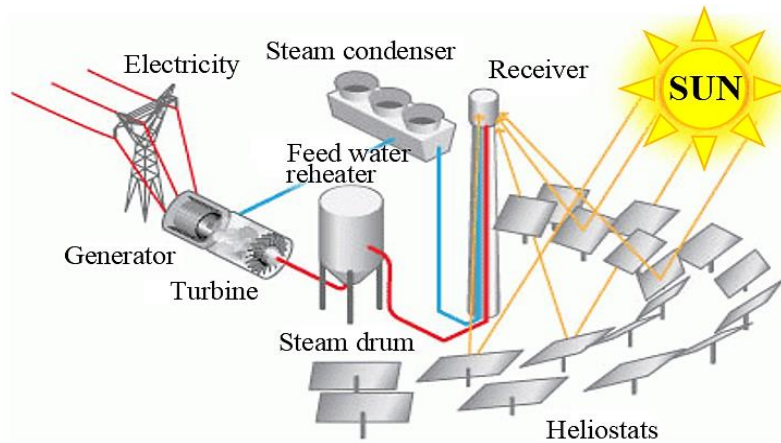


Figure 4: Solar power tower system

Point focus solar collectors, including parabolic trough collectors, dish Stirling systems, and Fresnel reflectors, offer unique advantages and limitations. PTCs provide high efficiency and reliability, while dish Stirling systems offer modularity and dual heat-electricity generation capabilities. Fresnel reflectors, on the other hand, provide a cost-effective solution for high-temperature heat generation. The choice of the collector type depends on the specific application requirements, cost considerations, and available resources. Further research and development are necessary to overcome the limitations and enhance the performance of these point focus solar collectors, ultimately contributing to the widespread adoption of solar energy as a sustainable energy source.

11. Augmentation of Point Focus Solar Collectors

Solar energy has emerged as a sustainable and abundant source of renewable energy. PFSCs are a key technology used to harness solar energy efficiently. This technology offers benefits such as high energy concentration, reduced material usage, and improved efficiency compared to other solar collector types. However, to further enhance their performance and address certain limitations, it is essential to explore some augmentation techniques which are enumerated as follows:

Optical Augmentation: Optical augmentation techniques aim to improve the concentration ratio and overall efficiency of PFSCs. Examples include the use of secondary reflectors, refractive or diffractive optical elements, and spectral filters. These techniques enhance the collection of solar radiation and minimize energy losses (Kincaid et al., 2018; Manikandan et al., 2019; Subramaniyan et al., 2021)

Thermal Augmentation: Thermal augmentation techniques focus on reducing heat losses and improving the thermal performance of PFSCs. Strategies such as selective coatings, advanced

heat transfer fluids, and innovative receiver designs help increase the overall efficiency and temperature output of the system. Shamsul Azha et al., 2020; Kumar and Varghese, 2022; Kalair et al., 2022).

Tracking Augmentation: Tracking augmentation techniques aim to enhance the accuracy and reliability of solar tracking systems used in PFSCs. Advanced tracking algorithms, improved sensors, and innovative control mechanisms can optimize the tracking accuracy, leading to increased energy collection (Nguyen, 2016; Awasthi et al., 2020; Seme et al., 2020).

Augmentation techniques offer several advantages, including increased energy collection, improved system efficiency, and enhanced economic viability. These benefits contribute to the overall competitiveness of PFSCs in the renewable energy market. Augmentation techniques also present challenges such as increased complexity, higher costs, and potential reliability issues (Lee et al., 2009; Kumar et al., 2021). The integration of new components and materials requires careful consideration to ensure long-term performance and economic feasibility. The augmentation of PFSCs holds great promise for enhancing solar energy harvesting. Optical, thermal, and tracking augmentation techniques offer significant benefits in terms of increased energy collection, improved efficiency, and economic viability. However, careful consideration of the associated challenges is crucial to ensure the long-term performance and reliability of augmented PFSC systems. Further research and development efforts are needed to optimize these techniques and facilitate the widespread adoption of augmented PFSCs in the renewable energy sector.

12. Thermodynamic Equations for PFSCs

Thermodynamic equations employed in computing the PFSC parameters are as follows:

a. Declination angle

To effectively estimate the solar radiation of a tilted surface, there is need to know the angular position of the sun at solar noon, hence the determination of the declination angle considering the number of days. Declination angle varies and is calculated using the following relation in Equation 1.

$$\delta = 23.45 \sin \left(360 \frac{284+n}{365} \right)$$

where n is the no of days. For n , the mean day in each month was used.

b. Zenith Angles of the sun

The Zenith angle was estimated considering the angle between the vertical and the line to the sun, that is, the angle of incidence of beam radiation on a horizontal surface has to be known in order to effectively estimate the amount of solar radiation on a solar collector. The zenith angle is given by Equation 2:

$$\cos \theta_z = \cos \phi \cos \delta \cos \omega + \sin \phi \sin \delta$$

where ϕ = latitude of the location, δ = declination angle, ω = Hour angle

c. Solar Azimuth Angle (γ_s)

The solar azimuth angle is estimated using the following relations in Equation 3:

$$\gamma_s = \sin(\omega) \left| \cos^{-1} \left(\frac{\cos \theta_z \sin \phi - \sin \delta}{\sin \theta_z \cos \phi} \right) \right|$$

where, Sign function is used to determine ω , θ_z = Zenith angle, ϕ = latitude of site and δ = Declination angle.

d. Incidence angle

The angle of incidence on the inclined surface is given by Equation 4 (Duffie and Beckman, 2013):

$$\cos \theta = \cos \theta_z \cos \beta + \sin \theta_z \sin \beta \cos (\gamma_s - \gamma)$$

Where θ = incidence angle, β = tilted angle, $\gamma = 0$, because it is facing south, θ_z = Zenith angle and γ_s = Solar azimuth angle.

e. Radiation on tilted surface

The geometric factor R_b , is the ratio of beam radiation on the tilted surface, and this can be estimated using the following relations in Equation 5.

$$R_b = \frac{\cos \theta}{\cos \theta_z} = \frac{G_{b,t}}{G_h}$$

where θ = angle of incidence, θ_z = zenith angle respectively, $G_{b,t}$ = radiation on tilted surface and G_h = radiation on horizontal surface.

To determine the available energy in the solar collector, it is important to consider the equation for energy gained by the solar collector. This is given by Equation 6 (Al-Sulaiman, 2014):

$$Q_{use} = m_a C_p \Delta T$$

Equation for heat losses from the collector is expressed in Equation 7 (Islam et al., 2015):

$$Q_{use} = A_{abs} Q_r [S_i - U_1 (\Delta T)]$$

The energy leaked from the solar collector is given by Equation 8 [29]: (Calise et al., 2016):

$$E_1 = \left\{ U_1 A_{abs} (T_{abs} - T_a) \left(1 - \frac{T_a}{T_{abs}} \right) \right\}$$

where S_i is the optical absorbed solar flux and U_i is the heat loss by emittance, reflection and optical efficiency of glazing given by Equation 9 (Jafarkazemi and Ahmadifard, 2013):

$$Q_R = \frac{m a C_P}{U_1 A_{abs}} \left[1 - \exp \left\{ \frac{-F \phi U_1 A_{abs}}{m a C_P} \right\} \right]$$

The energy destroyed by the solar collector is given by Equation 10 (Farahat et al., 2009):

$$E_d = -m C_P T_a \frac{T_{out}}{T_{in}} E_d = -m C_P T_a \left\{ 1n \left(\frac{T_{out}}{T_{in}} \right) - \left(\frac{T_{out} - T_{in}}{T_{abs}} \right) \right\}$$

(10)

where E_d is the heat loss due to absorber plate temperature. It is the latent heat absorbed by the solar collector in phase change. The exergy of the solar collector is given by Equation 11 (Islam et al., 2015):

$$E_{out} = \left[\left\{ \left(m_a C_P \left(T_{out} - T_a \right) l_n \frac{T_{out}}{T_a} \right) - \frac{m \Delta P_{out}}{\rho} \right\} + m w C_P (T_w - T_a) \right]$$

In this case, the angle of incidence is given by Equation 12 (Kalogirou et al., 2016):

$$\cos \theta = \sin \phi (\sin \delta \cos \beta + \cos \delta \cos \gamma \cos \omega \sin \beta) + \cos \phi (\cos \delta \cos \omega \cos \beta - \sin \delta \cos \gamma \sin \beta) + \cos \delta \sin \gamma \sin \omega \sin \beta$$

where δ is the Declination angle, n is no of day in the yea, β is the slope angle, ϕ is the latitude of the location, γ is the surface azimuth angle and ω is the hour angle. Tilt factor for sun light radiation is given by Equation 13.

$$r r_b = \frac{\cos \theta}{\cos \theta_z}$$

$$\cos \theta_z = (\sin \phi * \sin \delta) + (\cos \phi * \cos \delta * \cos \omega)$$

Radiation shape factor for the diffused radiation is given by Equation 15 while the tilt factor for reflected radiation is given by Equation 16.

$$R_d = \frac{(1 + \cos \beta)}{2}$$

$$r_r = \frac{\rho (1 - \cos \beta)}{2}$$

Instantaneous efficiency is given by Equation 17 while exergy (e) is given by Equation 18

$$\eta_i = \frac{\dot{m} C_P (T_2 - T_1)}{I_t * A_p}$$

$$e = (h - h_o) - T_o (S - S_o) + \frac{V^2}{2} + g z \quad kJ/kg$$

The top loss coefficient is given by Equation 19.

$$U_T = \left(\frac{N}{\frac{c}{T_{pm}} \left[\frac{(T_{pm} - T_a)}{(N+f)} \right]^e + \frac{1}{h_w}} \right)^{-1} + \frac{\sigma(T_{pm} + T_a)(T_{pm}^2 + T_a^2)}{\frac{1}{\varepsilon_p + 0.00591Nh_w} + \frac{2N+f-1+0.133\varepsilon_p}{\varepsilon_g} - N}$$

Where f = focal distance, h_w = wind heat transfer, ε_p = emittance of plate, N = number of glass covers, c = collector factor, e = emissive power, ε_g = emittance of glass (0.88), T_a = ambient temperature and T_{pm} = mean plate temperature. The bottom loss coefficient is given by the relation in Equation 20:

$$U_B = \frac{k}{L}$$

Where k is thermal Conductivity (Urethane) = 0.028 and L = thickness of urethane layer = 30mm = 0.03. Edge loss coefficient can be estimated using Equation 21:

$$U_e = \frac{\frac{k}{L_e} \times P \times C_t}{C_A}$$

Where k = thermal conductivity of insulation (polyurethane), L_e = Thickness of edge insulation, P = Perimeter of collector, C_t = Thickness of Collector, C_A = Collector Area. The useful energy is given by Equation 22.

$$Q_u = A_c(S - U_L(T_{pm} - T_A))$$

The bond conductance C_b is given by Equation 23.

$$C_b = \frac{K_b b}{\gamma}$$

Where K_b is the bond conductivity, b = bond Width and γ = Bond Thickness. The radiation tilted surface derived from the angle of incidence on the inclined surface is given by Equation 24.

$$R_b = \frac{\cos \theta}{\cos \theta_z}$$

The amount of solar energy received by the collector can also be obtained by the product of the rate of transmission of the glass cover and the absorption rate of the absorber and this is substituted in Equation 25.

$$Q_{rec} = I_n A(\tau\varepsilon)$$

where Q_{rec} is the solar energy received, τ is the transmissivity and ε is the absorption rate. As the collector absorbs heat its temperature gets higher than that of the surrounding and heat is lost to the atmosphere by convection and radiation. The rate of heat loss depends on the collector overall heat transfer coefficient, collector temperature and ambient temperature respectively. This is represented mathematically by Equation 26.

$$Q_{loss} = U_T A (T_p - T_a)$$

where Q_{loss} is the heat loss, U_T is the overall heat transfer coefficient, T_p is initial temperature of the absorber plate and T_a is the ambient temperature respectively. Thus the rate of useful energy extracted by the collector is the rate of extraction under steady state conditions and it is proportional to the useful energy absorbed by the collector. This is given by Equation 27.

$$Q_{usfl} = Q_{recv} - Q_{loss} = I_n A (\tau \varepsilon) - h A (T_p - T_a)$$

where Q_{usfl} is heat energy gained by the solar collector. The heat removal factor F_R is given by Equation 28.

$$F_R = \frac{m C_p (T_{out} - T_{in})}{A ((\tau \varepsilon) - h (T_p - T_a))}$$

$$Q_{usfl} = A F_R [I_n (\tau \alpha)_{av} - U_L (T_p - T_a)]$$

$$\frac{Q_{usfl}}{A} = q = I_n (\tau \varepsilon) - h (T_p - T_a)$$

13. Conclusion

Point focus solar collectors are widely used in solar energy systems to concentrate sunlight onto a small area, thereby increasing the efficiency of energy conversion. However, the performance of these collectors can be influenced by various factors. Solar irradiance, tracking accuracy, receiver design, and environmental conditions are key factors that need to be carefully considered during the design and operation of these systems. By understanding and optimizing these factors, researchers and engineers can enhance the performance and overall efficiency of point focus solar collectors, thereby contributing to the advancement of solar energy technologies. Energy storage is a critical component for the successful integration of PFSCs into the energy grid. While various storage options exist, each has its own advantages and limitations. Thermal energy storage systems, such as sensible and latent heat storage, offer high energy density and long-term storage capabilities. Electrochemical energy storage, including batteries and supercapacitors, provide high power density and fast response times. Chemical energy storage, particularly hydrogen production, shows promise but requires further research and development. A combination of these storage technologies, tailored to specific applications, may be the key to unlocking the full potential of PFSCs in the future. Advancements in point focus solar collectors have revolutionized the renewable energy sector by increasing their efficiency, reliability, and overall performance. The development of high-efficiency solar cells, improved concentrating technologies, thermal energy storage systems, and hybridization with other energy sources have significantly enhanced the viability of point focus solar collectors.

These advancements pave the way for a sustainable and cleaner energy future, reducing our dependence on fossil fuels and mitigating the impacts of climate change.

Point focus solar collectors possess several key characteristics that make them a viable option for harnessing solar energy. Their high concentration ratios, tracking mechanisms, thermal storage capabilities, and optical efficiency contribute to their overall performance. However, it is essential to acknowledge their limitations, such as weather sensitivity and initial cost. By understanding these characteristics, policymakers, researchers, and industry professionals can make informed decisions regarding the implementation and optimization of point focus solar collectors. Point focus solar collectors have a wide range of applications, from power generation to industrial processes, desalination, and heating/cooling systems. These collectors offer a sustainable and efficient way to harness solar energy, contributing to the global transition towards clean and renewable sources of power. As technology continues to advance, the potential for point focus solar collectors to revolutionize various sectors and mitigate climate change becomes increasingly evident.

Abbreviations

GHG	Greenhouse gas
PFSC	Point focus solar collector
CSP	Concentrated Solar Power
LCOE	Levelized cost of electricity
TES	Thermal energy storage
PCMs	Phase change materials
PTCs	Parabolic trough collectors
PV	photovoltaic
n	Number of days
δ	Declination angle
ω	Hour angle
γ_s	Solar Azimuth Angle
θ_z	Zenith angle
ϕ	latitude of site
θ	Incidence angle
β	Tilted angle
R_d	Radiation shape factor for the diffused radiation
$G_{b,t}$	Radiation on tilted surface

G_h	Radiation on horizontal surface
S_i	Optical absorbed solar flux
U_l	Heat loss by emittance, reflection and optical efficiency of glazing.
E_d	Heat loss due to absorber plate temperature difference with fluid
η_i	Instantaneous efficiency
e	Exergy, Emissive power
f	Focal distance
h_w	Wind heat transfer
ε_p	Plate emittance
N	Number of glass covers
c	Collector factor
ε_g	Glass emittance
T_a	Ambient temperature
T_{pm}	Mean plate temperature
k	Thermal conductivity
L	Thickness of urethane layer
L_e	Thickness of edge insulation
P	Perimeter of collector
C_t	Thickness of collector
C_A	Collector area
K_b	Bond conductivity
b	Bond width
γ	Bond thickness
Q_{rec}	Solar energy received
τ	Transmissivity
ε	Absorption rate
Q_{loss}	Heat loss
U_T	Overall heat transfer coefficient, top loss coefficient
T_p	Initial temperature of absorber plate
T_a	Ambient temperature
Q_{usfl}	Heat energy gained by the fluid
U_B	Bottom loss coefficient

F_R	Heat removal factor
Q_u	Useful energy
U_e	Edge loss coefficient
U_T	Top loss coefficient
R_b	Geometric factor, radiation tilted surface
Q_{use}	Available energy in the solar collector
γ	Surface azimuth angle
rr_b	Tilt factor for sun light radiation
r_r	Tilt factor for reflected radiation
C_b	Bond conductance

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THE RELATIONSHIP BETWEEN PARENTING STYLES AND EMOTIONAL INTELLIGENCE IN ADOLESCENTS

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Abstract

The current study aimed to analyze the relationship between parenting styles and emotional intelligence in adolescents. The main objective of this paper is to examine the correlation between leadership styles and emotional intelligence in adolescents. To achieve this goal, we surveyed 100 parents and 100 adolescents from different regions in Kosovo. In this study, we used quantitative methodology, and through the measurement instrument for parenting styles and the measurement instrument for emotional intelligence, we collected data to test our hypotheses. The results of the data analysis showed that the relationship between emotional intelligence and parenting styles is assessed through Spearman's rho correlation. The results indicate a small negative correlation (-0.181) between emotional intelligence and the authoritarian parenting style, but this correlation is not statistically significant (p-value: 0.072). For other parenting styles (permissive, authoritative, neglectful), the results show a weak and statistically insignificant correlation with emotional intelligence. The findings of this study can be used to develop appropriate strategies to assist parents and health professionals in dealing with the challenges of the relationship between parenting styles and emotional intelligence in adolescents.

Keywords: adolescent, parents, parenting styles, emotional intelligence, relationship.

Introduction

Studies of parent-adolescent relationships have grown tremendously recently with implications for emotional intelligence. This study examines the relationship between parenting styles and emotional intelligence in adolescents. Adolescence is a critical developmental period that requires parents and youth to renegotiate their relationship (Reis & Youniss, 2004).

The term emotional intelligence was coined by two researchers, Peter Salavoy and John Mayer in their article "Emotional Intelligence" in the journal *Imagination, Cognition and Personality* in 1990. It was later popularized by Goleman in his 1995 book "Emotional Intelligence".

Goleman defined Emotional Intelligence as a set of skills and characteristics that drive leadership performance. Emotional intelligence is most commonly defined as the ability to perceive, use, understand, manage and handle emotions (Goleman, 1995). Emotional intelligence is the ability to perceive, interpret, demonstrate, control, evaluate and use emotions to communicate and relate to others effectively and constructively (Bar-On, 2000).

Intelligence also refers to the ability to recognize one's own and others' feelings, to motivate oneself, and to manage emotions well in oneself and in our relationships. Unlike intelligence quotient (IQ) which changes little after the teenage years, emotional intelligence (EI) is largely learned, not genetically fixed or developed in early childhood, but continues to develop and is largely determined by the environment (Goleman, 1998).

The way parents discipline their children leads to deep and lasting consequences for the child's emotional life. The literature on how parents treat their children shows that some parents are indifferent to their children while some show warmth (Goleman, 1998).

Benson & Harris, (2002) asserted that parenting styles have a strong effect on children's emotions. Parenting styles have been found to influence children's self-control, sociability and social competence (Benson & Harris, 2002).

Parenting style is defined as a constellation of attitudes and behaviors of parents towards children and an emotional climate in which parental behaviors are expressed ((Walker, 2008). In the field of parenting, the typological approach of Pepe & McCann, (2003) for the concept of parenting has had a tremendous impact. They classified parenting into four types based on responsiveness and demand (Pepe & McCann, 2003).

The democratic parenting style is characterized as highly responsive and demanding. Democratic parents provide not only support and warmth, but also clearly defined rules and consistent discipline (Pepe & McCann, 2003).

The authoritarian parenting style is characterized as low in responsiveness, but high in demand. Parents of this style tend to use hostile control or harsh punishment in an arbitrary manner to achieve compliance, but they rarely provide explanations or allow verbal give-and-take (Pepe & McCann, 2003).

Permissive parenting style is characterized as low in demanding but high in responsiveness. Permissive parents are responsive to their children and satisfy their children's needs, but they fail to impose appropriate discipline, display behavioral control, or make demands for mature behavior (Pepe & McCann, 2003).

Finally, the neglectful parenting style is characterized as low in responsiveness and demanding. Neglectful parents are parent-centered and rarely involved in child-rearing practices. They neither provide warmth nor set rules for their children (Pepe & McCann, 2003).

Variations in parenting styles and qualities of parent-adolescent relationships are longstanding research topics in developmental and family psychology. Previous research has shown that parenting styles are critical family context factors that are closely related to parent-adolescent relationships (Herman, 2007). Despite the large number of studies on the links between parenting styles and emotional intelligence, existing research has mainly focused on the direct effects of parenting styles on parent-adolescent relationships, while the underlying mechanisms through which parenting styles relate to parent-adolescent (Assor, Roth, & Deci, 2004). Previous research has shown that parenting styles are critical family context factors that are closely related to adolescent emotional intelligence. A study of emotional intelligence and perceived parenting styles among adolescents in a rural area in Karnataka concluded that those who reported poor parenting also appeared to report low emotional intelligence in self-awareness, motivation, and social skills (Bar-On, 2000; Braberry & Greaves, 2009). Schaster & Singer, (1962) focused on "parenting styles and traits of emotional intelligence in adolescence". The sample included 127 adolescents from Greek schools, 15–19 years old. They used perceived parenting (Authority Questionnaire – PAQ) and trait IE (Trait Emotional Intelligence Questionnaire – Adolescent Short Form – TIEQue–ASF) The results of the study showed that parenting styles and IE trait were statistically significant for authoritarianism ($b = 0.27, z = 3.92, p < 0.001$) and marginally significant for authoritarianism ($b = -0.10, z = -1.77, p = 0.08$) (Yoder, 2005).

LITERATURE REVIEW

1.1. The influence of parenting styles on emotional intelligence in adolescents

Parenting styles play an important role in the development of emotional intelligence in adolescents. How parents handle and respond to their children's emotions can influence how they develop and express their emotions in the future. A supportive and understanding parenting style, where parents help teenagers understand and manage their emotions, can help develop emotional intelligence. Parents who show care and attention to their children's emotions help them learn how to recognize and understand their emotions, as well as better manage emotional reactions in their relationships with others (Roco, 2004).

On the other hand, interruptive or overbearing parenting styles, where parents have little time or attention to express concern for their adolescent's emotions, can have a negative impact on emotional intelligence. When adolescents do not have the opportunity to learn how to recognize and manage their emotions effectively, they may encounter challenges in their interpersonal relationships and in resolving emotional conflicts (Bar-On, 2000).

Studies have shown that parents who encourage free expression of emotions, awareness and understanding of them, and provide children with the tools to manage their emotions in a healthy way, are more likely to produce teenagers with higher emotional intelligence (Pepe & McCann, 2003).

To increase emotional intelligence in teenagers, it is important for parents to be positive role models in managing emotions and promote an environment where teens feel safe to express and express their emotions. This includes listening carefully, supporting positive emotions, and responding comprehensibly to the adolescent's difficult emotions. An authoritarian parenting style, where parents set strict rules and control teenagers' emotions, can hinder the development of emotional intelligence. In this case, adolescents may feel limited in expressing their emotions and do not learn how to manage them in a healthy and constructive way (Schute, Malouff, & Hall, 1998).

An overly permissive or unconcerned parenting style, where parents do not provide help and guidance in managing emotions, can also have a negative impact on adolescent emotional intelligence. Without parental support, they may encounter challenges in knowing and managing their emotions and may have difficulties with social connections and behaviors (Landa, Lopez, & Martinez, 2006).

Parents who combine wise and supportive ways of interacting are more likely to positively influence the development of adolescent emotional intelligence. This involves a combination of clear limits and clear rules with support and understanding of teenagers' emotions. Parents who provide guidance and assistance in managing emotions and encourage their recognition and understanding help adolescents develop healthy emotional intelligence (Walker, 2008).

1.2. Emotional variability during interactions in the parent-adolescent relationship

Some conflicts with parents can be considered a normal part of family relationships during adolescence and these conflicts are thought to influence the development of autonomy and individualization of adolescents (Caraso & Salovey, 2004). However, too much conflict is dangerous for adolescents' psychosocial adjustment and well-being. Adolescents who have more conflicts with their parents have more externalizing and internalizing problems; lower levels of self-esteem, well-being and adjustment to school; and more frequent substance use. This may reflect two-way processes: Adolescent conflicts with parents may lead to lower psychosocial adjustment, and their adjustment problems may cause more conflict with parents. The conditions under which parent-adolescent conflicts are positively related to parent-adolescent relationship development are less clear. Therefore, to understand more about the role that conflicts play in reshaping parent-adolescent relationships toward more equality, we need to understand what parents and adolescents do during conflict interactions, that is, rather than exploring the number of conflicts that parents and teenagers have, we must consider what they do during their conflicts (Dihoru, 2009).

An important aspect of conflict interactions is the extent to which parents and adolescents display different emotions and flexibly switch between these emotions during conflicts. This flexibility to express different emotions, or emotional variability, enables parent-adolescent dyads to explore new patterns of interaction. When parents and children can express negative and positive emotions during conflicts, they are more likely to find alternative patterns of interaction and renegotiate their relationship. For example, when parents and children can express their anger and frustration at each other during a disagreement, but also show love to each other, express interest in each other's thoughts, and laugh about the conflict, conflicts can help them find new ways to connect with each other. Parents and children who get stuck in anger or other negative emotions, or who only express positive emotions to each other and are afraid to express anger, may have more trouble renegotiating their relationship. Thus, greater emotional variability during parent-adolescent interactions involving conflict reflects

behavioral flexibility, or the ability to effectively adapt and reorganize behavior in response to the various interpersonal and contextual demands associated with adolescence (Roco, 2004). .

Focusing on emotional variability addresses the structure of parent-adolescent relationships and interactions rather than the content. Aspects of relationships are usually evaluated as relatively static characteristics and changes are examined over a long period. Short-term fluctuations in behavior during interactions are often ignored or attributed to lower reliability and measurement error. However, since moment-to-moment interactions are the proximal engines of development, these fluctuations may be a key feature of relationships and relationship development. Thus, investigating variability during parent-adolescent conflict interactions can expose underlying relational processes (Wood & Tolley, 2003).

A dynamic systems approach considers relationships as self-organizing developmental systems that organize behavior around coherent and stable patterns of interaction or attractors. The system is multistable, with multiple attractors or preferred interaction patterns coexisting. Systems tend to stabilize and settle into interaction patterns or attractive states that occur regularly, but at the same time, the system is also characterized by some variability. A dynamic systems approach suggests that this variability reflects internal processes in which relationship characteristics oscillate around an equilibrium from which the relationship withdraws (Petrides, 2004). Adaptive relationships can be flexibly rearranged when changes occur 27. In these relationships, dyad members can adapt easily and fluidly to environmental changes. For example, a mother and daughter may express negative emotions when they disagree about the daughter's curfew, but express mutual support and trust when talking about fun activities. Lack of flexibility (also called rigidity) can be conceptualized as a limited capacity to switch between behaviors in response to changes in the environment or developmental changes, for example, when mother and child cannot exit a negative state when they switch from their conflict about curfews to talk about fun activities, or when they have conflicts in different domains (Mayer & Salovey, 1993).

METHODOLOGY

The methodology of this study will be quantitative. The data collection is primary in nature because the data collection is done with a structured questionnaire prepared for this purpose which will be completely anonymous.

During the work and elaboration of this topic, we have used some of the tools, methods, and techniques most suitable for the study and research of this thesis. The study data were processed with the statistical computer package through the SPSS program.

The main purpose of this paper was to analyze the relationship between leadership styles and emotional intelligence in adolescents. This study also aimed to identify which styles were used more by parents as well as the differences in the use of parenting styles in the context of gender, education level and parents' place of residence. The samples of this research were parents and teenagers. 100 parents and 100 teenagers from different countries in the Kosovo Region participated in this study. The study questionnaire was applied online through the google forms application. In this research, two measuring instruments will be applied: The instrument for parenting styles is standardized Robinson et al, (2020) and the Instrument for measuring emotional intelligence is a standardized questionnaire by Schutte, (1990) analyzing each question in detail so that the questions trigger the variable, and are appropriate to the topic. The survey of respondents started on April 10, 2023 and ended on May 30, 2023. Before starting the survey, we informed the respondents about the purpose of our research and the security of the anonymity of their data.

The hypotheses of this study are:

H1 There is a positive correlation between parenting styles and emotional intelligence in adolescents

H2 Gender, age and place of residence do not have a significant impact on the emotional intelligence of teenagers

RESULTS

In this part of the paper, we have presented the results achieved during this research. For the most comprehensible and logical presentation of the results from the statistical analyses, we have presented the data in the form of tables.

Table 1.
Gender of parents

		N	Percent
Valid	Female	54	54.0%
	Male	46	46.0%
	Total	100	100.0%

Table 1 presents the parents' gender and the frequencies for each gender. From the table, it can be seen that 54% of parents are women, while 46% are men. This shows a balanced representation of the parents' gender in this study group. It is noted that the number of female parents is greater than the number of male parents, but the difference is not very large.

Table 2.
Age of parents

	N	Minimum	Maximumi	Mean	Deviation Std
Age of parents	100	36.00	65.00	51.6100	7.01642

Table 2 presents the data related to the age of the parents and some important statistics of their analysis. The table shows that there are 100 parents included in the study, the minimum value of the parents' age is 36 years, while the maximum value is 65 years. The mean age of the parents is 51.61 years and the standard deviation is 7.01, indicating that the ages of the parents have a certain distribution from the mean.

Table 3
Adolescent gender

		N	Percent
Valid	Female	60	60.0%
	Male	40	40.0%
	Total	100	100.0%

Table 4 presents the gender of the adolescents in the study. The table shows that of the total of 100 teenagers included in the study, 60% of them are female while 40% are male. Based on the data in the table, we can conclude that there is a greater representation of women than men in the group of teenagers included in the study.

Table 4
Adolescent age

	N	Minimum	Maximum	Mean	Deviation Std
Adolescent age	100	16.00	21.00	18.1200	1.51277

Table 5 shows the data related to the age of the adolescents in the study. The table shows that in the group of 100 teenagers included in the study, their average age is 18.12 years. The minimum age of the adolescents in the study is 16 years, while the maximum age is 21 years. The standard deviation of the teenagers' age is 1.5. Based on the data in the table, we can observe that the teenagers in the study have an average age of about 18 years, with a considerable difference between their minimum and maximum ages.

H1. There is a positive correlation between parenting styles and emotional intelligence in adolescents

Table 5.
Correlation between emotional intelligence and parenting styles

			Emotional intelligence	Authoritative style	Permissive style	Collaborative style	Neglecting style
Spearman's rho	Emotional intelligence	Correlation coefficient	1.000	-.181	.033	-.016	.049
		Sig.	.	.072	.742	.877	.627
		N	100	100	100	100	100

Based on table 8, where the correlation between emotional intelligence and parenting styles is presented, we can evaluate hypothesis H1.

In this case, the relationship between emotional intelligence and parenting styles was assessed through Spearman's rho correlation. The results show a small negative correlation (-0.181) between emotional intelligence and authoritarian parenting style, but this correlation is not statistically significant (p-value: 0.072). For other parenting styles (permissive, cooperative, neglectful), the results show a weak and statistically non-significant correlation with emotional intelligence.

Based on these results, we cannot accept hypothesis H1 that there is a positive correlation between parenting styles and emotional intelligence in teenagers. There is insufficient evidence to support such an association in this study.

H2. Gender, age and place of residence do not have a significant impact on the emotional intelligence of adolescents.

Table 6.

The influence of gender, age and place of residence on the emotional intelligence of adolescents

Model	R	"R squared	Adjusted R Square	Std. Error of the Estimate
	.189 ^a	.036	.006	.17004

Table 9 shows the results of the regression model regarding the influence of gender, age and place of residence on emotional intelligence. The correlation value (R) is very small (0.189), it shows that the influence of these factors is limited. The value of "R factor" is 0.036, which indicates a very small and not statistically significant effect. Accordingly, there is no consistent or strong interaction between emotional intelligence and these variables. The value of the estimate of the standard error (Std. Error) is also small (0.17), indicating that the estimate of the model is insignificant.

Table 7.

ANOVA analysis for the influence of gender, age and place of residence on the emotional intelligence of adolescents

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.103	3	.034	1.185	.320 ^b
	Residual	2.776	96	.029		
	Total	2.879	99			

Table 10 presents the ANOVA analysis to assess the influence of gender, age and place of residence on emotional intelligence. The result of the ANOVA analysis shows that there is no statistically significant impact, since the F-test value is small (1.18) and the p-value is above the significance level (0.32).

Tabela 8.

Coefficients for the influence of gender, age and place of residence on the emotional intelligence of adolescents

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.542	.252		18.024	.000
	Adolescent gender	-.059	.036	-.170	-1.631	.106
	Adolescent age	-.008	.012	-.072	-.683	.496
	Residence of teenagers	-.051	.045	-.115	-1.123	.264

Table 11 presents the coefficients for the influence of gender, age and place of residence on emotional intelligence. The standardized coefficients (Beta) for all variables (adolescent gender, adolescent age, adolescent residence) are small and not statistically significant (t-values are small and p-values are above the level of significance).

Based on these results, we can conclude that gender, age and place of residence do not have a significant impact on the emotional intelligence of teenagers and thus the hypothesis H2 is accepted.

CONCLUSIONS AND RECOMMENDATIONS

From the results we conclude that there is no significant correlation between emotional intelligence and authoritarian parenting style. This result shows that teenagers with a high level of emotional intelligence are not particularly influenced by the authoritarian parenting style. Likewise, we did not find significant correlations between emotional intelligence and other parenting styles such as abusive, cooperative and neglectful. This suggests that parenting styles do not have a significant impact on the development of emotional intelligence in adolescents. If we look from a demographic perspective, the results show that there is no significant influence of gender, age and place of residence on the level of emotional intelligence of teenagers. This means that emotional intelligence does not vary significantly by these demographic variables. Also, we found no statistically significant differences in parenting styles based on parents' gender and place of residence.

These results indicate that there is a need for more studies and research to better understand emotional intelligence and parenting styles in teenagers. It may be interesting to include different methods of measuring emotional intelligence and to analyze more contextual factors to find other potential associations. Longitudinal studies can also provide a broader picture and help identify changes over time in emotional intelligence and parenting styles.

Moreover, by paying attention to the cultural context, a fuller and broader understanding of emotional intelligence and parenting style in the global context can be created. By developing these recommendations and continuing research in this area, we can improve our understanding of emotional intelligence and parenting styles in adolescents, influencing education and child rearing policies and practices in a positive way..

RECOMMENDATIONS

- We recommend that parents be aware of their parenting style. Understand how your parenting affects your teen's emotions and behavior. Once you understand your style, you can make improvements and adapt your parenting style to improve your relationship with your teen.
- We recommend promoting open and sensitive communication with your teenager. Try to create an environment where the teenager feels heard and understood. Listen carefully, respond sensitively, and express your emotions with him constructively.
- We recommend teaching and promoting emotional intelligence in the adolescent. Help them understand, express and manage their emotions in a healthy way. You can use techniques such as developing emotional awareness, identifying different emotions, and practicing stress management strategies.
- We recommend creating a strong emotional connection with your teenager. Creating an atmosphere of warmth, love and trust helps create emotional connection. You can invest time in joint activities, express your love and support, and create special moments for both parties.
- We recommend considering the cultural and social context. Learn about the influence that culture and society have on parenting and emotional intelligence. If you have a particular cultural context, adapt to match your teen's needs and promote positive values that help emotional connection.

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YOLOV5 GÖRÜNTÜ İŞLEME YÖNTEMİ İLE BİTKİ ÜZERİNDE BEZELYENİN (*Pisum sativum* L.) TESPİTİ

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Özet

Bu araştırmada bezelye bitkisinin derin öğrenme yöntemi ile yapılan eğitim uygulaması üzerinde çalışılmıştır. Makinalı hasatta bezelye bitkisinde bakla rengi bitkinin rengi ile aynı olduğu için ayırt edilmesi zordur. Bundan dolayı özellikle robotik seçici hasat uygulamalarında zorluk yaşanmaktadır. Yaptığımız çalışmada yetiştirildiği tarım alanında renginden dolayı bitki üzerinde seçilmesi ve toplanması vakit alan bezelyenin, robotik hasat uygulamalarında kullanılmak üzere derin öğrenme ile bitki üzerinde tanımlanması ve yapraktan ayrılması amaçlanmıştır. Derin öğrenme metodu için YOLOv5 ailesinin nano-small-medium ve large modelleri kullanılmıştır. Oluşturulan modellere göre ağımız eğitilmiştir. Eğitilen modeller test setiyle kontrol edilmiştir. Test sonucunda elde edilmiş olan tüm metrik değerleri incelenmiştir. En başarılı model YOLOv5l algoritmasıyla, 640x640 boyutundaki görsellerin 20 Batch, 95 Epoch ile eğitilmiş model olduğu görülmüştür. Model değerleri sonuçları “metrics/precision”, “metrics/recall”, “metrics/mAP_0.5” ve “metrics/mAP_0.5:0.95” olarak incelenmiştir. “YOLOv5 large” modelinin metrik verilerinin diğer modellerle kıyaslandığında daha yüksek olduğu tespit edilmiştir. Ölçülen değer Model 4: Size: 640x640, Batch: 20, Epoch: 95, Algorithm: YOLOv5l ‘dur. Modelin başarı oranı 95 epoch için F1 score %90,10, precision %92,59, recall %83,27, mAP %64,20’dir. Buradan “Model 4”in robotik bezelye hasadında bezelyenin bitki üzerinde ayırt edilmesinde kullanılacak en iyi tespit modeli olduğu anlaşılmıştır.

Anahtar Kelimeler: Bezelye, YOLOv5, tanımlama, hasat

YOLOV5 DETECTION OF PEA(*pisum sativum*) ON THE PLANT BY IMAGE PROCESSING METHOD

Abstract

In this research, the training application of pea plant with deep learning method was studied. In machine harvesting, it is difficult to distinguish the pod colour of the pea plant because it is the same with the colour of the plant. Therefore, it causes difficulties especially in robotic selective harvesting applications. In our study, pea, which take time to be selected and collected on the plant due to their colour in the agricultural field where they are grown, were identified on the plant and separated from the leaves with deep learning to be used in robotic harvesting applications. For the deep learning method, nano-small-medium and large models of the YOLOv5 family were used. Our network was trained according to the models created. The trained models were checked with the test set. All metric values obtained as a result of the test were analysed. It was seen that the most successful model was the model trained with the YOLOv5l algorithm with 20 Batch, 95 Epoch for 640x640 images. The results of the model values were analysed as "metrics/precision", "metrics/recall", "metrics/mAP_0.5" and "metrics/mAP_0.5:0.95". It was determined that the metric data of the "YOLOv5 large" model was higher compared to the other models. The measured value is Model 4= Size: 640x640, Batch: 20, Epoch: 95, Algorithm: YOLOv5l. The success rate of the model is F1 score 90.10%, prediction 92.59%, recall 83.27%, mAP 64.20% for 95 periods. It is concluded that "Model 4" is the best detection model to be used in robotic pea harvesting to distinguish peas on the plant.

Keywords:Pea, YOLOv5, identification, harvesting

Giriş

Derin öğrenme, yapay sinir ağları ve öğrenme algoritmalarının çok katmanlı yapılarını kullanarak karmaşık ilişkileri modellemesidir. Büyük veri kümelerinde yüksek düzeyde öznitelik çıkarma ve desen tanıma yeteneğine sahiptir. Derin öğrenme, bilgisayarlara verileri insan beyninden esinlenerek işlemeyi öğreten bir yapay zeka (AI) yöntemidir. Derin öğrenme modelleri, doğru öngörü ve tahminler üretmek için resimler, metinler, sesler ve diğer verilerdeki karmaşık modelleri tanıyabilir. Görüntüleri tasvir etmek veya bir ses dosyasını metne dönüştürmek gibi tipik olarak insan zekası gerektiren görevleri otomatikleştirmek için derin öğrenme yöntemlerini kullanabiliriz (Anonim 1). Derin öğrenme, genelleştirme yeteneğine sahip yüksek boyutlu modeller kullanarak yüksek doğruluk için oldukça fazla etiketli veriye ihtiyaç duymaktadır (Saralioglu ve ark., 2022). Bu özelliği, derin öğrenmeyi eski ve sığ öğrenme yaklaşımlarından ayıran en önemli avantajlardan biri olup, derin öğrenme yöntemini küçük veri problemlerinde etkin kılmaktadır (Elmas, 2021). Derin öğrenmenin bir başka avantajı, geleneksel yöntemlere göre daha az mühendislik gerektirmesi ve mevcut hesaplama ve veri miktarındaki artışlardan kolayca faydalanabilmesidir (LeCun ve ark., 2015). Derin öğrenmenin birçok kullanım alanı bulunmaktadır. Bunlara görüntü ve ses tanıma, doğal dil işleme, oyunlar ve eğlence, sağlık alanı, otomotiv sektörü, finansal hizmetler, üretim ve zincir yönetimi, enerji sektörü, robotik ve otomasyonu örnek olarak verilebilir. Teknolojinin hızla gelişmesiyle kendine yeni uygulama alanları bulmaktadır. Derin öğrenme, karmaşık veri setlerindeki önemli ilişkileri keşfetme, geleneksel yöntemlere göre avantajlar sağlama ve çeşitli uygulama alanlarında etkili bir şekilde kullanılabilme gibi özellikleriyle dikkat çeken bir makine öğrenmesi alanıdır. Derin öğrenme tarım alanında birçok uygulama da kullanılmaya başlamıştır. Liakos ve ark. (2018) yılında yaptıkları bir araştırmada tarımsal üretim sistemlerinde makine öğrenmesinin kullanıldığı çeşitli alanları incelemiştir. Yapılan çalışma tarımsal verim tahmini, hastalık tespiti, yabancı ot tespiti, bitki kalitesi ve tür tanıma konularını kapsamaktadır. Haque ve ark. (2022) yılında oluşturdukları patlıcan için hastalık tespiti sistemi çalışmalarında 6 derin öğrenme modelini karşılaştırmışlardır. Her bir model inceleme sonucunda %99 bir başarı elde etmişlerdir. Zang ve ark. (2018) derin öğrenme tabanlı domates hasat robotu çalışmalarındaki deneysel sonuçları, 0,01 saniyeden daha kısa bir tahmin süresiyle ortalama %91,9 doğruluk oranıdır. Hidayah ve ark. (2022) yılında 4 grup ürün üzerinde derin öğrenme ile hastalık tespiti üzerine çalışmalarında YOLOv5 modeli ile ortalama hassasiyet değerini %94,2 olarak bulmuşlardır. (Fu ve ark., 2022) yılında yaptıkları hedef odaklı lahana

ilaçlama sistemi çalışmalarında YOLOv5 derin öğrenme modelinin kullanmışlardır. (Wang ve ark., 2022) yılında hıyar ıslahını desteklemek amacıyla modifiye edilmiş YOLOv5s derin modeline dayalı bir salatalık kök-ur nematodu tespit modeli çalışmalarında iyi bir performans elde ettiklerini vurgulamışlardır. Bu çalışmada YOLOv5 modelinin farklı uygulamalarının ana bitki ile neredeyse aynı renkte olan bezelye baklalarının hasat dönemleri ve bakla büyüklüklerinin tespit edilmesi amaçlanmıştır.

2. Materyal ve Yöntemler

2.1. Materyal

Bezelye Leguminosae familyasına ait bir sebzedir. Kültürü yapılan bezelyenin *Pisum arvense* ve *Pisum sativum* olmak üzere iki formu vardır (Özdemir, 2002). Bezelye, dünyanın pek çok ülkesinde yıl boyunca en fazla tüketilen baklagillerden birisidir. Genelde taze baklaları veya kuru taneleri için yetiştirilen bezelyenin ekiliş ve üretiminde, son yıllarda konserve ve dondurulmuş gıda sanayinin hızla gelişmesi önemli artışlar sağlamıştır (Öz ve Karasu, 2010). Protein kaynağı olarak kullanılan besin maddelerinin insan beslenmesindeki öneminin ne derece büyük olduğu artık yadsınamaz bir gerçektir. Bezelye bir baklagil bitkisi olarak havanın serbest azotunu bitkilerin alabileceği forma dönüştürmesi yanında, tanelerinin %20-30 gibi yüksek oranda protein içermesi, karbonhidratlarca yeterli; kalsiyum, demir ve özellikle fosforca zengin olması ayrıca çeşitli vitaminlere de sahip bulunması bakımından iyi bir bitkisel protein kaynağıdır (Akçin, 1988). Bezelye meyveleri bakla şeklindedir. Döllenmeden sonra taç yapraklarının dökülmesi ile meyve üzerinde sadece çanak yaprak kalır. Meyve birkaç gün içinde hızla gelişir. Bakla iki parçalı simetriktir. Tohum taslakları baklanın karın kısmında bulunan plesanta üzerinde sıralanmış durumda bulunur. Bezelye meyveleri çeşitlere bağlı olarak değişik uzunluklarda, değişik genişliklerde, düz veya kıvrık, küt uçlu veya sivri uçlu olabilirler. Meyvelerin boyu 3-15 cm eni 0,5-2,5 cm arasında değişir. Baklalar taze iken renkleri açık yeşilden koyu yeşile doğru değişkendir. Olgunlaşan baklalarda renk açık sarıdan kahverengiye kadar değişir. Bezelyede hasat olgunluğuna gelmiş baklalar en geç iki-üç gün içinde hasat edilmez. Hasat zamanında yapılmaz geç kalınırsa daneler unlu bir durum alır ve konservelik kalitesi düşer. Özellikle konservelik bezelyeler geniş alanlarda yetiştirilir ve hasadı makinalar ile yapılır. Küçük alanlarda ise hasat el ile kademeli olarak yapılmaktadır (Vural ve ark.2000).

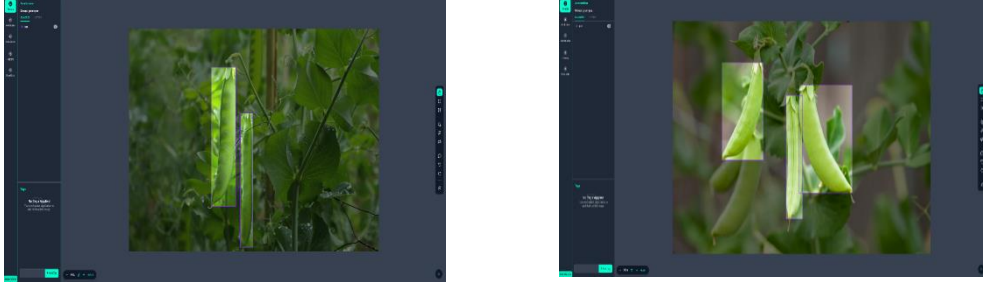
2.2.Yöntem

Çalışma kapsamında nesne tespiti ve analizi hedeflenen bezelye sebzesinin veri setini hazırlarken, sera ve tarlada çekilmiş bitki fotoğrafları kullanılmıştır. Hasat esnasında ve yetiştirme sırasında Tekirdağ Naip Köyünde üretici tarlasından çekilmiş pek çok bezelye görseli toplanmıştır. Elde edilen görseller arasında, yapmış olduğumuz proje kapsamında değerlendiremeyeceğimiz görseller elenmiştir. Yapacağımız nesne tespit çalışması için sağlıklı olacak 45 adet görsel belirlenmiştir. Ayrıca her bir görselde birden fazla bezelye bulunabilmektedir. Şekil 1’de alınan görüntülerden örnekler gösterilmiştir.



Şekil 1. Üretici tarlasından alınan görüntü örnek resimleri

Çalışma kapsamında nesne tespiti ve analizi hedeflenen bezelye için veri setini hazırlarken tarlada çekilmiş bitki fotoğrafları kullanılmıştır. Bezelye bitkisi hasat olgunluk seviyesi durumundayken toplam 45 bitki fotoğrafı çekilmiştir. Her bir görselde birden fazla bezelye bulunmaktadır. 45 bitki görselin her birinde bezelye görüntüsünü içeren kısımların sınırlayıcı kutu alanı ile işaretlenmesi ve ait olduğu nesne sınıfı olan “bezelye” sınıfına atanması yapılmıştır. Etiketleme görüntüler üzerinde alan seçimleri, işaretlemeleri ve sınıf etiketlemeleri yapılmasını sağlayan popüler web sitesi olan Roboflow ile yapıldı. Şekil 2’de Etiket ekranı gösterilmiştir. Şekil 3’de modellerin eğitilmesi sırasında kullanılan eğitim seti verilmiştir.



Şekil 2. Etiketleme Ekranı



Şekil 3. Modellerin eğitilmesi sırasında kullanılan eğitim setinden görüntüler

Yapmış olduğumuz çalışmada, CNN yöntemiyle geliştirilmiş YOLO model ailesinin açık kaynak olarak geliştirilen YOLO (You Only Look Once) modeli seçilmiştir. YOLO bilgisayarla görme ve derin öğrenme alanında büyük ilgi gören son teknoloji nesne algılama sistemidir. YOLO, görüntülerdeki nesnelere gerçek zamanlı olarak yüksek doğruluk ve verimlilikle tespit etme ve konumlandırma yapmaktadır. Nesnelere tespit etmek için bölge önerme algoritmaları ve çoklu aşamalar kullanan geleneksel nesne tespit yöntemlerini kullanmamaktadır. Bu yöntemin yerine YOLO, nesne tespitini uzamsal olarak ayrılmış sınırlayıcı kutulara ve ilişkili sınıf olasılıklarına bir regresyon problemi olarak çerçeveleyerek farklı bir yaklaşım benimsemektedir. YOLO modelinin en önemli avantajlarından biri hızı ve verimliliğidir. YOLO görüntüleri gerçek zamanlı olarak işleyerek otonom araçlar, gözetleme sistemleri ve robotik gibi hızlı nesne tespiti gerektiren uygulamalar için uygun hale getirir. YOLO'nun tek aşamalı algılama yaklaşımı, sinir ağından tek bir geçişle tahminler yapmasına olanak tanıyarak birden fazla hesaplama ihtiyacını ortadan kaldırır ve işlem süresini önemli ölçüde azaltır. Hızına ve doğruluğuna ek olarak, araştırmacılar belirli uygulamalar için özelleştirmelerine olanak tanıyan açık kaynaklı uygulaması ve önceden eğitilmiş modellerin kullanılabilirliği nedeniyle yaygın olarak kullanılmaktadır. YOLO modeli gerçek zamanlı işleme yetenekleri, yüksek doğruluğu ve verimliliği ile nesne tespitinde devrim yaratmıştır. Tek aşamalı algılama yaklaşımı, hızı ve çok yönlülüğü, onu bilgisayarla görme ve ötesinde çok çeşitli uygulamalar için popüler bir seçim haline getirmiştir. Bu nedenlerle YOLO modeli seçilmiştir. YOLO modelinin birçok versiyonları vardır. Çalışmamızda bu versiyonlardan YOLOv5 modeli

kullanılmıştır. Ayrıca YOLOv5 'in alt modelleri olan n/s/m ve l (nano-small-medium ve large) modelleriyle derin öğrenme eğitimi için yapılmıştır.

Bezelye tespiti yapacak olan modelin eğitiminin başlatılması için, YOLOv5 modelinin bilgisayardaki konumuna gidildi ve burada bir Python çalıştırıcı editör açıldı. Ana dizinde bulunan ve YOLOv5 eğitimini sağlayan train.py programı, çalıştırılmak üzere kontrol edildi. Bu Python programının çalıştırılması, çeşitli parametreler ile özelleştirilebilmektedir.

Proje dahilinde, bezelye sebzesi için aşağıda yazılı olan kodlar içerisindeki parametreler ve düzenlemeler tercih edildi.

```
python train.py --img 640 --batch 20 --epochs 95 --data dataset.yaml --weights yolov5n.pt
python train.py --img 640 --batch 20 --epochs 95 --data dataset.yaml --weights yolov5s.pt
python train.py --img 640 --batch 20 --epochs 95 --data dataset.yaml --weights yolov5m.pt
python train.py --img 640 --batch 20 --epochs 95 --data dataset.yaml --weights yolov5l.pt
```

--img: Eğitimi yapılacak görsellerin YOLOv5 modeli tarafından düşürüleceği piksel boyutu. Varsayılan değeri 640x640 olarak belirlenmektedir ve burada da bu şekilde seçilmiştir.

--batch: Modeli eğitirken, ekran kartı tarafından bir seferde kullanılacak veri noktası paketi sayısıdır.

--epochs: Modelin eğitimi yapılırken, tüm eğitim verilerinin eğitilen ağa gösterilme, ağırlıkların güncellenmesi sayısıdır.

--data: Veri setini içeren dosyanın genel yol ve sınıf bilgisini içeren yaml dosyasının yoludur.

--weights: Modelin eğitiminde kullanılacak eğitim katsayılarını içeren ağırlık dosyasının konumudur.

Bu kod satırlarının doğru şekilde çalıştırılması sonucunda, modellerin eğitim işlemi başlamıştır. Program, öncelikle YOLOv5 dosyalarını kontrol edip, herhangi bir güncelleme durumunu kontrol etmektedir. Ardından, belirlenen döngü sayısı (epoch) boyunca eğitim işlemi yapılmaktadır.

Değerlendirme Göstergeleri;

Gerçek Pozitif (TP), doğru şekilde pozitif olarak kategorize edilen pozitif görüntülerin sayısını tanımlar.

Gerçek Negatif (TN), modelin Negatif bir örneği gerçekten Negatif olarak doğru şekilde tanımladığı belirli bir örnek sayısını gösterir.

Yanlış Pozitif (FP), negatif bir örneğin algoritma tarafından kaç örnekte yanlışlıkla pozitif bir örnek olarak tanımlandığını detaylandırır.

Yanlış Negatif (FN), algoritmanın pozitif bir numuneyi yanlışlıkla negatif olarak kategorize ettiği örnek sayısını gösterir.

Doğruluk (Accuracy): İncelenen sınıflandırma problemi dengeli sınıf dağılımına sahipse kullanılan metriktir. Sınıf dağılımının dengesiz olması durumunda, sınıf sayısı düşük olan sınıfı yakalama problemi yaşanabilmektedir.

$$\text{Accuracy} = \frac{\text{TN} + \text{TP}}{(\text{TP} + \text{FP} + \text{TN} + \text{FN})}$$

Hata Oranı (Error Rate): Probleme yanlış yapılan sınıflandırmaların/tahminlerin sıklığının oranını verir.

$$\text{Error Rate} = \frac{\text{FN} + \text{FP}}{(\text{TP} + \text{FP} + \text{TN} + \text{FN})} \text{ or } (1 - \text{Accuracy})$$

Precision (Kesinlik): Pozitif sınıf (1) tahminlerinin başarı oranıdır. Tahmin edilen pozitif sınıfların (1 olarak tahmin edilen sınıfların) gerçekte ne kadarının pozitif olduğunu gösteren metrik değeridir.

$$\text{Precision} = \frac{\text{TP}}{(\text{FP} + \text{TP})}$$

Recall (Duyarlılık): Pozitif sınıfın (1) doğru tahmin edilme oranıdır. Tahmin edilen pozitif sınıfların ne kadarının doğru tahmin edildiğini gösteren metrik değeridir.

$$\text{Recall} = \frac{\text{TP}}{(\text{TP} + \text{FN})}$$

F1-Score: Precision ve recall değerlerinin harmonik ortalamasıdır.

$$\text{F1 Score} = \frac{2 * \text{Precision}}{(\text{Precision} + \text{Recall})}$$

Mean Average Precision (Ortalama Kesinlik Ölçütü): Bu metrik, algılanan sınırlayıcı kutuların hassas ve geri çağırma değeridir. mAP değer skalası 0 ile 1 arasındadır. Elde edilen değerler ne kadar yüksek olursa kesinlik ölçütü o kadar iyi olacaktır. mAP, her sınıf için ayrı ayrı ortalama kesinlik (AP) ve ardından sınıf üzerindeki ortalama hesaplanarak bulunur. Hesaplanan mAP değeri 0.5'in üzerindeyse doğru pozitif olarak kabul edilir.

$$\text{mAP} = \frac{1}{C} + \sum_{k=1}^T P(k)\Delta R(k)$$

3.Araştırma Bulguları

YOLOv5 algoritmalarının sonuçlarının hata matrisi metriklerine göre sonucu F1 Score,Precision ,Recall ve Precision-Recall değer grafikleri incelenmiştir.Değer sonuçları Tablo 1’de verilmiştir.

Tablo 1.Değer Sonuçları

Model	Epoch	*F1 Score	Precision	Recall	Map@0.5:0.95	**F1 Score / Precision Recall
Yolov5n	95	72,05%	79,46%	63,33%	30,44%	0,70%
Yolov5s	95	88,12%	77,03%	83,33%	46,31%	0,80%
Yolov5m	95	87,82%	88,53%	77,18%	55,04%	0,82%
Yolov5l	95	90,10%	92,59%	83,27%	64,20%	0,87%

*NOT: Tablodaki F1 Score Değeri son Epoch değerlerine göre hesaplanmıştır.

**NOT: Tablodaki F1 Score Değeri (aynı zamanda Precision Recall) Hata Matrisindeki formüle göre hesaplanmıştır.

F1 Score / Precision Recall

Model 4: F1 skoru, bir sınıflandırma modelinin kesinlik (precision) ve duyarlılık (recall) metriklerinin harmonik ortalamasını temsil eden bir performans ölçüsüdür. F1 skoru, özellikle dengesiz sınıflandırma durumlarında, sınıflar arasındaki dengeyi değerlendirmek için kullanışlıdır. Bir modelin F1 skoru, kesinlik ve duyarlılığı bir arada değerlendirerek, bu iki metrik arasında bir denge sağlayıp sağlamadığını gösterir. Özellikle F1 skoru %0.87 olarak değerlendirildiğinde modelin orta seviyede bir denge sağladığını gösterir. Hem kesinlik hem de duyarlılık makul düzeydedir, ancak her iki metrik de mükemmel değildir. Bu durumda, modelin sınıflar arasındaki dengeyi korumaya çalıştığı ve hem yanlış pozitiflerin hem de yanlış negatiflerin dikkate alındığı bir strateji izlediği söylenebilir.

Precision:

Model 4: Precision (kesinlik), bir sınıflandırma modelinin pozitif olarak tahmin ettiği örneklerin gerçekten pozitif olan örnekler arasındaki oranıdır ve eğitimde Precision değeri %92,59 olarak belirlenmiştir. Bu değer, modelin pozitif olarak tahmin ettiği örneklerin yaklaşık olarak %92,59'unun gerçekten pozitif olduğunu gösterir. Yüksek bir kesinlik değeri, modelin pozitif tahminlerinin çoğunlukla doğru olduğunu gösterir.

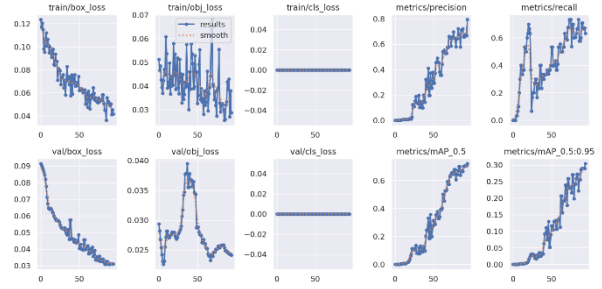
Recall:

Model 4: Recall değeri %83,27olarak belirlenmiştir. Bu değer, modelin gerçek pozitif örneklerin yaklaşık olarak %83,27'ini doğru bir şekilde tespit ettiğini gösterir. Recall, genellikle özellikle yanlış negatiflerin kritik olduğu durumlarda dikkate alınır. Yüksek bir recall değeri, modelin pozitif sınıfı kaçırmama eğiliminde olduğunu gösterir. Ancak, bu durumda, precision (kesinlik) değeri de göz önünde bulundurulmalıdır. Çünkü yüksek recall değerleri genellikle daha düşük precision değerleri ile birlikte gelir.

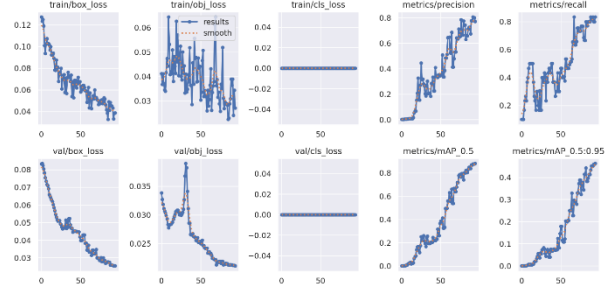
Loss Function:

Tablo 2. Loss Function sonuç grafiği

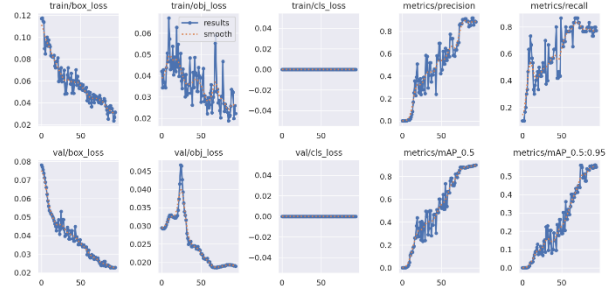
Görsel 1:Size: 640x640, Batch: 20, Epoch: 95, Algorithm: YOLOv5n



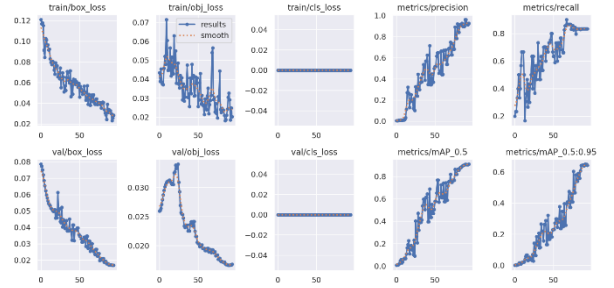
Görsel 2:Size: 640x640, Batch: 20, Epoch: 95, Algorithm: YOLOv5s



Görsel 3:Size: 640x640, Batch: 20, Epoch: 95, Algorithm: YOLOv5m



Görsel 4:Size: 640x640, Batch: 20, Epoch: 95, Algorithm: YOLOv5l



Model 4: Tablo 2'deki grafikler incelendiğinde Model 4'nin hatalarının zaman içinde genel olarak azaldığını görülmektedir. Bu durum, modelin eğitim süreci boyunca genellikle daha iyi hale geldiği ve tahminlerinin gerçek değerlere daha yakın olduğu anlamına gelmektedir.

Modellerin başarılarını ölçmek için modellerin nesne tespitlerindeki doğru tahmin başarıları ve ortalamaları önemli rol oynasa da, tek başına yeterli değildir. Modellerin, hem eğitim hem de doğrulama veri kümelerindeki kayıp değerleri de model başarısının incelenmesinde rol oynayan önemli parametrelerdir. Eğitim ve doğrulama verilerindeki sınıflandırma kayıplarını ifade eden train/cls_loss ve val/cls_loss parametreleri çok sayıda nesne sınıfının tespitini gerektiren modellerde önemli bir rol oynar. Modellerin kayıp değerlerini gösteren tablodaki dört parametre sütunu (train/box_loss, train/obj_loss, val/box_loss, val/obj_loss) değerleri incelendiğinde, eğitim setinde en az kayıp değerlerine sahip modelin, "Model 4" olduğu görülmektedir. Modellerin optimizasyon parametreleri (x/lr0-1-2) incelenmiştir. Tüm modellerin bu parametrelerdeki değerleri eşittir. Bu değerler tablo 3'de verilmiştir.

Tablo 3. Optimazasyon parametreleri

Model	x/lr0-1-2	Fark(Model 1'e)
Model4	0,00030842	
Model1	0,00030842	0
Model2	0,00030842	0
Model3	0,00030842	0

Son olarak, modellerin optimizasyon parametreleri (x/lr0-1-2) incelenmiştir. Tüm modellerin bu parametrelerdeki değerleri eşittir.

senaryolarda insan iş gücüne bağlı giderlerin azaltılabileceğini vurgulamıştır. Mohamed,R.(2023) derin öğrenme ile biberin dal üzerinde belirlenmesi ve sınıflandırması çalışmasında %93 'lük başarı elde etmiştir.Gai ve ark.(2021) Yolov4 derin öğrenme algoritması ile kiraz meyvesinin dal üzerinde tespitini yapmışlardır.Ma ve ark(2022) derin öğrenmeye dayalı kivi hasat robotu için algılama çalışmalarında %88.7 'lik bir hasat başarı oranı elde etmişlerdir.Li ve ark.(2022) dal üzerinde kiraz tespiti çalışmalarında derin öğrenme metodu kullanmışlardır. Wei ve ark.(2023) asma üzerinde derin öğrenme metodu ile üzüm salkımının tespitini yapmışlardır. Chen ve ark.(2021) F-YOLO modeli kullanılarak çay krizanteminin erken çiçeklenme aşamasının tespitini yapmışlardır. Zhang ve ark.(2021) robotik elma hasadı için elmanın yerinin tespitini de YOLOv4 derin öğrenme modelini kullanmışlardır. Çalışmanın robotik hasat tespit başarı oranını % 92.9 olarak tespit etmişlerdir.Guo ve ark.(2023) YOLOv4 derin öğrenme modeli kullanarak üzüm salkımlarının asma üzerinde tespitini yapmışlardır.Hou ve ark.(2023) robotik domates hasatında kullanılmak üzere YOLOv7 modellemesi ile domates tespit sistemi geliştirmişlerdir. *Tarım alanında verimlilik artışı, kaynakların daha etkin kullanımı ve sürdürülebilir tarım uygulamaları için derin öğrenme yöntemleri tarım alanında birçok farklı uygulama alanında etkili bir şekilde kullanılmaktadır.YOLO modeli birçok çalışmada başarılı bir şekilde kullanılmıştır. Yapılan çalışmalar incelendiğinde elde edilen sonuçlar ile yaptığımız çalışmada elde ettiğimiz sonuçlar paralellik göstermektedir. Bezelye hasadında kullanılmak için tasarlanacak robotik sistemlerin tanımlama performansını arttırmak için YOLOv5 'in bütün metrik değerleri incelenmiştir. Değerlerin incelenmesi sonucunda hangi modelin robotik hasat sistemlerinin geliştirilmesi ve optimizinde kullanılacağı tespit edilmiştir. Yapılan çalışma, robotik bezelye hasadı için derin öğrenme ile bitki üzerinde bezelyenin tespiti yapılmıştır. Eğitim seti 45 bezelye bitkisi görüntüsünden oluşan bir veri kümesi olarak hazırlanmıştır. Her bir görüntüde birden fazla bezelye bulunmaktadır. Hazırlanan veri seti ile eğitilen ağ tarlada alınmış video görüntüleri ve tarlada çekilmiş görüntülerle test edilmiştir. YOLOv5 modelinin alt varyatları ile test edilen ağda en başarılı sonucu Model 4(YOLOv5l) vermiştir .Başarı oranı 95 epoch için F1 score %90,10,presicion %92,59,recall %83,27, mAP %64,20'dir. Çalışma robotik bezelye hasadında kullanılmak üzere bezelye tanımlamadaki YOLOv5 modelinin potansiyelini göstermektedir.*

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**FACTORS CONTRIBUTING TO TEACHER BURNOUT AND THE COPING
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Abstract

Due to teacher burnout, thousands of educators worldwide quit their jobs in the classroom each year. Excessive job stress can lead to physical and emotional tiredness, which is known as teacher burnout syndrome. Excessive workloads, toxic settings, student conduct, a lack of autonomy, or being closely monitored by the administration are the main causes of burnout. Teachers who are under stress begin to feel unappreciated and alone. Teachers who experience burnout may have anxiety, sadness, cardiovascular illness, or even pass away. This study examines the body of research on teacher burnout and successful stress-reduction initiatives. Staff members are healthier, burnout is decreased, and teacher retention is raised when efficient methods to treat stress in educators are put into place.

Keywords: Teacher burnout, English language teaching, coping

Introduction

Teachers serve a crucial role in facilitating learning and caring for students, who will become future leaders. Teaching, although recognized as a crucial profession for a nation, is also known to be one of the most demanding careers in terms of stress levels, as stated by Adams (2001). Therefore, it is crucial to prioritize the well-being of teachers. This is because teachers are responsible for more than just imparting knowledge; they are also the ones who motivate and inspire students. Additionally, teachers are expected to stay current with the latest information, be accountable for their actions, possess assessment skills, and maintain positive interactions with everyone in the educational environment. All of these responsibilities are aimed at facilitating the learning process.

Numerous aspects of a teacher's life provide challenges. The ability to effectively manage obstacles may greatly enhance one's life, as it provides stimulation. At the end of a day's work, certain educators have a sense of being depleted, both emotionally and physically, feeling unwell, exhausted, overwhelmed by their workload, and inadequately compensated. Furthermore, some individuals may have a sense of isolation or detachment from their educational institution, their colleagues, or the administrative staff (Abaci, 1995).

Excessive stress among teachers can result in adverse physical, mental, and emotional well-being, which may subsequently impact teacher performance, teacher-student relationships, and ultimately, student achievement. Consequently, measuring the stress levels is crucial as it is necessary to implement essential modifications to the environment or personal circumstances, with the aim of enhancing difficult conditions.

Impact of Burnout on Teachers

Human service professions, especially the teachers, experience stress and burnout very often. Burnout is the term used to describe the adverse effects that arise from prolonged stress in the workplace. It encompasses emotional elements such as fatigue, detachment from oneself, and a diminished feeling of personal achievement (Huebner, Gilligan & Cobb, 2002). Collected data indicates that teaching is often seen as a vocation with significant levels of stress. According to Kyriacou (2001), around 25% of schoolteachers perceive teaching as extremely stressful. The repercussions of stress and burnout have detrimental effects on teachers, students, and the education sector as a whole. Throughout the academic year, elevated levels of stress can contribute to an increased rate of absenteeism (Griffith, Steptoe & Cropley, 1999).

Additionally, burnout among teachers may result in premature retirement, thereby diminishing the pool of skilled educators and limiting their ability to instruct and support children.

Annually, a significant proportion of educators and school administrators experience an inability to sustain their employment in educational institutions due to feelings of depletion and fatigue (Gray & Taie, 2015; Herman & Marlowe, 2005; Moran, 2018). Multiple research have documented that teachers frequently encounter fatigue in their professions (Antoniou et al., 2013; Clipa, 2017), resulting in detrimental personal outcomes (Mark & Smith, 2012). This is a concerning and enduring issue that has lasted for several decades. According to Truch (1980), a significant majority of teachers, over 90%, have encountered some degree of burnout. Additionally, more than a quarter of teachers, specifically over 25%, have suffered severe levels of burnout as a result of their employment (Bas, 2011).

Role of a Teacher as a Whole

Presently, schools are undergoing rapid transformation, leading to a shift in the responsibilities and scope of instructors. According to Bas (2011), teachers have other responsibilities beyond instructing learners. These include devising curricula, creating assignments, directing students, building communication with families, and participating in community services and departmental chores. The nature of the teaching profession has led to its classification as the most demanding occupations globally (Diehl & Carlotto, 2014; Shernoff et al., 2011). Teachers not only transmit knowledge, but also have a crucial role in facilitating the overall development of students.

Everyday Sources of Teacher Burnout

Teacher burnout can be attributed to a multitude of internal and environmental variables. For instance, both school systems and society frequently expose instructors to the potential of burnout, resulting in a subsequent decline in their passion for doing their jobs. The absence of teacher passion and ardor for teaching leads to the teachers to loose their passion in teaching as well as the low performance level of the students (Fernet et al., 2014; Skinner & Jeffry, 2016). Furthermore, the work experiences of teachers, along with the norms of the school and the policy contexts such as budget cuts, heightened expectations for student accomplishment, and the low level of support from administrators and parents, have been found to contribute to

greater burden on teachers (Richards, 2012). Additionally, inadequate infrastructure, insufficient teaching materials, and subpar classroom resources are recognized as potential sources of stress (Fernet et al., 2012). Furthermore, factors such as insufficient teacher training and a absence of other forms of encouragement can also cause stress and burnout (Ingersoll & Strong, 2011; Kim et al., 2017).

Kyriacou (2001) identified ten primary factors that contribute to teacher stress:

- *Instructing unmotivated students;*
- *Enforcing discipline;*
- *Time constraints and heavy workload;*
- *Adapting to changes;*
- *Being assessed by others;*
- *Interactions with colleagues;*
- *Self-esteem and professional standing;*
- *Administrative and managerial tasks;*
- *Conflicting roles and ambiguity;*
- *Substandard working conditions.*

Without a doubt, the factors causing stress among various teachers will differ and depend on both the unique characteristics of the teacher and the situations in their professional and personal domains. However, the above-indicated categories suggest potential sources of stress for instructors that need to be addressed.

Coping Strategies

Kyriacou (2001) categorizes coping tactics into two distinct types: *direct action and palliative techniques*:

Direct action encompasses the various ways that teachers might employ to effectively reduce the underlying causes of stress. For example, if the presence of time constraints and strict deadlines is causing stress, a proactive approach to alleviate the issue would involve requesting a time extension or requesting a modification to the deadline.

Palliative approaches aim to alleviate the symptoms of stress rather than addressing the root cause, by specifically targeting the reduction of stress-related emotions. Certain solutions may involve physical methods, such as relaxation training designed to alleviate sensations of tension and anxiety. Others may pertain to cognitive processes and include the instructor altering their evaluation of stressful events.

- *Endeavor to maintain a sense of proportion when faced with difficulties;*
- *Avoid engaging in conflicts; • Make an effort to unwind after work;*
- *Take proactive measures to address issues;*
- *Maintain emotional composure;*
- *Allocate more time to specific tasks;*
- *Engage in open discussions about problems and emotions with others;*
- *Cultivate a balanced and fulfilling personal life;*
- *Anticipate and prioritize tasks in advance;*
- *Acknowledge and accept personal limitations.*

These strategies encompass both *proactive measures and palliative approaches*. Implementing direct action may seem like the most effective approach to mitigate job-related stress. Nevertheless, there are instances where these tactics may be impracticable to execute. Under those circumstances, the implementation of beneficial, soothing methods is crucial.

Methods for Cognitive Reorganization

Utilizing cognitive therapy techniques can serve as a palliative measure to assist instructors in mitigating job-related stress. Howard and Johnson (2004) illustrate that instructors who engage with challenging children often employ strategies to alleviate their own stress by modifying their perception of stressful conditions in the school environment. In addition, teachers who depart from a school or the teaching profession following their experience with challenging students exhibit specific traits.

Scenario: The class is not listening. The teacher had to reiterate his/her message multiple times in order to get the learners' attention.

Feeling(s): Anguish

Reflections: Teaching this class is an overwhelming task.

In this example, a teacher had a sense of frustration when faced with the challenge of capturing the attention of his students. S/he recalls believing that instructing this specific group of students was an overwhelming task. Undoubtedly, anyone would experience annoyance in such a position. However, perceiving it as an overwhelming situation undoubtedly intensified his/her emotional reaction, leading to more stress and anger. By reassessing the scenario, s/he may have discerned that just a subset of learners were genuinely inattentive, hence it would be erroneous to claim that the entire class was disengaged. Moreover, it is probable that even pupils learners who perceive themselves as "impossible" to teach have acquired a multitude of knowledge throughout the year.

To lessen undesirable emotions such as frustration caused by stress, instructors can benefit from altering their cognitive perspective on stress-inducing circumstances. An effective approach is to develop alternative conceptualizations of these events that contradict or are inconsistent with existing beliefs. In the prior example, the teacher cannot believe that the entire class is uneasy to educate, but rather that only a small amount of learners motivate to instruct. Both propositions cannot be simultaneously accurate. The difficulty in managing a mere subset of learners contradicts the notion that the entire class is at fault. Recognizing that these challenging children have acquired knowledge during the year contradicts the notion that it is unfeasible to educate them. One can determine the true incompatibility of these new concepts with the old ones by observing their ability to reduce feelings of tension and dissatisfaction. It appears that this teacher has the belief that students either acquire knowledge effortlessly or are incapable of being instructed. Hence, the teacher is disregarding any ambiguous aspects between these two polarities.

Keep in mind that this technique requires regular practice and constant application in order to become effective. It would be advantageous to start utilizing it after the school day, when there is an opportunity to allocate a few minutes for reflecting on the day's occurrences. To maximize effectiveness, it is advisable to start employing these approaches during stressful conditions, rather than solely after they have diminished.

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**KAPYA BİBER (*Capsicum annuum L.*) ÜRETİMİNDE KAYNAK KULLANIM
ETKİNLİĞİNİN BELİRLENMESİ: ÇANAKKALE İLİ ÖRNEĞİ**

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Özet

Türkiye dünyanın önemli biber üreticisi ülkelerinden biridir. Biber üretim alanı ve üretim miktarı bakımından dünya genelinde 3.sırada yer almaktadır. 2019 yılı FAO verilerine göre ülke dünya genelinde biber üretim alanında %4.69, üretim miktarında da %7.19'luk paya sahiptir. Bu çalışmada önemli biber üretim merkezlerinden biri olan Çanakkale ilinde kopya biber üretiminde kullanılan faktörlerin kaynak kullanım etkinliğinin belirlenmesi amaçlanmıştır. Araştırmada kullanılan veriler "Tabakalı Örneklem Yöntemi" ile tespit edilen 76 tarım işletmesinden yüzyüze yapılan anketler yoluyla derlenmiştir. Cobb-Douglas tipi fonksiyon yardımıyla oluşturulan kopya biber üretimine ait tahmin denklemin belirlilik katsayısı (R^2) 0.79 olup, F değeri (8.94) %1 düzeyinde anlamlı bulunmuştur. Tahmin denkleminde yer alan üretim faktörlerinin elastikiyet katsayıları toplamı ($\sum \beta_i$) 0.562 olarak tespit edilmiştir. Hesaplanan değer kopya biber üretiminde ölçüğe azalan getirinin olduğunu göstermektedir. Denklemle ilişkin DW İstatistiği 1.639 olup, değişkenler arasında otokorelasyona rastlanılmamıştır. Denkleminde yer alan bağımsız değişkenlere ait üretim elastikiyeti katsayıları incelendiğinde; fide sayısı, tarımsal mücadele ilacı miktarı ve mazot kullanım miktarı değişkenlerinin elastikiyet katsayıları negatif olduğu anlaşılmaktadır. Tahmin denkleminde yer alan gübre faktörü ve işgücü faktörünün elastikiyet katsayıları %5 düzeyinde önemli bulunmuştur. Denklemindeki faktörlerin marjinal etkinlik katsayıları dikkate alındığında biber üretiminde; fide sayısı, tarımsal mücadele ilacı kullanım miktarı ve mazot kullanım miktarına ilişkin değişkenlerin aşırı kullanıldığı ve azaltılması gerektiği söylenebilir. Bununla birlikte biber üretim faaliyetinde işgücü (19.47) ve saf gübre kullanım miktarı (13.64) değişkenleri optimum düzeyin altında kullanılmakta olup, birim alana kullanım miktarlarının artırılması gerekmektedir. Yürütülen araştırmada işgücü ile saf gübre kullanımına ilişkin faktör bileşenlerinin marjinal etkinlik katsayısı 1.43 olarak elde edilmiştir. Bu değer gübre faktörünün tohum faktörüne nispetle fazla kullanıldığını ve azaltılması gerektiğini göstermiştir. Yapılan çalışma biber üretiminde üretim faktörlerinin etkin kullanılmadığını, bu durumun da üretici geliri düşürdüğünü göstermiştir. Zira araştırma sonuçları, tahmin denkleminde yer alan değişkenlerin elastikiyet katsayıları toplamı dikkate alındığında, araştırma alanında kopya biber üretiminin karlı bir faaliyet dalı olmadığını ortaya koymuştur. Araştırma kapsamındaki işletmelerde karlı bir biber üretim faaliyetinin yapılabilmesi için; üretimde kullanılan girdilerin marjinal düzeyde yapılan masraflara göre girdinin sağlamış olduğu ürün artışına karşılık gelen değerlerin ya eşit ya da daha yüksek olması gerekmektedir. Diğer bir ifade ile üretimde karlılık üretim faktörlerinin rasyonel kullanılmasına bağlıdır.

Anahtar Kelimeler: Biber üretimi, Etkinlik, Elastikiyet, Marjinal Verim, Marjinal Gelir, Marjinal Etkinlik.

DETERMINATION OF RESOURCE UTILIZATION EFFICIENCY IN CAPIA PEPPER (*Capsicum annuum L.*) PRODUCTION: THE CASE OF ÇANAKKALE PROVINCE

Abstract

Turkey is one of the most important pepper producer countries in the world, and it ranks 3rd in the world in terms of pepper production area and production amount. According to FAO data of 2019, Turkey had a share of 4.69% in pepper production area and 7.19% in production amount in the world. In this study, it was aimed to determine the resource utilization efficiency of the factors used in capia pepper production in Çanakkale province, which is one of the important pepper production centers in Turkey. The data used in the research were gathered through face-to-face surveys from 76 agricultural enterprises which were determined by the "stratified sampling method". The coefficient of determination (R^2) of the estimation equation of capia pepper production created by means of the Cobb-Douglas type function was 0.79, and the F value (8.94) was significant at the level of 1%. The sum of the elasticity coefficients of the production factors in the estimation equation ($\sum\beta_i$) was determined as 0.562. The calculated value shows that there was a decreasing return to scale in capia pepper production. The DW statistic for the equation was 1.639, and no autocorrelation was found between the variables. When the production elasticity coefficients of the independent variables in the equation were examined; it was understood that the elasticity coefficients of the number of seedlings, the amount of pesticides and the amount of diesel fuel use were negative. The elasticity coefficients of the fertilizer factor and labor factor in the estimation equation were found to be significant at the 5% level. Considering the marginal efficiency coefficients of the factors in the equation, in pepper production; it could be said that the variables related to the number of seedlings, the amount of pesticide use and the amount of diesel fuel use were overused and should be reduced. However, the variables of labor (19.47) and the amount of pure fertilizer use (13.64) in pepper production were used below the optimum level, and the amount of use per unit area needs to be increased. In the research, the marginal efficiency coefficient of the factor components related to the use of labor and pure fertilizer was calculated as 1.43. This value showed that the fertilizer factor was used more than the seed factor and it should be reduced. The study showed that production factors are not used effectively in pepper production, and this situation reduces producer income. Considering the sum of the elasticity coefficients of the variables in the estimation equation, it was revealed that capia pepper production is not a profitable activity in the research area, In order to carry out a profitable pepper production; according to the marginal costs of the inputs used in production, the value corresponding to the product increase provided by the input should be either equal or higher. In other words, profitability in production depends on the rational use of production factors.

Key words: Pepper Production, Efficiency, Elasticity, Marginal Yield, Marginal Revenue, Marginal Efficiency.

Giriş

Biber (*Capsicum spp.*), hem dünyada hem de Türkiye’de sevilerek tüketilen, içerdiği mineral maddelerin yanı sıra vitamin yönünden oldukça zengin ve insan beslenmesine olumlu katkısı olan bir sebze türüdür. Kapyta biberi [*Capsicum annuum L. var. conoides (Mill.) Irish*], uzun konik şekilli ve kırmızı rengini aldığında tüketilen bir biber tipi olup “salçalık” veya “yağlık” biber olarak da adlandırılmaktadır. Taze olarak tüketilebilmesinin yanı sıra farklı kullanım alanlarında; dondurulmuş, kurutulmuş, közlenmiş olarak ya da salça, sos, baharat ve konserve olarak da tüketilebilmektedir (Karaağaç ve Balkaya 2010).

Birleşmiş Milletler Gıda ve Tarım Örgütü’nün verilerine göre, 2019 yılında dünya toplam biber üretim alanı 1963089 ha, üretim miktarı ise 36026386 ton olarak gerçekleşmiştir. Dünya biber üretim alanlarının %4.69’u, üretim miktarının da %7.19’u Türkiye’ye aittir (FAO, 2020). Türkiye, 2019 yılında dünyada en fazla biber üreten üçüncü ülke konumundadır.

Türkiye toplam biber üretim alanının %47.57’sinde (37003 ha) kapyta biber ekimi yapılmakta olup, Türkiye toplam biber üretim miktarının %48.96’sını kapyta biber üretimi oluşturmaktadır (TÜİK, 2021a).

Türkiye İstatistik Kurumu verilerine göre Çanakkale ilinde kapyta biber üretim verileri incelendiğinde; 7176 ha alan üzerinde, 266679 ton ürün elde edildiği anlaşılmaktadır. Çanakkale ili kapyta biber üretim alanlarında 4486 ha ve %62.52’lik pay ile Yenice ilçesi en büyük paya sahiptir. Yenice ilçesini %13.38 pay ile Biga ilçesi, %8.50 pay ile Bayramiç ilçesi takip etmektedir. Çanakkale’de en yüksek kapyta biber üretimi ise 153232 ton ve toplamdaki %57.46’lık pay ile Yenice ilçesinde gerçekleşmiştir. Bu ilçeyi %14.76 oran ile Biga ilçesi, %9.15 pay ile Bayramiç ilçesi izlemektedir (TÜİK, 2021b).

Konu ile ilgili olarak yapılan literatür incelemesinde biber üretiminde kaynakların etkin kullanımından daha fazla sayıda biber üretim maliyetine yönelik çalışmalar olduğu tespit edilmiştir (Peševski ve Stojkov, 2014; Ayodele ve ark., 2016; Channa ve ark., 2020; López-Marín ve ark., 2022). Ancak biber üretiminde kaynakların etkin kullanımına ilişkin tatmin edici düzeyde çalışma olmadığı anlaşılmaktadır.

Tarımsal üretimde kaynakların etkin kullanımı ve verimlilik ülke ekonomisi ve üretici refahı açısından büyük öneme sahiptir. Zira, üretim faktörlerinin optimal düzeyde kullanımı üretim maliyetlerini de önemli düzeyde azaltabilmektedir (Semerci, 2022a). Tarımsal üretimde kaynakların etkin bir şekilde kullanılması aynı zamanda verimliliğin de artmasına neden olmaktadır (Semerci, 2022b). Kapyta biber üretimi konusunda yürütülen araştırmalara ait bilgiler alta verilmiştir.

Aytaç (1990) çalışmada 122 tarım işletmesinden elde edilen veriler yardımıyla cam seralarda biber üretiminin girdi ihtiyaçları tespit edilmiş ve üretimde kullanılan girdilerle biber üretimi arasındaki ilişki Cobb-Douglas üretim fonksiyonu yardımıyla analiz edilmiştir.

Çakan (1996) 72 tarım işletmesinden elde edilen veriler yardımıyla biber üretimi incelenmiş ve üretim girdilerinin ekonometrik analizi yapılmıştır. Araştırmada; alüviyal topraklarda, kireçsiz kahverengi topraklarda ve kırmızı kahverengi topraklarda olmak üzere 3 farklı toprak tipinde yapılan biber üretimi ekonomik yönden analiz edilmiştir. Çalışmada tahmin denkleminde üretim miktarı bağımlı değişken; üretim alanı, çapalama sayısı, saf azot, saf fosfor, işgücü, tohum miktarı ve ilaçlama masrafları bağımsız değişkenler olarak yer almıştır.

Yayar ve Karkacier (1997) çalışmada 25 işletmeden elde edilen bilgiler yardımıyla biber üretiminin ekonometrik analizi yapılmıştır. Tahmin denkleminde bağımlı değişken biber üretim miktarı bağımsız değişken olarak da; çapalama işgücü (EİG), biber üretim alanı, ilaç masrafları, saf azot miktarı, saf fosfor miktarı, sulama sayısı, hasat sayısı, tohum masrafı ve traktör çekigücü dikkate alınmıştır.

Radam ve Ismail (1999) Malezya'da 159 işletmede çalışmada biber üretiminde bağımlı değişken biber üretim miktarı, açıklayıcı değişkenler olarak da; gübre miktarı (β_i 0.3116), herbisit miktarı (β_i 0.0881), diğer tarımsal mücadele ilacı miktarı (β_i 0.2232), işgücü (β_i 0.2494) ve fide sayısı (β_i 0.2518) değişkenleri ele alınmıştır.

Yılmaz ve ark. (2000) araştırmada 71 işletmeden elde edilen veriler yardımıyla biber üretiminde tarımsal mücadele ilacı ve gübre girdilerinin ne ölçüde kullanıldıkları Cobb-Douglas tipi üretim fonksiyonu yardımıyla incelenmiştir.

Dipeolu ve Akinbode (2008) Güneybatı Nijerya'da 284 işletmede gerçekleştirilen çalışmadan elde edilen veriler yardımıyla biber üretiminin fonksiyonel analizi yapılmıştır. Araştırma üretim miktarı bağımlı değişken olup; üretim alanı (β_i 0.052), aile işgücü (β_i -0.024), kiralık işgücü (β_i 0.057), fide sayısı (β_i 0.257), gübre miktarı (β_i 0.375) ve tarımsal mücadele ilacı miktarı (β_i 0.221) değişkenleri de bağımsız değişken olarak dikkate alınmıştır.

Ambili ve Joseph (2013) çalışmada Hindistan'da biber üretiminin ekonometrik analizi yapılmıştır. Yürütülen çalışma ülke biber üretiminin %96'sının gerçekleştirildiği Kerala Eyaletinde son 40 yıllık dönemde biber üretim alanlarında azalma görüldüğünü ortaya koymuştur.

Jayalath ve Rathnayake (2015) Sri Lanka'da 100 tarım işletmesi üzerinden yürütülen araştırmada biber üretiminin teknik etkinlik analizi yapılmıştır. Tahmin denkleminde biber

verim miktarı bağımlı deęişken olup, bağımsız deęişkenler; biber üretim alanı (β_i 0.826) , aile işgücü (β_i -0.127), kiralık işgücü (β_i 0.067), kimyevi gübre kullanım miktarı (β_i 0.0370), dolomit uygulaması (β_i 0.08.19), tarımsal mücadele ilacı masrafı (β_i -0.159), elle ot alma sayısı (β_i -0.580) olarak belirlenmiştir.

Mohammed (2015) Nijerya’da 200 tarım işletmesinde yürütölen arařtırmada bağımlı deęişken biber üretim miktarı, bağımsız deęişkenler olarak da; üretim alanı (β_i 0.213), tohum miktarı (β_i 0.636), gübre miktarı (β_i 0.053), işgücü (β_i -0.085) ve tarımsal mücadele ilacı (β_i -0.069) yer almıştır.

Mustapha ve ark. (2015) Nijerya’da 76 tarım işletmesinde çalışmada oluşturulan tahmin denkleminde biber üretim miktarı bağımlı deęişken ise; üretim alanı, gübre miktarı, çiftlik gübresi miktarı, tohum miktarı, tarımsal mücadele ilacı miktarı olarak sıralanmıştır.

Ali ve ark. (2016) arařtırmada biber üretim miktarı bağımlı deęişken olup, bağımsız deęişkenler; üreticilerin eğitim süresi (β_i 0.214), üreticilerin deneyim süresi (β_i 0.185), yayım hizmeti veren kuruluşlarla iletişim (β_i 0.248), polythene kullanım miktarı (β_i 0.118), traktör çekigücü (β_i -0.146), tohum miktarı (β_i -0.018), gübre miktarı (β_i -0.071), tarımsal mücadele ilacı kullanım miktarı (β_i -0.015), sulama süresi (β_i 0.088), işgücü miktarı (β_i 0.118) deęişkenleri dikkate alınmıştır.

Asravor ve ark. (2016) Gana’da 200 üretici ile yapılan arařtırmada çalışmada bağımlı deęişken biber üretim miktarı, bağımsız deęişkenler olarak da; üretim alanı (β_i 0.3437), kiralık işgücü (β_i 0.2845), aile işgücü (β_i -0.2880), gübre maliyeti (β_i 0.2065), tohum miktarı (β_i 0.0938) ve dięer masraf unsurları (β_i 0.1795) belirlenmiştir.

Abate ve ark. (2019) Etiyopya’da 385 üreticiyle yürütölen arařtırmada biber üretiminin fonksiyonel analizi yapılmıştır. Tahmin denkleminde üretim miktarı bağımlı deęişken, üretim alanı (0.630), tohum miktarı (β_i 0.297), gübre miktarı (β_i 0.033), tarımsal mücadele ilacı (β_i 0.021), hayvan işgücü (β_i 0.100) ve işgücü (β_i 0.072) ise bağımsız deęişkenler olarak yer almıştır.

Lagiso ve ark. (2020) Güney Etiyopya’da 170 işletmede yürütölen arařtırmada hazırlanan tahmin denkleminde; biber üretiminde üretim miktarı bağımlı deęişken, üretim alanı (β_i -0.173),

hayvan işgücü (β_i 0.31), tohum miktarı (β_i 0.087), işgücü (β_i 0.47) ve gübre miktarı (β_i 0.38) açıklayıcı değişken olarak yer almıştır.

Nursalam (2020) Endonezya'da 60 tarım işletmesinden elde edilen veriler yardımıyla biber üretiminde teknik etkinlik analizi yapılmıştır. Tahmin denkleminde üretim miktarı bağımlı değişken, arazi büyüklüğü (β_i 1.135), işgücü (β_i 0.270), kimyevi gübre miktarı (β_i 0.145) ve tarımsal mücadele ilacı miktarı (β_i 0.075) da açıklayıcı değişken olarak yer almıştır.

Bayramoğlu ve ark. (2021) çalışmada 232 işletmeden derlenen veriler yardımıyla bir çok ürünler birlikte biber üretiminin maliyet analizi yanında fonksiyonel analizini yapmıştır. Araştırmada biber üretimine ilişkin fonksiyonda bağımlı değişken üretim maliyeti bağımsız değişkenler olarak da; fide maliyeti, gübre maliyeti, ilaç maliyeti, materyal masrafı, işgücü masrafı, sera büyüklüğü ve fide unsurları yer almıştır.

Kumari ve ark. (2021) Hindistan'da 99 tarım işletmesinden elde edilen verilerle biber üretiminin ekonometrik analizi yapılmıştır. Tahmin fonksiyonunda biber üretiminden elde edilen kar bağımlı değişken olarak yer almıştır. Denkleminde yer alan bağımsız değişkenler ise; Tohum fiyatı, çiftlik gübresi ve kimyevi gübre fiyatı, tarımsal mücadele ilacı fiyatı, işgücü fiyatı, hayvan çekigücü ve makine çekigücü fiyatı, sabit masraflar ve biber fiyatı şeklinde sıralanmıştır.

Essa ve Essa (2022) Güney Etiyopya'da 320 tarım işletmesinden elde edilen veriler yardımıyla kırmızı biber üretiminde teknik etkinlik analizi yürütülmüştür. Çalışmada biber üretim miktarı bağımlı değişken, açıklayıcı değişkenler olarak da tohum miktarı (β_i 0.114), işgücü (β_i 0.210), tarımsal mücadele ilacı miktarı (β_i 0.286) ve kimyasal gübre miktarı (β_i 0.443) dikkate alınmıştır.

Yapılan araştırmada kapyta biber üretiminde ülkenin ilk sırasında yer alan Çanakkale ilinde il toplam üretim miktarının %81.37'sini oluşturan Bayramiç, Biga ve Yenice ilçelerinde bu üretim faaliyetinde kullanılan girdiler ile üretim miktarı arasındaki ilişki Cobb-Douglas tipi fonksiyon yardımıyla analiz edilmiştir. Araştırmada kapyta biber üretiminde kullanılan girdilerin üretim elastikiyeti katsayıları, marjinal verim değerleri, marjinal gelirleri, marjinal etkinlik katsayılarıyla birlikte, üretim girdilerinin kombinasyonu göz önünde bulundurularak girdiler arasında marjinal teknik ikame oranı ve faktör bileşimlerinin etkinlik katsayıları da

hesaplanmıştır. Araştırma sonucunda elde edilen bulgular konu ile ilgili yapılan diğer araştırma bulgularıyla karşılaştırılarak analiz edilmiştir.

2. MATERYAL VE YÖNTEM

2.1. Materyal

Araştırmanın birincil verilerini araştırma alanı olarak belirlenen ve Türkiye'nin Marmara Bölgesi'nde yer alan Çanakkale iline bağlı Biga, Bayramiç ve Yenice ilçelerinde kapa biber üreten ve "Tabakalı Örneklem Yöntemi" kullanılarak belirlenen 76 adet tarım işletmesinden anket uygulamasıyla elde edilen veriler oluşturmaktadır. Çalışmanın ikincil verilerini ise; başta Birleşmiş Milletler Gıda ve Tarım Örgütü (FAO) ve Türkiye İstatistik Kurumu (TÜİK) ve Çanakkale İl Tarım ve Orman Müdürlüğü'nden elde edilen veriler oluşturmaktadır. Çalışmada yağlık ayçiçeği ile ilgili ulusal ve uluslararası düzeyde çeşitli kurum ve kuruluşların yayınlarından, tezlerden ve komisyon raporlarından yararlanılmıştır.

2.2. Yöntem

2.2.1. Örneklemde Kullanılan Yöntem

Araştırmada örneklem çerçevesinin oluşturulmasında Çanakkale İl Tarım ve Orman Müdürlüğü Çiftçi Kayıt Sistemi verilerinden yararlanılmıştır (TOB, 2020). Bir bölgedeki tarım işletmelerinin sosyo-ekonomik yapısını incelemeye yönelik olarak yapılan araştırmalarda tarım işletmeleri büyüklüklerine ya da gelir durumlarına göre tabakalara ayrılmaktadır. Bunun temel nedeni işletmelerin genel olarak ele alınması halinde araştırma alanında bulunan işletmelerin farklı büyüklüklerde olması nedeniyle heterojen bir yapıyla karşılaşılmasıdır. Tabakalandırma işlemiyle popülasyona ait tahminlerin doğruluk derecesi artırıldığı gibi popülasyondaki farklı bölümlerin (işletme büyüklük gruplarının) yeterince temsil edilmesi sağlanmış olmaktadır (Oğuz ve Karakayacı, 2017).

Araştırmada örneklem çerçevesi ve örnek sayısının belirlenmesinde (işletmelerin arasında homojenliğin sağlanması amacıyla) Tabakalı Örneklem Yöntemlerinden Neyman tarafından önerilen istatistikî formül kullanılmıştır (Yamane, 1967).

$$n = \frac{[\sum(N_h * S_h)]^2}{N^2 * D^2 + [\sum(N_h * S_h)]^2} \quad D^2 = \left(\frac{d}{t}\right)^2$$

(1)

Denklem 1'de gösterimi verilen; n= örnek hacmini, N_h= h'inci tabakaya ait örneklem çerçevesindeki işletme sayısını, S_h= h'inci tabakadaki verilerin standart sapmasını, S_h²= h'inci tabakadaki verilerin varyansını, t= belli bir güven aralığı için t tablo değerini, N= Örneklem çerçevesine toplam işletme sayısını, d= ortalamadan belli bir % sapmayı göstermektedir.

Örnek hacmi oluşturan işletmeler, standart sapma ve varyasyon katsayıları (C.V.) dikkate alınarak tabakalara ayrılmıştır. Varyasyon katsayısı, standart sapmanın ortalamaya göre yüzde kaçlık bir değişim gösterdiğini ifade etmektedir. Varyasyon katsayısının düşük olması, birim değerlerin ortalamadan sapmalarının daha az olduğu anlamına gelir. Başka bir ifade ile incelenen birimlerin, özellik bakımından daha homojen olduğunu göstermektedir. Varyasyon katsayısı %33'ün üzerinde olan bir örnek normal bir populasyonu ifade etmez ve veriler arasında büyük farklılıkları işaret eder. Varyasyon katsayısı Denklem 2'deki gibi hesaplanmaktadır (Oğuz ve Karakayacı, 2017).

$$C.V. = \frac{s}{\bar{x}}$$

(2)

Denklem 2'de; C.V., varyasyon katsayısını, S, standart sapmayı ve \bar{X} ise ortalamayı ifade etmektedir. Örnek hacmin tabakalara dağıtılmasında Denklem 3 kullanılmış olup, tabakalar belirlenirken C.V. katsayıları da göz önüne alınmıştır.

$$n = \frac{(N_h * S_h) * n}{\sum (N_h * S_h)}$$

(3)

Denklem 3 yardımıyla işletmeler; 2.00-4.99 dekar, 5.00-9.99 dekar, 10 dekar ve üzeri olmak üzere 3 gruba ayrılmıştır. Tabakaların homojen dağılımı tespit edildikten sonra her bir gruba giren örnek sayıları (n_h), Denklem 4 yardımıyla bulunmaktadır.

$$n_h = \frac{N_h}{N} * \left(\frac{n}{\sum N_h * S_h} \right)$$

(4)

Eşitlikten yararlanılarak yapılan hesaplamada; birinci grupta 21, ikinci grupta 20, üçüncü grupta 35 işletme olmak üzere araştırma kapsamında 76 tarım işletmesinde kapyra biber üretimiyle ilgili anket çalışması yürütülmüştür.

2.2.2. Analizlerde Kullanılan Yöntem

Fonksiyonel analiz için çalışmada Cobb-Douglas üretim fonksiyonu kullanılmıştır (Kip ve İşyar, 1976; Doll ve Orazem 1984; Beattie ve ark., 2009). Çeşitli araştırmacılar da Cobb-Douglas tipi üretim fonksiyon denklemlerinin tarımsal faaliyetlerin fonksiyonel analizi için uygun olduğunu belirtmişlerdir (Heady ve Dillon, 1961; Zoral, 1973,1984; Özçelik, 1989). Ayrıca Cobb-Douglas tipi üretim fonksiyonu; hesaplama kolaylığı sağlaması, üretim esnekliğinin istatistiksel testlerinin yapılması, yetersiz veri ile bile yeterli serbestlik derecelerinin sağlanması vb. birçok yönden tercih edilmektedir (Heady ve Dillon, 1966).

Fonksiyona ait denklem altta verilmiştir (Dawson ve Lingard, 1982; Doll ve Orazem, 2005; Gujarati ve Porter, 2014)

$$Y = \alpha X_1^{b_1} X_2^{b_2} X_3^{b_3} \dots X_n^{b_n}$$

(5)

Denklemin her iki tarafının logaritması alındığında Denklem 6 şekline dönüşmektedir.

$$\log Y = \log \alpha + \beta_1 \log x_1 + \beta_2 \log x_2 + \dots + \beta_k \log x_k + e^u \quad (6)$$

Denklemdaki β_i sembolleri ile gösterilenler, üretim elastikiyetlerini ifade etmektedir ($\beta_i=1,2,\dots,n$). β_i katsayılarının testi,

$$t \beta_i = \beta_i / se(\beta_i)$$

(7)

Denklem 7. formülüyle yapılmakta ve hesaplanın $t\beta_i$ değeri, “t-tablosu”nda (n-k-1) serbestlik derecesini gösteren satır ile istenen önem seviyesine ait sütunun kesiştiği yerdeki değeri ile karşılaştırılmaktadır.

Elde edilen regresyon denklemine ilişkin; çoklu regresyon (R) ve determinasyon katsayısı (R^2), bağımsız değişkenlere ait elastikiyet katsayıları (β_i), standart hataları ($se \beta_i$) ve önem seviyeleri ($t\beta_i$), değişkenlerin geometrik ortalamaları (X_iG , YG), basit korelasyon katsayıları (r_{ij}) ile denklemin standart sapması (S) ve önem seviyesi (F değeri) uygun bir istatistik paket programı yardımıyla yapılan regresyon analizleri sonucunda elde edilmiştir. Bununla birlikte araştırmada tahmin denkleminde ilgili olarak aşağıda belirtilen hesaplamalar ve bağıntı araştırmaları yapılmıştır: Determinasyon Katsayısı (R^2), Kısmi Korelasyon Katsayılarının (bi) Önem Testi, İçsel Bağıntı (autocorrelation), Çoklu Bağıntı Varlığı (multicollinearity) (Ertek, 1996; Gürler, 1996).

Kapya biber üretiminde kullanılan herhangi bir X_i girdisinin marjinal fiziksel veriminin (Marginal Physical Productivity-MPP-) hesaplanmasında altta verilen formül kullanılmıştır (Singh ve ark., 2004; Mobtaker ve ark., 2010; Rafiee ve ark., 2010).

$$MPP_{Xij} = \beta_{ij} * GM(Y) / GM(X_i)$$

(8)

Denklemden; MPP_{Xj} girdinin marjinal fiziksel verimini, α_j girdinin regresyon katsayısını, $GM(Y)$ bağımlı değişken olan ürünün geometrik ortalama değerini, ve $GM(X_j)$ girdilerin geometrik ortalama değerlerini göstermektedir.

Anket uygulanan işletmelerde çeltik üretiminde kullanılan üretim faktörlerinin Marjinal Gelirinin (MG) hesaplanmasında kullanılan formül aşağıda gösterilmiştir.

$$MjRxj = \beta_j * \frac{GM(Y)}{GM(Xij)} * Fy$$

(9)

formülü kullanılarak tespit edilmiştir (Singh ve ark., 2004; Mobtaker ve ark., 2010; Rafiee ve ark., 2010). Marjinal verimin ürün fiyatı ile çarpımı Marjinal Gelir'i vermektedir. Bu durumda, j'inci üretim faktörü kârı maksimum yapacak şekilde veya en ekonomik biçimde olarak kullanılıyor demektir.

Marjinal gelirlerin faktör fiyatlarına bölünmesi ile bulunan Marjinal Etkinlik Katsayıları (Marginal Efficiency Coefficients –MEC-) ekonomik yönden hangi faktörün etkin hangi faktörün de az veya fazla kullanıldığını ifade etmektedir. Marjinal etkinlik katsayısının hesaplanmasında kullanılan eşitlik altta gösterilmiştir (Dilmen, 1985; Singh ve ark., 2004; Mobtaker ve ark., 2010; Rafiee ve ark., 2010).

$$MEC = \frac{\text{Marginal Factor Revenue}}{\text{Marginal Factor Cost (Factor Price or Opportunity Cost)}}$$

(10)

Üretim faktörlerine ilişkin hesaplanan marjinal etkinlik katsayılarının yorumlanmasında aşağıda belirtilen kurallar dikkate alınmıştır (Akçay ve Uzunöz, 1999):

EK = 1 ise faktör etkin kullanılmaktadır (MR=MC).

EK > 1 ise faktör az kullanılmaktadır ve artırılmalıdır (MR>MC),

EK < 1 ise faktör aşırı kullanılmaktadır ve azaltılmalıdır (MR<MC)

Üretimde kullanılan faktörler arasındaki teknik ikame haddi (marjinal teknik ikame oranı), diğer bir ifadeyle Y seviyesinde bir üretim miktarını elde etmek için X₁ faktörü miktarına karşılık, X₂ faktörünün ne miktarda kullanılması gerektiği;

$$MTIO_{x2/x1} = \frac{X1G \text{ Marjinal Verim}}{X2G \text{ Marjinal Verim}}$$

(11)

veya;

$$MTIO_{x2/x1} = \frac{b1.X2G}{b2.X1G}$$

(12)

formülleri kullanılarak hesaplanmıştır.

Çalışmada faktör bileşenlerinin marjinal etkinlik katsayıları hesaplanırken altta verilen eşitlikten yararlanılmıştır (Karagölge, 1973).

$$FBMEK = \left(\frac{bj * xjgo}{bi * xjgo} \right) / \left(\frac{Fxi}{Fxi} \right)$$

(13)

Formülde marjinal teknik ikame oranlarının hesaplanmasında değişkenlerin geometrik ortalaması kullanılmıştır (Gündoğmuş, 1998; Karkacıer, 2001).

3. ARAŞTIRMA VE BULGULAR

Araştırma kapsamında Çanakkale ilinde 76 tarım işletmesinden elde edilen veriler yardımıyla kapyra biber üretim miktarı ile; fide sayısı, saf gübre kullanım miktarı, tarımsal mücadele ilacı kullanım miktarı, üretimin tamamı için kullanılan mazot ve işgücü kullanım miktarları arasındaki ilişkiler Cobb-Douglas üretim fonksiyonu yardımıyla analiz edilmiştir (Neill, 2002). Çalışmada kapyra üretim fonksiyonunda yer alan değişkenler aşağıda gösterilmiştir.

Y = Kapyra biber üretim miktarı (kg/da)

Fonksiyonda yer alan bağımsız değişkenler ise aşağıda verilmiştir.

X₁ = Fide sayısı (adet/da)

X₂ = Saf gübre miktarı (kg/da),

X₃ = Tarımsal mücadele ilacı kullanım miktarı (cc/da)

X₄ = Mazot miktarı (lt/da),

X₅ = İşgücü (saat/da).

Yapılan araştırmada üretimde yer alan değişkenler arasındaki fonksiyonel bağıntı;

$$Y = 1.415 * X_1^{-0.107} * X_2^{0.188} * X_3^{-0.092} * X_4^{-0.030} * X_5^{0.603}$$

(S=0.085; R= 0.624; R² = 0.79; F=8.94) şeklinde belirlenmiştir.

Tahmin denkleminin ilişkin çoklu korelasyon ve determinasyon katsayıları (F_{hesap}>F_{tablo}) %1 olasılık seviyesinde anlamlı bulunmuştur. Araştırmada oluşturulan denklemde otokorelasyon varlığı “Durbin Watson (DW) Testi” kullanılarak test edilmiştir (Tablo 1).

Tablo 1. Kapyta biber üretimi tahmin denkleminde ait temel istatistikler

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change	Durbin-Watson
					R Square Change	F Change	df1	df2		
1	0.624 ^a	0.390	0.346	0.0847	0.390	8.940	6	70	0.000	1.639

a. Predictors: (Constant), işgücü, saf gübre, tarımsal mücadele ilacı, mazot, fide sayısı.

b. b. Dependent Variable: üretim miktarı

Tahmin denkleminde ait $DW_{H(\text{hesap})}$ istatistiği (0.05; n=76; k'=5) değeri tablo üst değerinden yüksek olması nedeniyle ($DW_H 1.639 > DW_{U(0.05)} 1.624$) fonksiyona yönelik otokorelasyon probleminin olmadığı anlaşılmıştır (Tablo 1,2).

Tablo 2. Kapyta biber üretim fonksiyonu varyans analizi tablosu

	Serbestlik Derecesi	Kareler Toplamı	Kareler Ortalaması	F değeri	P değeri
Regresyon	5	0.320	0.064	8.940	0.000
Kalan	70	0.502	0.007		
Toplam	75	0.822			

Bağımsız değişkenlere ait üretim elastikiyetleri incelendiğinde; fide sayısı, tarımsal mücadele ilacı ve kullanılan mazot faktörlerinin üretim elastikiyeti katsayıları negatif, saf gübre miktarı ve işgücü değişkenlerine ilişkin üretim elastikiyeti katsayılarının pozitif karakterli olduğu tespit edilmiştir (Tablo 3).

Tablo 3. Kapyta biberde üretim faktörlerine ait üretim elastikiyeti katsayıları

	X ₁ (fide sayısı)	X ₂ (saf gübre miktarı)	X ₃ (tarımsal mücadele ilacı miktarı)	X ₄ (mazot miktarı)	X ₅ (işgücü kullanım miktarı)	($\sum\beta_i$)
Üretim elastikiyetleri (β_i)	-0.107	0.188	-0.092	-0.030	0.603	0.562
Standart hata (se β_i)	0.246	0.171	0.126	0.041	0.230	-
t β_i	-1.023	1.918*	-0.938	-0.310	6.113*	-

(*) : %5 ihtimal düzeyinde önemli.

Fonksiyonda yer alan faktörlerin üretim elastikiyetleri toplamı ($\sum\beta_i$) 0.562'dir. Bu durum kapyta biber üretiminde ölçeğe göre azalan getiriyi ifade etmektedir. Kısacası, kapyta biber üretiminde yer alan değişkenler %1 artırıldığında, üretim miktarında %0.56 oranında bir artış olması beklenebilir.

Oluşturulan denkleminde saf gübre (X₁) ve işgücü (X₅) girdilerinin üretim elastikiyeti katsayıları %5 ihtimal düzeyinde önemli bulunmuştur. Teorik açıdan konuya yaklaşıldığında

kapya biber üretiminde kullanılan saf gübre girdisindeki %1'lik artışın üretimi %0.188, işgücü girdisindeki %1'lik artışın ise kapya biber üretiminde %0.603 oranında artıracığı söylenebilir. Pratik açıdan ise kapya biber üretiminde nitelikli girdi kullanımının üretim düzeyinde belirli bir aşamaya kadar artış sağlayabileceği şeklinde yorumlanması daha uygundur.

Fonksiyonda yer alan üretim faktörlerinin elastikiyet katsayıları toplamı ($\sum\beta_i$) 0.562 olarak hesaplanmıştır. Bu değer ölçeğe azalan getiriyi göstermektedir. Araştırmada kapya biber üretim miktarında etkili olan üretim faktörlerine ait marjinal ürün değerleri ve marjinal etkinlik katsayıları Tablo 4'te verilmiştir.

Tablo 4. Kapya biber üretim modelinde yer alan faktörlerin marjinal kıymetleri ve etkinlik katsayıları

	X ₁ (fide sayısı)	X ₂ (saf gübre)	X ₃ (tarımsal mücadele ilaç)	X ₄ (mazot)	X ₅ (işgücü)	Y
Geometrik Ortalama	4451.23	44.39	483.20	17.60	99.76	3220.83
Marjinal Ürün Kıymeti (TL)	-0.03	77.62	-130.01	-37.61	1557.47	-
Faktör Fiyatları (TL)	0.44	5.69	212.00	6.85	80	-
Marjinal Etkinlik Katsayısı	-0.07	13.64	-0.61	-5.49	19.47	-

Tablo 4'ün incelenmesinde de anlaşılacağı üzere kapya biber üretiminde kullanılan girdiler içinde sadece saf gübre ve işgücü değişkenleri pozitif niteliktedir. Bu nedenle tüm faktörler için hesaplama yapılmakla birlikte sadece bu iki değişken hakkında ekonomik ve teknik yorumda bulunulmuştur. En yüksek marjinal etkinlik katsayısı işgücü değişkenine (X₅) aittir. Bu değişkeni saf gübre değişkeni (X₂) izlemektedir. Marjinal ürün değerlerinin belirlenmesinde faktör fiyatları olarak kullanılan girdilerin birim fiyatları dikkate alınmıştır. Marjinal etkinlik katsayılarına göre işgücü ve saf gübre girdileri ekonomik optimum düzeyinin altında kullanılmaktadır. Bu nedenle marjinal etkinlik katsayısı yüksek olan işgücü ve saf gübre faktörlerinin kullanımının artırılması tavsiye edilebilir. Diğer bir ifade ile bu faktörler; toprak analizi yapıldıktan sonra tavsiye edilen miktarlara göre kullanımı teşvik edilmeli, daha nitelikli işgücü kullanımına özen gösterilmelidir.

Marjinal Teknik İkame Oranı

Marjinal Teknik İkame Oranının belirlenmesinde iki girdiden birisi negatif, diğeri pozitif üretim elastikiyetine sahip olduğu durumda, bunlar arasında ikame ilişkisi söz konusu olmamaktadır (Özçelik, 1989). Çalışmada tarımsal mücadele ilacına ait etkinlik katsayısının negatif işaretli olması nedeniyle çalışmada bu değişkenlerle diğer değişkenler arasında ikame oranı hesaplanmamıştır. Denklemdeki iki faktör arasındaki marjinal teknik ikame oranı, bu

faktörlerin geometrik ortalamalarına göre bulunan marjinal verimlerinin oranından ibarettir (Heady ve Dillon, 1966; Zoral, 1984).

$MT\ddot{O}>1$ olması faktör bileşiminin paydadadaki değişken lehine, $MT\ddot{O}<1$ olması da faktör bileşiminin paydaki değişken lehine değiştirilmesini gerektirmektedir. Yapılan çalışmada $MT\ddot{O}_{\text{gübre/işgücü}}$ 1.43 olarak bulunmuştur.

Buna göre üretim fonksiyonuna dahil edilen bütün faktörler geometrik ortalamalarındaki seviyelerinde kullanılırken, işgücü (X_3) miktarında yapılacak bir birimlik ilaveye karşılık, aynı üretim seviyesinde kalmak şartıyla, gübre kullanımında 1.43 kg azaltmaya gidilmeli ve diğer girdilerin kullanım miktarları geometrik ortalaması seviyesinde sabit tutulmalıdır.

Faktör Bileşenlerinin Marjinal Etkinlik Katsayısı

Faktör bileşenlerinin marjinal etkinlik katsayısı faktörler arasındaki marjinal teknik ikame oranının ($MT\ddot{O}$) fiyat oranına (FO) bölünmesi ile elde edilmektedir. Optimum kullanım düzeyinde belirtilen iki oranın birbirinden bölünmesinden elde edilen değer 1'e eşit olması gerekir.

Yapılan çalışmada $MT\ddot{O} [(b_j \cdot x_i) / (b_i \cdot x_j)]$ 'nın Fiyat Oranına $[F_{x_j} / f_{x_i}]$ bölünmesinden elde edilen değer 20.07 olarak elde edilmiştir. Bu değer gübre faktörüne göre işgücü kullanımının aşırı olduğu ve azaltılması gerektiğini ortaya koymaktadır. Yapılan hesaplamalarda faktörlerin geometrik ortalama değerleri dikkate alınmıştır.

Dünya genelinde biber üretimiyle ilgili olarak yapılan fonksiyonel analiz çalışmalarından elde edilen bulgular bu bölümde ayrıntılı olarak incelenmiştir. Yapılan araştırma sonucunda elde edilen bulgular ve karşılaştırmalı analizi altta verilmiştir.

Yürütülen bir araştırmada 122 tarım işletmesinden elde edilen veriler yardımıyla cam seralarda biber üretiminin girdi ihtiyaçları tespit edilmiş ve üretimde kullanılan girdilerle biber üretimi arasındaki ilişki Cobb Douglas üretim fonksiyonu yardımıyla analiz edilmiştir. Yapılan fonksiyonel analiz sonucunda biber üretim faaliyetinde girdilerin ekonomik optimuma uygun olarak kullanılmadığı, girdi kullanım düzeylerinin bir kısım girdiler için gerekenden az, diğer bir kısım girdiler için ise fazla olduğu saptanmıştır. Cam seralardaki biber üretim faaliyetlerinde en önemli girdinin arazi olduğu belirlenmiştir (Aytaç, 1990).

Türkiye'nin Kahramanmaraş ili Narlı bölgesinde alüviyal topraklar üzerinde kırmızı biber yetiştirilen işletmelere (I. Bölge) ait verilerin kullanılması ile elde edilen fonksiyon %1 düzeyde önemli olup, fonksiyona ilişkin determinasyon katsayısı (R^2) 0.942 olarak hesaplanmıştır. Tahmin denkleminde bağımsız değişkenlere ait üretim elastikiyetleri katsayıları toplamı ($\sum \beta_i$)

1.73 olup, hesaplanan değer ölçeğe artan getiri durumu söz konusudur. Çalışma değişkenlerden saf azot, tohum miktarı ve ilaçlama masraflarına ait üretim elastikiyetlerinin negatif olduğunu göstermiştir. Yapılan marjinal analizler sonucu saf azot, tohum miktarı ve ilaçlama masrafları hariç, diğer değişkenlerin geometrik ortalamalarındaki kullanım seviyelerinin az olduğu saptanmıştır. Ayrıca, girdilerin birbirleri ile etkin kullanılmadıkları belirlenmiştir (Çakan, 1996).

Aynı araştırmacının kireçsiz kahverengi topraklar üzerinde kırmızı biber yetiştiren işletmelere ait verilerin kullanılması ile elde edilen fonksiyon %40 düzeyde önemli bulunmuş olup, R^2 değeri ise 0.510 olarak hesaplanmıştır. Denklemden yer alan değişkenlerden işgücü ve tohum miktarı hariç diğer bağımsız değişkenlerin üretim elastikiyetleri negatif değerlidir. Denklemden bağımsız değişkenlere ait üretim elastikiyetleri katsayıları toplamı ($\sum\beta_i$) -1.2005 olup, hesaplanan değer ölçeğe azalan getiriyi ifade etmektedir. Yapılan çalışma; üretimde kullanılan işgücü ve tohum miktarının artırılması halinde biber üretiminde ve ürünün gayrisafi üretim değerinde artışa neden olacağını ortaya koymuştur. Yapılan araştırma; diğer değişkenlerin geometrik ortalamalarındaki kullanım seviyelerinin fazla olduğu ve girdilerin birbirleri ile etkin kullanılmadıkları göstermiştir (Çakan, 1996).

Yine aynı araştırmacı tarafından kırmızı kahverengi Akdeniz toprakları üzerinde kırmızı biber yetiştiren işletmelere ait verilerin kullanılması ile elde edilen fonksiyon %1 düzeyinde önemli olup, fonksiyona ait R^2 değeri 0.927 olarak hesaplanmıştır. Tahmin denkleminde yer alan değişkenlerden çapalama sayısı, saf fosfor ve ilaçlama masrafları değişkenlerinin üretim elastikiyetleri negatif değerlidir. Değişkenlerden sulama sayısı faktörü %4 ve ekim alanı faktörü ise %11 düzeyinde önemli bulunmuştur. Bağımsız değişkenlere ait üretim elastikiyetleri toplamı 1.4086 olup, ölçeğe artan getiri vardır. Yapılan çalışma; çapalama sayısı, kullanılan saf fosfor miktarı ve ilaçlama masrafları hariç diğer bağımsız değişkenlerin artırılmasının üretim miktarı ve ürünün gayrisafi üretim değeri üzerinde olumlu etkiye neden olacağını ortaya koymuştur. Araştırmada, biber üretiminde tahmin fonksiyonunda yer alan değişkenler arasında etkin kullanım durumunun bulunmadığı tespit edilmiştir (Çakan, 1996).

Yürütülen bir araştırmada biber üretimi tahmin denkleminde yer alan değişkenlerden; çapalama işgücü %20, biber üretim alanı ve saf azot miktarı %1, sulama sayısı %5, hasat sayısı %10 düzeyinde anlamlı bulunmuştur. Fonksiyonda yer alan değişkenlerden saf azot miktarı, saf fosfor miktarı ve sulama sayısı değişkenlerine ait elastikiyet katsayıları negatif işaretli bulunmuştur. Denklemin R^2 değeri 0.731 olup %1 düzeyinde önemli bulunmuştur. Fonksiyonda yer alan ve istatistiki yönden önemli bulunan değişkenlerin etkinlik katsayıları

şöyle yorumlanmıştır: çapalama işgücü (2.99), biber üretim alanı (12.17) ve hasat sayısı (3.86) az kullanılmaktadır ve artırılmalıdır. Çalışmada saf azot miktarı ve sulama sayısı değişkenlerinin negatif marjinal gelire sahip olmaları nedeniyle aşırı kullanıldıkları ve azaltılmaları gerektiği sonucuna varılmıştır (Yayar ve Karkacı, 1997).

Yapılan bir çalışmada biber üretimine ilişkin tahmin fonksiyonunun R^2 değeri 0.5375 olarak hesaplanmıştır. Tahmin denkleminde yer alan değişkenlerden gübre miktarı, herbisit miktarı ve fide sayısı değişkenleri %1, işgücü değişkeni ise %10 düzeyinde önemli bulunmuştur (Radam ve Ismail, 1999).

Biber üretimiyle ilgili oluşturulan bir üretim fonksiyonunda bağımlı değişken olarak gayri safi üretim değeri, açıklayıcı değişkenler olarak; gübre masrafı (β_i 0.2156), ilaç masrafı (β_i -0.2645), emek (β_i 0.2921), tohum (β_i -0.0015), sera tipi (β_i 0.0817) kullanılmıştır. Fonksiyonun DW İstatistiği 1.0182, belirlilik katsayısı (R^2) 0.24 olarak belirlenmiş olup denkleme ilişkin F İstatistiği 2.294 %6 önem düzeyinde anlamlı bulunmuştur. Biber üretim fonksiyonunda emek % 3 önem seviyesinde anlamlı bulunurken, gübre % 9 ve ilaç % 13 önem seviyelerinde anlamlı, tohum ve sera tipi ise anlamsız bulunmuşlardır. Yapılan araştırma; tahmin edilen biber üretim fonksiyonunda ilaç değişkeninin katsayısının negatif olması bu girdinin aşırı yönde kullanıldığını, gübre girdisinde ise hesaplanan marjinal gelir değerinin biber üretiminde ekonomik optimum noktadan daha düşük seviyelerde gübre kullanıldığını ortaya koymuştur. Çalışma sonucunda; biber üretiminde ilaç kullanımında entegre mücadelenin yaygınlaştırılması, gübre kullanımında ise toprak ve bitki analizlerine dayalı gübreleme yapılması önerilmiştir (Yılmaz ve ark., 2000).

Konu ile ilgili olarak oluşturulan biber üretimi tahmin denkleminde yer alan değişkenlerden gübre miktarı %1, üretim alanı %5, fide sayısı ve tarımsal mücadele ilacı değişkenleri de %10 düzeyinde önemli bulunmuştur (Dipeolu ve Akinbode, 2008).

Biber üretiminin ekonometrik analiziyle ilgili bir çalışmada elde edilen fonksiyonda yer alan üretim alanı ve tarımsal mücadele ilacı masrafı değişkenleri %1, aile işgücü elle ot alma %5, kiralık işgücü ve dolomite application değişkenleri de %10 düzeyinde önemli bulunmuştur (Jayalath ve Rathnayake, 2015).

Benzer bir çalışmada oluşturulan tahmin denkleminde yer alan değişkenlerden tohum miktarı ve gübre miktarı değişkenleri %1, üretim alanı ise %10 düzeyinde önemli bulunmuştur. Bununla birlikte çalışmada bağımlı değişken biber miktarı, bağımsız değişkenler olarak da; üretim alanı maliyeti (β_i -0.0795), tohum maliyeti (β_i 0.1596), gübre maliyeti (β_i 0.0579), işgücü maliyeti (β_i 0.3517), tarımsal mücadele ilacı maliyeti (β_i -0.0426) ve ürün maliyeti (β_i 0.2672)

değişkenleri yer almıştır. Değişkenlerden tohum maliyeti, gübre maliyeti, işgücü maliyeti ve üretim maliyeti ise %1 düzeyinde önemli bulunmuştur (Mohammed, 2015) .

Nijerya'da biber üretiminde girdi-çıkıtı analizi konusunda hazırlanan tahmin denkleminin R^2 değeri 0.726, F istatistiği ise 3.541 bulunmuştur. Denklemden yer alan değişkenlerden üretim alanı ve işgücü kullanımı %5, gübre miktarı %10 düzeyinde önemli bulunmuştur. Bununla birlikte çiftlik gübresi ve tohum miktarı değişkenlerinin elastikiyet katsayıları negatif bulunmuştur. Değişkenlerden üretim alanı (0.047) ve tarımsal mücadele ilacının (0.108) marjinal etkinlik katsayıları 1'in altında, gübre (373.943) ve işgücü (45.02) değişkeninin de 1'in üzerinde olduğu hesaplanmıştır (Mustapha ve ark., 2015).

Diğer bir araştırmada hazırlanan tahmin denkleminde yer alan değişkenlerden; üreticilerin eğitim süresi, üreticilerin deneyim süresi, yayım hizmeti veren kuruluşlarla iletişim, polietilen kullanım miktarı %1, işgücü miktarı %5 ve sulama süresi değişkeni de %10 düzeyinde önemli bulunmuştur. Denkleme ilişkin R^2 değeri 0.824, F istatistiği ise 27.602 olarak hesaplanmıştır. Yapılan çalışmada girdilerin marjinal etkinlik katsayıları da hesaplanarak yorumlanmıştır. Araştırma sonucunda; polietilen kullanım miktarı (4.14), sulama (8.84) ve işgücü faktörlerinin (2.01) marjinal etkinlik katsayıları 1'in üzerinde bulunmuştur. Bu faktörlerin üretimde kullanım miktarı az olup, artırılmaları önerilmiştir. Biber üretiminde kullanılan traktör çekigücü, tohum miktarı, gübre miktarı ve tarımsal mücadele ilacı kullanım miktarına ilişkin marjinal etkinlik katsayılarının negatif işaretli olması bu girdilerin aşırı kullanıldığını ve azaltılması gerektiğini göstermiştir (Ali ve ark., 2016).

Gana'da yürütülen bir çalışmada biber üretimi tahmin denklemindeki değişkenlerden üretim alanı, kiralık işgücü, aile işgücü ve gübre maliyeti değişkenleri %1, diğer masraf unsurları değişkeni de %10 düzeyinde önemli bulunmuştur. Bununla birlikte çalışmada bağımlı değişken biber üretim masrafı, bağımsız değişkenler olarak da; üretim alanı kira değeri (β_i 0.0398), kiralık işgücü (β_i 0.3999), aile işgücü (β_i 0.4087), diğer masraf unsurları (β_i 0.0599), gübre maliyeti (β_i 0.0791), tohum maliyeti (β_i 0.0370), üretim miktarı (β_i 0.0047) değişkenleri yer almıştır. Değişkenlerden üretim miktarı hariç, diğer faktörlerin tamamı %1 düzeyinde önemli bulunmuştur (Asravor ve ark., 2016).

Etiyopya'da yapılan bir araştırmada tahmin denkleminde yer alan değişkenlerden üretim alanı ve tohum miktarı faktörleri %1, gübre miktarı, hayvan işgücü ve işgücü faktörleri de %5 düzeyinde önemli bulunmuştur (Abate ve ark., 2019). Yine Güney Etiyopya'da yapılan bir çalışmada biber üretimi tahmin denkleminde yer alan değişkenlerden hayvan işgücü, işgücü ve

gübre miktarı değişkenleri %1, tohum miktarı değişkeni de %5 düzeyinde önemli bulunmuştur (Lagiso ve ark., 2020).

Endonezya'da konu ile ilgili olarak yapılan bir çalışmada elde edilen tahmin denkleminin R^2 değeri 0.799, F İstatistiği 5.477 olarak hesaplanmıştır. Denkleminde yer alan değişkenlerden üretim alanı %1, işgücü ve kimyevi gübre miktarı değişkenleri de %10 düzeyinde önemli bulunmuştur. Tahmin denkleminde yer alan faktörlerin üretim elastikiyeti katsayıları toplamı 1.625 olup, ölçeğe artan getiri bulunmaktadır. Yürütülen çalışmada değişkenlerin marjinal etkinlik katsayıları şöyle bulunmuştur: arazi büyüklüğü (1.21), işgücü (4.16), kimyevi gübre miktarı (2.19) ve tarımsal mücadele ilacı miktarı (1.11). Bu değerler denkleminde yer alan değişkenlerin tamamının etkinlik katsayılarının 1'den büyük olduğunu ve marjinal gelir = marjinal maliyet prensibi gereği bu girdilerin kullanımının artırılmaları gerektiğini ortaya koymaktadır (Nursalam, 2020).

Bayramoğlu ve ark. (2021) tarafından yapılan araştırma kapsamında oluşturulan fonksiyonun R^2 değeri 0.884, F istatistiği 187.818 ve DW İstatistiği 2.062 olarak hesaplanmıştır. Tahmin denkleminde; fide maliyeti %1, gübre maliyeti, ilaç maliyeti ve materyal masrafı %5 düzeyinde istatistikî açıdan önemli bulunmuştur. Yapılan araştırma fide maliyetindeki 1 TL'lik artışın ürün maliyetini 2.25 TL, gübre maliyetindeki 1 TL'lik artışın üretim maliyetinde 2.914 TL, ilaç maliyetindeki 1 TL'lik artışın da üretim maliyetini 1.12 TL artıracığını ortaya koymuştur. Yapılan analiz sonucuna göre her bir ürün için kurulan modelde materyal masrafları ile biber üretim maliyeti arasındaki ilişki beklendiği gibi negatif yönlü bulunmuştur. Biber üretiminde materyal masraflarında meydana gelen 1 TL'lik artışın üretim maliyetlerini 4.19 TL azaltacağı tahmin edilmiştir. Yapılan analizde mevsimlik işgücü maliyetinde 1 TL'lik artışın biber üretiminde 3.04 TL azalmasına yol açacağı tespit edilmiştir. Çünkü işletme ölçeği arttıkça kullanılan sabit sermayenin etkinliği artmakta ve kaynaklar rasyonel kullanılmaktadır (Altıntaş ve Akçay, 2007; Bayramoğlu ve ark., 2010; Çıtak, 2011; Bayramoğlu ve Bozdemir, 2017; Erdoğan ve Bayramoğlu, 2017; Oğuz ve ark., 2017; Bal, 2018; Topcu, 2018).

Hindistan'da yapılan bir çalışmada biber üretimi tahmin denkleminde yer alan değişkenlerden tohum fiyatı, çiftlik gübresi ve kimyevi gübre fiyatı, hayvan çekigücü ve makine çekigücü fiyatı, biber fiyatına ilişkin elastikiyet katsayıları %1 düzeyinde, tarımsal mücadele ilacı fiyatına ait katsayı da %5 düzeyinde önemli bulunmuştur. Denklemin ilişkin R^2 değeri 0.960, F İstatistiği de 313.006 olarak hesaplanmıştır (Kumari ve ark., 2021).

Güney Etiyopya'da yürütülen bir çalışmada biber üretimi tahmin denkleminde yer alan değişkenlerin elastikiyet katsayıları toplamı 1.051 olup, ölçeğe artan getiri söz konusudur.

Tahmin denkleminde yer alan deęişkenlerin tamamı %1 seviyesinde önemli bulunmuştur (Essa ve Essa, 2022).

Dünya genelinde biber üretiminde yapılan araştırmalardan elde edilen verilerle bu çalışmada elde edilen veriler üç temel noktada karşılaştırılabilir. Bunlardan birincisi elde edilen tahmin denkleminin ilişkin determinasyon katsayısının açıklayıcılık özelliğidir. Diğer bir ifade ile tahmin denkleminde yer alan bağımsız deęişkenler (biber üretiminde kullanılan ve fonksiyonda yer alan deęişkenler) bağımlı deęişkeni (biber üretim miktarını) hangi ölçüde açıklayabilmektedir (Özçelik, 1994).

Diğer bir konu ise biber üretiminde kullanılan girdilerin elastikiyet katsayılarının toplamının ölçüğe getirisinin ne olduğudur. Son görülen önemli bir nokta da bu araştırmada elde edilen verilere göre biber üretiminde etkili olan faktörlerin istatistiki yönden önem düzeyinin ve marjinal etkinlik katsayılarının diğer araştırma bulgularıyla karşılaştırılarak analiz edilmesidir. Tarımsal üretimde üretim miktarı ile üretim faaliyetinde kullanılan deęişkenler arasındaki ilişki farklı tipteki fonksiyonlar yardımıyla analiz edilmektedir. Fonksiyona ilişkin determinasyon katsayısı (R^2) denkleminde yer alan deęişkenlerin hangi düzeyde bağımlı deęişkeni açıklayabildiğini göstermektedir. Bu bakımdan tahmin denkleminin R^2 değeri ve önem düzeyi ile denklemin F İstatistik değeri ve önem düzeyi elde edilen fonksiyonun gerçeklik kazanmasında büyük bir öneme sahiptir. Yapılan araştırmada hazırlanan denklemin determinasyon katsayısı (0.79) ve F İstatistik değeri (8.940) istatistiki açıdan %1 düzeyinde önemli bulunmuştur. Bu çalışmada oluşturulan denkleme ilişkin determinasyon katsayısı; Nursalam (2020) ile bulunan değerle aynı, Çakan (1996)'ın alüviyal topraklar ve kırmızı kahverengi akdeniz toprakları için hesapladığı değerler ile, Ali ve ark. (2016), Bayramođlu ve ark. (2021) ve Kumari ve ark. (2021) tarafından hesaplanan değerlerden küçük olduğu anlaşılmaktadır.

Bununla birlikte araştırmada hesaplanan determinasyon katsayısı; Çakan (1996)'ın kireçsiz kahverengi topraklar için bulduğu değer ile, Yarar ve Karkacier (1997), Radam ve Ismail (1999), Yılmaz ve ark. (2000) ve Mustapha ve ark. (2015) tarafından hesaplanan değerlerden ise büyük olduğu tespit edilmiştir.

Yapılan araştırmada kopya biber üretiminde kullanılan girdilerin üretim elastikiyetleri katsayıları toplamı ($\sum\beta_i$) 0.562 olarak hesaplanmıştır. Bu değer Çakan (1996), Yarar ve Karkacier (1997), Radam ve Ismail (1999), Yılmaz ve ark. (2000), Dipeolu ve Akinbode (2008), Jayalath ve Rathnayake (2015), Mohammed (2015), Ali ve ark. (2016), Asravor ve ark.

(2016), Abate ve ark. (2019), Lagiso ve ark. (2020) Nursalam (2020) ve Essa ve Essa (2022) tarafından hesaplanan değerlerden düşük düzeyde bulunmuştur.

Yürütülen araştırma tahmin denkleminde yer alan işgücü ve saf gübre kullanım miktarına ilişkin değişkenlerin elastikiyet katsayılarının pozitif, %5 düzeyinde önemli olduğu ve marjinal etkinlik katsayılarının da 1'in üzerinde olduğunu göstermiştir.

Benzer şekilde biber üretiminde işgücü değişkeni; Yarar ve Karkacier (1997), Radam ve Ismail (1999), Jayalath ve Rathnayake (2015), Asravor ve ark. (2016), Abate ve ark. (2019), Bayramoğlu ve ark. (2021) ve Kumari ve ark. (2021) tarafından yapılan çalışmada istatistiki yönden önemli bulunmuştur. Aynı şekilde işgücü değişkeninin marjinal etkinlik katsayısı; Mustapha ve ark. (2015), Ali ve ark. (2016), Nursalam (2020) ve Essa ve Essa (2022) tarafından yapılan çalışmalarda da 1'in üzerinde olduğu tespit edilmiştir.

Biber üretiminde saf gübre kullanımı istatistiki yönden önemli bulunmuştur. Benzer şekilde gübre faktörü; Yılmaz ve ark. (2000), Dipeolu ve Akinbode (2008), Radam ve Ismail (1999), Mohammed (2015), Asravor ve ark. (2016), Abate ve ark. (2019), Bayramoğlu ve ark. (2021), Kumari ve ark. (2021) ile Essa ve Essa (2022) tarafından yapılan araştırmalarda da istatistiki yönden önemli bulunmuştur. Aynı şekilde gübre faktörünün marjinal etkinlik katsayısı; Yılmaz ve ark. (2000), Mustapha ve ark. (2015) ve Nursalam (2020) tarafından yapılan çalışmalarda 1'in üzerinde bulunmuştur.

Bu araştırmada elde edilen temel bulgulardan yola çıkarak yapılan karşılaştırmalara göre biber üretiminde kullanılan faktörlerin ülkeden ülkeye ve bölgeden bölgeye değişiklik gösterdiği söylenebilir. Yapılan araştırmada özellikle biber üretiminde kullanılan girdilerden işgücü ve gübre kullanım miktarına ilişkin faktörlerin, bu araştırmada olduğu gibi, diğer araştırmalarda da istatistiki yönden önemli çıktığı ve belirtilen girdilerin marjinal etkinlik katsayısının da 1'den olduğu tespit edilmiştir. Bu nedenle bu araştırmadaki bulguların diğer araştırma sonuçlarıyla paralellik gösterdiği söylenebilir.

4.SONUÇ

Türkiye dünyanın önde gelen biber üreticisi ülkelerinden biridir. Ekim alanı ve üretim miktarı bakımından ilk 3 ülke arasında yer alan Türkiye'de biber üretimi birçok üreticinin geçim kaynağıdır.

Türkiye'de salçalık kopya üretim alanı, 2020 yılı verilerine göre toplam biber üretim alanının %47.57'sini, üretim miktarının da %48.96'sını oluşturmaktadır. Araştırma alanı olarak belirlenen Çanakkale ili ülke kopya biber üretiminde ilk sırada yer almakta olup, üretimin %20.60'ını karşılamaktadır.

Kapya biber üretimi Çanakkale ili için yüksek öneme sahiptir. Çanakkale ilinin toplam bitkisel üretim değeri içinde biberin payı %5.08'dir. İl toplam sebze üretim değeri içerisinde ise biberin payı %25.33'dür.

Bu çalışmada kapya biber üretiminde elde edilen üretim miktarı ile üretim faaliyetinde kullanılan girdiler arasındaki ilişkiler fonksiyonel olarak analiz edilmiştir. Yapılan araştırmada kapya biber üretim miktarı ile fide sayısı, saf gübre kullanım miktarı, tarımsal mücadele ilacı, mazot ve işgücü kullanım miktarları arasındaki ilişkiler Cobb-Douglas tipi fonksiyon kullanılarak incelenmiştir.

Çalışmada kapya biber üretimine ilişkin oluşturulan fonksiyonda; saf gübre (X_2) ve işgücü (X_5) girdilerinin üretim elastikiyetleri %5 ihtimal düzeyinde önemli bulunmuş, üretim miktarı üzerinde etkili olan faktörlerin üretim elastikiyetleri katsayıları toplamının ise ($\sum\beta_i$: 0.56) ölçeğe azalan getiriye ifade ettiği sonucuna varılmıştır.

Tahmin denkleminde yer alan değişkenlerden işgücü değişkenine ait (X_5) marjinal etkinlik katsayısı 19.47, saf gübre değişkeni ilişkin değer ise 13.64 olarak hesaplanmıştır. Marjinal etkinlik katsayılarına göre biber üretiminde işgücü faktörünün ekonomik optimum düzeyinin altında kullanıldığı belirlenmiştir. Bu nedenle marjinal etkinlik katsayısı yüksek olan işgücü ve saf gübre faktörlerinin birim alanda kullanımının artırılması tavsiye edilebilir. Diğer bir ifade ile biber üretiminde nitelikli ve kaliteli işgücü kullanımına özen gösterilmelidir. Bununla birlikte biber üretiminde toprak analizine dayalı olarak gübreleme yapılmalıdır. Yapılan araştırma birim alanda kullanılan gübre miktarının az olduğunu ve artırılması gerektiğini kanıtlamıştır. Bu amaca yönelik olarak biber üretim alanlarında mutlaka toprak analizi yapılmalıdır. Toprak analizine dayalı olarak tavsiye edilecek miktarlarda gübre kullanımı hem birim alandan elde edilen verimi artıracak hem de gelir değerini yükseltecektir.

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Özet

Tekstilden havacılığa, lifler birçok sektör için vazgeçilmezdir ve bu alandaki gelişmeler lifleri kullanma ve görme şeklimizi tamamen değiştirme potansiyeline sahiptir. Akıllı lifler, çeşitli sektörlerde yeni bir inovasyon ve olanaklar çağını başlatan gelişmiş malzemeler ve en son teknolojinin dikkate değer bir birleşimini temsil etmektedir. Dış uyaranlara dinamik olarak tepki verebilen malzemelere olan talep, akıllı liflerin gelişimini de etkilemektedir. Bu lifler verileri algılamak, uyarlamak ve iletmek amacıyla üretildiği için, tekstil, çevresel izleme ve sağlık hizmetleri de dahil olmak üzere çeşitli sektörlerde ilgi çekici yeni olanaklar sunmaktadır. Akıllı liflerin giyilebilir teknolojide kullanımı, en ilginç yeni keşiflerin arasında yer almaktadır. Bu liflerin giysi ve aksesuarlara entegre edilmesi, vücut sıcaklığı, kalp atış hızı, duruş ve fiziksel aktivite gibi çeşitli sağlık parametrelerinin gerçek zamanlı olarak izlenmesine olanak tanımaktadır. Ayrıca, akıllı lifler gerilim, deformasyon ve sıcaklık değişikliklerini gerçek zamanlı olarak tespit edebildiği için inşaat mühendisliğinde yapıların güvenliğinin görüntülenmesinde kullanılabilir. Akıllı lifler nem, kirlilik seviyeleri ve diğer çevresel faktörler hakkında veri toplanmasına yardımcı olarak sürdürülebilirlikle ilgili karar alma süreçlerini iyileştirmektedir. Bütün bunlara ek olarak, bazı akıllı lifler dış uyaranlara tepki olarak renk, doku veya şekil değiştirme yeteneğine sahiptir, bu da onları hem tekstil endüstrisi için hem de kamuflaj gibi askeri uygulamalarda kullanılacak malzemeler üretmek için kullanışlı hale getirmiştir. Bu çalışma, akıllı lif teknolojisindeki en son gelişmelerin kapsamlı bir özetini sunmakta, muhtemel uygulamalarını vurgulamaktadır.

Anahtar Kelimeler: Akıllı lifler, sağlık görüntüleme, sensörler, renk değiştiren lifler

RECENT DEVELOPMENTS IN SMART FIBERS

Abstract

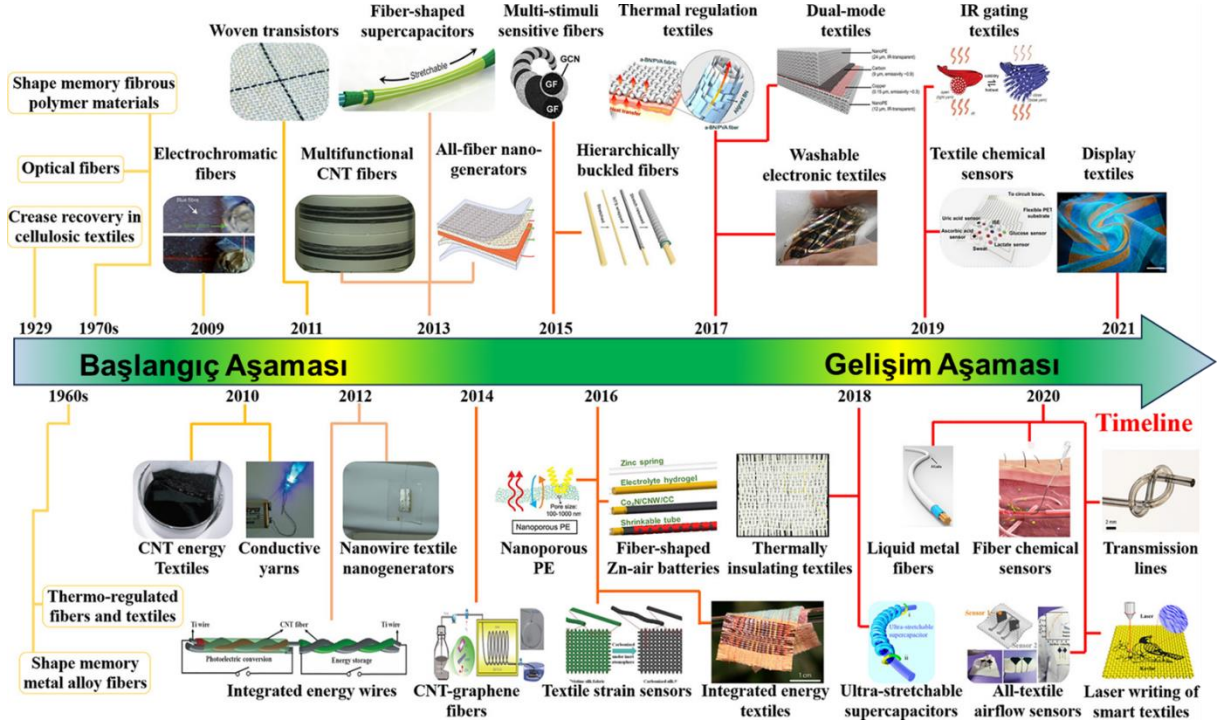
From textiles to aerospace, fibers are essential to many industries, and new developments in this field have the potential to completely change how we use and see fibers. Smart fibers represent a remarkable convergence of advanced materials and cutting-edge technology, ushering in a new era of innovation and possibilities across various industries. The demand for materials that can react dynamically to outside stimuli has fueled the development of smart fibers. Because these fibers are made to sense, adapt, and transmit data, they present intriguing new possibilities in a variety of industries, including textiles, environmental monitoring, and healthcare. Smart fibers' use in wearable technology is among their most interesting new discoveries. The integration of these fibers into apparel and accessories allows for the real-time monitoring of several health indices, such as body temperature, heart rate, posture, and physical activity. Furthermore, smart fibers can be used in structural health monitoring in aerospace and civil engineering, where they can detect stress, strain, and temperature changes in real-time. Additionally, these fibers help collect data on humidity, pollution levels, and other environmental factors, which improves sustainability decision-making. Also, certain fibers have the ability to change color, texture, or shape in reaction to outside stimuli, which makes them useful for both fashion and design as well as for generating materials that can be used in military applications such as camouflage. This study provides a thorough summary of the most recent developments in smart fiber technology, and highlights its prospective applications.

Keywords: Smart fibers, health monitoring, sensors, color-changing fibers

Giriş

Akıllı lifler, akıllı malzemelerden alınan verilerin işlenmesi yoluyla dış çevreyi ve iç durumu algılama, yanıt verme ve yeni işlevleri keşfetme yeteneğine sahip olan lifler olarak tanımlanmaktadır. Akıllı lifler, algılama, geri bildirim, bilgi tanıma ve depolama, yanıt verme, kendi kendine teşhis koyma, kendi kendini onarma gibi akıllı işlevlere sahiptir (Dang and Zhao 2021). Algılama işlevi, akıllı liflerin dış ve iç ortamı algılayabileceği ve ışık, ısı, stres, radyasyon veya manyetik yoğunluktaki değişiklikler gibi dış uyaranları algılayıp tanıyabileceği anlamına gelmektedir. 1970li yıllarda şekil hafızalı polimerlerin keşfi ile birlikte başlayan şekil hafızalı akıllı liflerin üretim süreci 2000li yıllarda bilgi teknolojilerini oluşturan transistör, sensör, kapasitör, pil gibi elektronik devre elemanlarının üretimi ile gelişimini sürdürmüş ve günümüzde ısı konfor sağlayan akıllı liflerden, tekstil malzemelerinden üretilmiş ekranlara kadar pek çok alanda araştırma ve geliştirme süreçleri devam etmektedir. Şekil 1'de akıllı liflerin tarihsel gelişimi kronolojik olarak verilmiştir. (H. Wang et al. 2021).

Geleneksel liflerin tekstil pazarındaki pazar payı, lif tipine ve spesifik uygulamaya bağlı olarak değişmektedir. Örneğin, Uluslararası Pamuk Danışma Komitesi'nin (ICAC) verilerine göre, pamuk hala küresel tekstil pazarında en yaygın kullanılan doğal elyaftır ve toplam elyaf tüketiminin yaklaşık %27'sini oluşturmaktadır. Aynı verilere göre polyester, naylon ve akrilik gibi sentetik elyaflar da tekstil endüstrisinde yaygın olarak kullanılmakta ve toplam elyaf tüketiminin yaklaşık %70'ini oluşturmaktadır. Bununla birlikte, çevre dostu ve yüksek performanslı tekstillere yönelik tüketici tercihlerinden kaynaklanan, tekstil pazarında sürdürülebilir ve gelişmiş elyaflara yönelik artan bir talep bulunmaktadır.



Şekil 1. Kronolojik olarak akıllı liflerin tarihi gelişimi (H. Wang et al. 2021)

Akıllı lifler, geleneksel liflere kıyasla daha küçük bir Pazarda kendisine yer bulmasına rağmen, askeri, endüstriyel, uzay ve havacılık, sağlık, eğlence ve spor gibi uygulamalarda hızla büyüyen bir ekonomik potansiyele sahiptir.



Şekil 2. Akıllı liflerin Pazar analizi

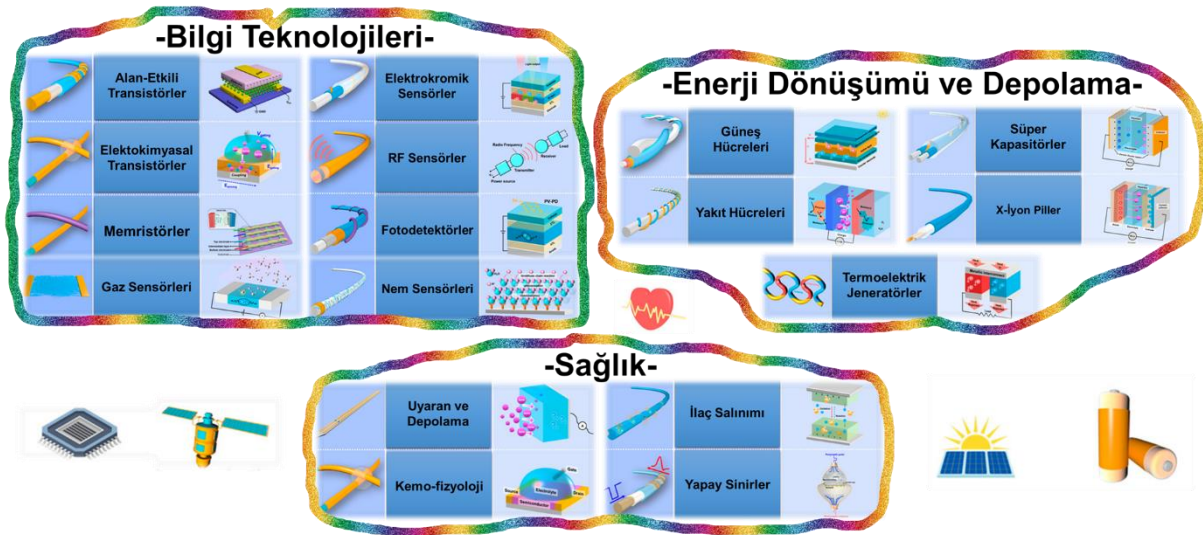
Mordor Intelligence'ın raporuna göre geleneksel liflerin Pazar büyüklüğü 2021 yılı itibariyle 193.1 milyar USD seviyesinde iken, 2028 yılına kadar %6.5'lik CAGR ile 282.2 milyar USD'ye ulaşacağı tahminlenmiştir. Şekil 2'de de gösterilen farklı şirketlerin raporları incelendiğinde, 2020-2030 yılları arasında özellikle akıllı kumaş pazarının çok daha yüksek bir CAGR ile (%20-%28) büyüyeceği öngörülmektedir (WEB1 2023; WEB2 2023; WEB3 2023).

1. Akıllı Liflerin Uygulama Alanları

Sun vd. tarafından yapılan çalışmalarda akıllı liflerin uygulama alanları, bilgi teknolojileri, sağlık ve enerji dönüşümü/depolama olarak 3 temel gruba ayrılmıştır. Şekil 3'de çeşitli uygulama alanlarında kullanılan akıllı lifler ve çalışma mekanizmaları gösterilmiştir (Sun et al. 2023).

- Bilgi Teknolojileri:

Bilgi teknolojileri içerisinde lif formunda üretilmiş olan alan-etkili transistörler (H. M. Kim et al. 2016), elektrokimyasal transistörler (Qing et al. 2019), memristörler (Xu et al. 2020), elektrokromik sensörler (Zhou et al. 2018), RF sensörleri (Liu et al. 2021), fotodetektörler (Dong et al. 2016; Du et al. 2022), nem (J. Zhang et al. 2019) ve gaz sensörleri (Nie et al. 2018) örnek olarak verilebilir.



Şekil 3. Akıllı liflerin temel uygulama alanları (Sun et al. 2023)

- *Sağlık:*

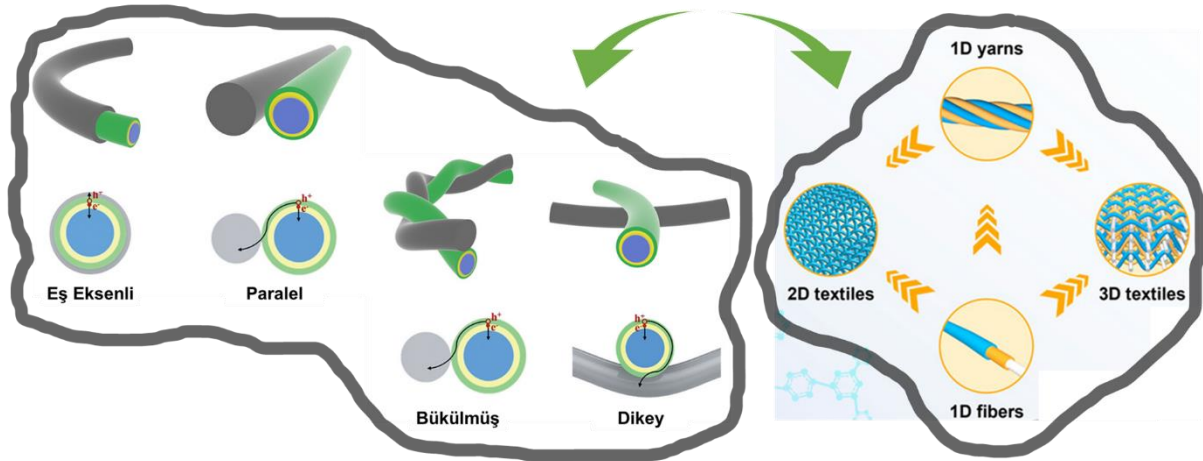
Sağlık alanında yapılan çalışmalar incelendiğinde, akıllı lif formundaki yapıların uyarandepolama (Tsukada, Nakashima, and Torimitsu 2012), kemo-fizyoloji (Y. Wang et al. 2017), elektrik kontrollü ilaç salınımı (Esrafilzadeh et al. 2013), ve yapay sinir üretimi (Ham et al. 2023) gibi uygulamalarının mevcut olduğu bilinmektedir.

- *Enerji Dönüşümü ve Depolama:*

Enerji dönüşümü alanında akıllı lifler kullanılarak yapılan çalışmalar incelendiğinde en temel uygulamaların güneş hücreleri (Song et al. 2016), yakıt hücreleri (Kwon et al. 2014), ve termoelektrik jeneratörler (Y. Kim et al. 2020) olduğu görülmektedir. Enerji depolama alanında ise süperkapasitörler (Tian et al. 2021), ve Li-iyon (Karahan Toprakci and TOPRAKCI 2021), Zn-iyon (Yi et al. 2019) ve Na-iyon (Borman 2017) piller ile ilgili çalışmalar ön plana çıkmaktadır.

2. Akıllı Liflerin Sınıflandırılması

Akıllı lifler, kullanılan malzemeye göre polimer kompozitleri, polimer karışımları, inorganik lifler ve hibrit lifler olarak sınıflandırılabilir. Ayrıca, liflerin mimarisine göre çekirdek-kabuk morfolojisinde, paralel yerleşim, çapraz yerleşim veya bükülmüş olarak akıllı kumaşların içerisinde yer alabilir. Ayrıca boyutlarına göre 1 boyutlu, 2 boyutlu, veya 3 boyutlu olarak akıllı kumaşlar oluşturulabilmektedir (Chen et al. 2023; Sun et al. 2023).



Şekil 4. Akıllı liflerin boyutlarına veya mimarisine göre sınıflandırılmasının şematik görünümü (Chen et al. 2023)

Bu çalışmada akıllı liflerin aşağıda detaylı incelemesi de verilmiş olan çalışma mekanizmalarına göre sınıflandırılması sunulmuştur.

- *Şekil hafızalı lifler:*

Şekil hafızalı lifler ilk olarak ortaya çıkan akıllı liflerdir. Deforme olmuş liflere basınç ve sıcaklık gibi belirli dış uyaran koşulları verildiğinde, şekil hafızalı lifler orijinal şekline geri dönebilmektedir. Choe vd. yaptıkları çalışmada insan cildinde IR ve su iletiminin ayarlanabilir düzenlenmesi için şekil hafızalı polimerik liflere dayalı akıllı bir tekstil geliştirmiştir. Bu çalışmada kullanılan lifler ısı yalıtım performansını artırmak için hiyerarşik mikro/nanogözenekli yapılarla üretilmiştir ve asimetric IR yansıtıcılığı ve hidrofilitiklik sağlamak için bir tarafa gümüş nanoteller kaplanmıştır. Şekil hafızalı polimerik lif tabanlı dokuma kumaş, uyarılara yanıt olarak şekil ve yapının deformasyonu ve geri kazanımı ile ısı yalıtımı ve asimetric ıslanabilirliğin büyük ölçüde ayarlanabilirliğini göstermektedir (Choe et al. 2022).

- *Optik lifler:*

Optik lifler, ışık enerjisini lifin içine hapsedebilen ve bir dalga kılavuzu modunda iletebilen bir tür optik kompozit lif türüdür. Optik lif, çekirdek ve kaplama olmak üzere iki parçadan oluşmaktadır. Elektromanyetik radyasyonun iletiminde, basamak tipi veya gradyan tipi lif yapısına sahip dalga kılavuzu kullanılmaktadır. Optik lifler, bilgi algılama ve bilgi iletimi gibi ikili işlevlere sahip olduğundan, yaygın olarak bir algılama malzemesi olarak kullanılmaktadırlar. Rahman vd. yaptıkları çalışmada çok modlu optik lifleri yapay sinir ağları yardımı ile görüntü transferinde kullanmışlardır. %98'den yüksek oranda görüntü transferi gerçekleştirebilmişlerdir (Rahmani et al. 2018).

- *Fotokromik lifler:*

Işığa duyarlı renk değiştiren maddeler, ışığın etkisi altında tersine çevrilebilir konfigürasyon değişikliklerine uğrayabilen ve böylece renk gelişimi veya solmasının tersine çevrilebilirliğini sergileyen izomerler içeren organik bileşiklerdir. Renk değiştirme mekanizması, belirli bileşiklerin ultraviyole ışığın veya görünür ışığın ışınlaması altında, farklı absorpsiyon spektrumlarına sahip yeni bileşikler oluşturmak için moleküler yapıda veya elektronik enerji seviyelerinde değişikliklere uğraması ve başka bir ışık koşulu altında, bu bileşiğin orijinal durumuna geri dönmesi prensibine dayanmaktadır. Bu sayede tersine çevrilebilir değişiklikler sürekli bir döngüde meydana gelebilmektedir. Zheng vd. yaptıkları çalışmada fotokromik boyalarla katkılanmış elektroöğrülmiş polikaprolakton liflerini şablonlayarak veya fotokromik

öz-kılıf ipliklerinin ticari kumaşlara işleyerek, akıllı giyilebilir göstergeler geliştirmiştir (Zheng et al. 2020).

- *Sıcaklığa duyarlı lifler:*

Sıcaklığa duyarlı lifler, özellikleri sıcaklıkla tersine çevrilebilir şekilde değişebilen lifleri ifade etmektedir. Isı koruması ve nemlendirme etkisi ve sıcaklığa duyarlı olarak renk değişikliği gösterebilen lifler en yaygın uygulama alanlarıdır. Mitsubishi Rayon Fiber Corporation tarafından geliştirilen "Ventcool" lifi, nem oranı yüksek olduğunda anında esneyebilen ve kurduğunda hızla kıvrılabilen, çevreye ve dinamik değişikliklere karşılık gelen dinamik lifler olarak adlandırılır. Li vd. sıcaklık değişimine bağlı olarak elektriksel direnci değişebilen PEDOT kaplı termoplastik poliüretan lifleri üretmişler ve bu lifleri esnek sıcaklık sensörü olarak kullanmışlardır (Li et al. 2022). Bir diğer çalışmada Duan vd. tarafından kendiliğinden kristallenme faz değişimi ile düzenlenen elektro-termokromik floresan lifler üretilmiştir. Yapılan çalışmada lüminesans özelliklerinin, faz değişimli malzemelerin kristalleşme/erime süreçleri sırasında florofor moleküllerinin dağılım durumunun ve floresan emisyonunun tersine çevrilebilir dönüşümü sayesinde ayarlanabildiğini göstermişlerdir (Duan et al. 2021).

- *İletken lifler:*

İletken lifler, standart koşullar altında (20 °C, bağıl nem% 65) $1 * 10^7 \Omega\text{-cm}$ 'den daha düşük özgül dirence sahip olan lifleri ifade etmektedir. Antistatik elektriksel özellik sağlamak, elektromanyetik dalgaların absorpsiyonu ve elektrik sinyallerini tespiti ve iletimi için kullanılmaktadır. İletken lifler elektron iletken lifler, iyon iletken lifler ve endüktif lifler olarak ayrılabilir. Choi vd. yaptıkları çalışmada giyilebilir tekstil elektroniğindeki gelişmiş ara bağlantı bileşenleri için yüksek elektrik iletkenliğine (0.11 S/cm), su geçirmezliğe ve mekanik stabiliteye sahip bir lif geliştirmiştir. Ticari bir Kevlar lifi önce Ag nanopartikül-poli(stiren-bütadien-stiren) polimer kompozitleri ile kaplanmış ve sonrasında da su geçirmezlik ve kendi kendini temizleme özellikleri kazandıran kendinden montajlı tek katman oluşturuca reaktiflerle kaplanmıştır (Choi et al. 2018).

- *pH'a duyarlı lifler:*

pH'a duyarlı lifler, pH'daki değişikliklerle hacim veya şekil değiştiren lifleri ifade etmektedir. Bu değişim, moleküler düzeyde, makromoleküler düzeyde ve moleküller arası düzeyde uyarın duyarlılığına dayanmaktadır. Zhang vd. elektroçirime yöntemi ile farklı derecelerde deasetilasyona sahip anyonik poli(akrilik asit) (PAA) ve katyonik kitosandan (Cs) oluşan pH'a duyarlı nanolifler üretmiştir (R.-Y. Zhang et al. 2018). Bir diğer çalışmada da pH 5.0 ile pH 7.0 arasında kesin bir pH eşliğinde duyarlı özellikler gösteren dekstranın koesterifikasyonu yoluyla

dekstran esterleri sentezlenmiştir. Çok katmanlı elektro eğrilmiş nanolifler sayesinde, üç farklı ilaç yükü, pH değerinin kademeli olarak artırılmasıyla sıralı ve bağımsız olarak ilaç salınımı gerçekleştirilmiştir (Theerasilp and Crespy 2019).

- *Antibakteriyel lifler:*

Antibakteriyel veya deodorant lifler gibi insan sağlığını korumak veya yaşam konforunu arttırmak amacıyla akıllı liflerin üretimi sürekli olarak geliştirilmektedir. Bunlar arasında, seçici antibakteriyel lifler en yaygın kullanılan akıllı lif grubudur. Seçici antibakteriyel lifler, belirli bir antibakteriyel madde eklenerek yüzey bakterilerini inhibe etme veya öldürme yeteneğine sahip akıllı bir lifi ifade etmektedir. Aytac vd. ambalaj malzemeleri için fonksiyonel bir katman olarak biriktirilebilen, ortalama 225 ± 50 nm çapında enzim ve bağıl neme (RH) duyarlı antimikrobiyal liflerin geliştirmişlerdir. Selüloz nanokristaller, zein (protein) ve nişasta, kekik yağı, sitrik asit ve nisin gibi doğadan elde edilen serbest antimikrobiyallerden ve kekik yağı, sorbik asit ve nisin siklodekstrin-içerme komplekslerinden oluşan bir kokteyl içeren çoklu uyarana-duyarlı nanoliflerden oluşturulan lifler, %95 bağıl nemde %50 bağıl neme kıyasla daha fazla aktif antibakteriyel madde salmış ve bu da %95 bağıl nemde E. coli popülasyonunda daha yüksek bir azalma meydana getirmiştir (Aytac et al. 2021). Bir diğer çalışmada, plazma bombardımanı tekniği ile geliştirilmiş kuaterner amonyum tuzunun kimyasal aşılması ile etkili bir antibakteriyel performansa sahip yeni bir cam lifi geliştirilmiştir (Guo et al. 2019). Cai vd. entegre bir radyatif soğutma etkisi ve fotokatalitik antibakteriyel özelliğe sahip hiyerarşik bir poliüretan/metal-organik çerçeve (MOF) kompozit nanolif membran üretmiştir. Elektro eğirme yöntemiyle üretilen hiyerarşik nanolif membran, ZIF-8 nanopartiküllerindeki bol kimyasal bağlara atfedilen %97'lik yüksek güneş yansıtma özelliği ve %93'lük gelişmiş termal emisyon özelliği göstererek doğrudan güneş ışığı altında $\sim 7,2$ °C ve geceleri $\sim 5,5$ °C'lik bir sıcaklık düşüşü sağlamıştır. Ayrıca, ZIF-8'in fotokatalitik aktivitesi sayesinde, %96'lık bir bakteriyel ölüm oranı elde edilmiştir (Cai et al. 2023).

3. Sonuçlar ve Tartışma

Son yıllarda akıllı lifler hem akademik hem de endüstriyel alanda önemli bir ilgi kaynağı olmuştur. Akıllı lifler, akıllı giyilebilir cihazların en temel bileşenidir. Bu nedenle özellikle kişisel sağlık yönetiminde, giyilebilir elektroniklerde ve giyilebilir enerji dönüşümü/enerji depolama uygulamalarında önemli ilerleme yaratmaları beklenmektedir. Lif ve tekstil tabanlı elektroniklerin malzeme ve yapısal tasarımlarındaki ilerlemeler, insan hareketlerinin, fizyolojik sinyallerin ve biyokimyasal sinyallerin gerçek zamanlı olarak izlenmesine olanak sağlamıştır.

Termal yönetim açısından, aynı tekstilde etkili soğutma, ısıtma veya her iki fonksiyona sahip akıllı tekstiller geliştirilmiştir. Buna ek olarak, esnek elektroniklerin sürdürülebilir çalışmasını sağlamak için enerji dönüşümünü, depolanmasını ve toplanmasını desteklemek üzere yüksek performanslı akıllı enerji lifleri ve tekstilleri geliştirilmiştir.

Bununla birlikte, akıllı liflerin veya tekstillerin pratikteki uygulamalarını gerçekleştirebilmek için üstesinden gelinmesi gereken önemli sorunlar bulunmaktadır. Bu çalışmada sunulan akıllı lif veya tekstillerin çoğu laboratuvar ölçeğinde üretilmektedir ve endüstriyel ölçekte üretime geçişte birçok zorluk bulunmaktadır. Diğer bir dezavantaj ise, geleneksel cihazlara kıyasla, lif veya tekstil tabanlı elektroniklerin genellikle daha düşük performans göstermesidir. Ayrıca, lifler ve tekstiller için yıkanabilirlik pratik uygulamalar için büyük önem taşımaktadır ve bildirilen bazı akıllı lifler ve tekstiller bu süreçte zarar görmektedir. Ayrıca, geniş bir uygulama yelpazesine ulaşmak için çok işlevli akıllı liflerin ve tekstillerin geliştirilmesi gerekmektedir. Örneğin, kendi kendine güç sağlayan, kablosuz akıllı giysiler için algılama, enerji depolama ve bilgi aktarım işlevlerinin entegrasyonu ve veri güvenliği gereklidir. Birçok zorluk devam etse de, akıllı liflerin ve tekstillerin parlak bir geleceğe sahip olduğu düşünülmektedir.

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GİYİLEBİLİR ELEKTRONİKLERDEKİ SON TRENDLER

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Özet

Giyilebilir cihazlar olarak da bilinen giyilebilir elektronikler, vücuda aksesuar veya implant olarak giyilebilen elektronik cihazları ifade etmektedir. Bu cihazlar fonksiyonuna göre giyilebilir elektronikler ve giyilebilir akıllı elektronikler olarak sınıflandırılmaktadır. Sadece zaman ve tarihi gösteren bir saat giyilebilir elektronik iken, kalp atış hızı, kan basıncı, vücut ısısı, lokasyon ve fiziksel aktivite gibi çeşitli parametreler hakkında gerçek zamanlı geri bildirim sağlayarak kullanıcılarının rahatını, güvenliğini ve esenliğini artıran saatler de akıllı giyilebilir elektronikler olarak adlandırılmaktadır. Bu cihazı giyen/taşıyan kişinin sağlığını ve faaliyetlerini çeşitli verilerle takip etmek için geliştirilen bu elektronik sistemler genellikle sensörler, mikroişlemciler ve kablosuz iletişim sistemleri gibi alt bileşenlerden oluşmaktadır. Bu elektronikler metal, plastik veya kompozit yapılardan üretilebildiği gibi tekstil yapılarından da üretilebilmektedir. Tekstil ürünlerinin vücuda kolaylıkla sarması, gün boyunca elektroniğin sabit bir şekilde taşınabilmesi gibi avantajları sayesinde son zamanlarda elektronik tekstil (e-tekstil) olarak tanımlanan giyilebilir elektroniklere olan ilgi her geçen gün artmaktadır. Bu çalışmada giyilebilir elektroniklerdeki son trendler ele alınmıştır.

Anahtar Kelimeler: Giyilebilir elektronikler, elektronik tekstiller, tekstil sensörleri, tekstil aktüatörleri

RECENT TRENDS IN WEARABLE ELECTRONICS

Abstract

Wearable electronics, also known as wearable devices, refer to electronic devices that can be worn on the body as accessories or implants. These devices are classified as wearable electronics and wearable smart electronics according to their function. While a watch that only displays the time and date is a wearable electronic, watches that improve the comfort, safety and well-being of their users by providing real-time feedback on various parameters such as heart rate, blood pressure, body temperature, location and physical activity are called smart wearable electronics. These electronic systems, which are developed to monitor the health and activities of the person wearing/carrying this device usually consist of subcomponents such as sensors, microprocessors and wireless communication systems. These electronics can be produced from metal, plastic or composite structures and textile structures. Thanks to the advantages of textile products such as high coverability of textiles and the ability to carry electronics stably throughout the day, the interest in wearable electronics, recently defined as electronic textiles (e-textiles), is increasing day by day. In this study, the latest trends in wearable electronics are discussed.

Keywords: Wearable electronics, electronic textiles, textile sensors, textile actuators

Giriş

Giyilebilir elektronikler, vücuda aksesuar veya implant olarak takılabilen elektronik cihazları ifade etmek için kullanılan bir terimdir. Bu cihazlar tipik olarak bir kişinin sağlığının ve faaliyetlerinin çeşitli yönlerini izlemek için gelişmiş sensörler, mikroişlemciler ve kablosuz iletişim teknolojisi gibi farklı bileşenlerin bir veya birkaçından oluşmaktadır. Bu ürünlere ait Pazar payı her geçen gün artmakta ve yaklaşık 70 milyar \$ bir paya sahiptir. Bu payın içinde spor, kişisel takip, kontrol sistemleri, iletişim, ev tekstili, etkileşimli tekstiller, medikal, askeriye, otomotiv, çevre kontrolü gibi birçok alanda farklı form ve büyüklükteki ürün yer almaktadır (Khan et al., 2019; Pang et al., 2020; Zhang et al., 2021).

1. Giyilebilir Elektronikler

Giyilebilir bir elektroniğin en önemli fonksiyonu vücuda kolaylıkla uyum sağlaması, vücudu sarması, takılabilmesi, giyilebilmesi, taşınabilmesidir. Bunlara ilave olarak konforlu olması, bakımı ve onarımının kolay olması da önemlidir. Giyilebilir elektroniklerin temel bileşenleri ve bu bileşenlerin önemli fonksiyonları aşağıdaki şekildedir (Ismar et al., 2020; Kan & Lam, 2021; Koncar, 2016):

- **Sensörler:** Kişide veya kişinin çevresinde meydana gelen değişimleri algılama ve bu değişimleri anlamlı elektriksel sinyallere dönüştürme,
- **Aktüatörler:** Elektrik, hidrolik, pnömatik veya mekanik enerjiyi harekete veya kuvvete dönüştürme,
- **Birleştirme elemanları:** Giyilebilir elektroniğin farklı kısımlarını birleştirme,
- **Kullanıcı arayüzleri:** Kullanıcıların giyilebilir elektronik veya yazılım uygulaması ile etkileşime girmesi ve elektroniğin kontrolü,
- **Güç kaynağı:** Sistemin çalışması için enerji sağlamak,
- **Jeneratör:** Enerji hasadı yapmak,
- **Devreler:** Elektronik fonksiyonun gerçekleşmesi,
- **Mikrokontrolör/İşlemci:** Sistemin kontrolü,
- **İletişim sistemleri/Wireless sistemler:** Uzaktan sistem takip ve kontrolü.

2. Giyilebilir Elektroniklerin Kullanım Alanları Ve Bunlardaki Son Trendler

Giyilebilir elektronikler yıllardır kullanılan cihazlar olmasına rağmen son zamanlarda hem elektronik ve esnek malzeme teknolojilerindeki gelişmeler hem de yazılım-yapay zekâ teknolojilerindeki gelişmeler sayesinde farklı bir boyuta taşınmıştır. Giyilebilir elektroniklerdeki en önemli gelişmeler sağlık ve fitness takibinde, akıllı tekstillerde, tıbbi ekipmanlarda, enerji hasadında ve giyilebilir elektroniklerin sürdürülebilirliği alanında gerçekleşmektedir. Bu başlıklarda meydana gelen önemli trenler aşağıda ele alınmıştır.

3.1 Sağlık ve Fitness Takibi ve Tıbbi Cihazlar

Sağlık ve fitness takibi cihazları yıllardır kullanılmaktadır. Bu sistemler akıllı saatler ve akıllı tekstiller gibi ürünler ile yapılmakta ve genellikle adım sayısı, yürüme koşma hızı, nabız, kalp atışı, vücut sıcaklığı, uyku analizi, stres seviyesi gibi analizler yapılmaktadır. Bu alanda ar-ge kapsamında yapılan çalışmaların çoğu daha esnek ve vücudu saran fonksiyonel polimer kompozitler kullanımı ile kablosuz çalışabilen sistemler üzerine yoğunlaşmıştır. Bu sistemlerin daha gelişmiş versiyonlarında ise hidrasyon takibi, kandaki oksijen ve glikoz seviyesinin ölçülmesi gibi fonksiyonlarda bulunmakta ve gerekli durumlarda uyarı yapıp kullanıcının yapması gerekenleri bildirmektedir. Sağlık ve spor sırasında kullanılan bir diğer sistem de giyilebilir elektrokardiyogram (EKG) ve kan basıncını izlemeyi sağlayan cihazlardır. Kişilerin yaşamlarını sağlıklı bir şekilde sürdürebilmeleri için uyku oldukça önemlidir. Uyku takibi de son zamanlarda takip edilen kriterlerdendir. Özel polimerle hazırlanan yapay derilerle uyku takibi yapılabilen yüzeyler hakkında çalışmalar yoğunlaşmaktadır. Bu sistemler sayesinde uyku kalitesi hakkında önemli bilgiler elde edilebilmektedir. Yine son zamanlarda yapılan çalışmalarda kullanıcıların stres seviyesi, kaygı ve ruh halinin takibi hakkında da çalışmalar yapılmaktadır. Bu tür bilgiler kişinin kalp atışlarından, nabzından, terleme derecesinden yola çıkarak yapılmaktadır. Ayrıca solunum takibi yapan hem tekstil hem de bandaj formunda geliştirilmiş sistemler de bulunmaktadır. Bu sistemler yaşlı ve bebeklerin sağlık takibinde oldukça avantajlıdır. Son yıllarda nöroloji alanında yapılan çalışmalar sayesinde giyilebilir özel elektrotlar ile kişilerin nörolojik fonksiyonları takip edilebilmektedir. Bu tür cihazlar epilepsi ve benzeri hastalıkların takip ve tedavisi için önemlidir. Bu sistemlerin yönetimi de oldukça önemlidir. Bu yüzden giyilebilir cihazlara güvenli bir şekilde kullanıcıya erişim için parmak izi veya göz tanıma, doğrulama gibi sistemler adapte edilmektedir. Uzaktan hasta izleme sistemleri

ise bu alandaki önemli gelişmelerdendir. Özellikle evden takip edilebilecek hafif veya kronik hastaların takibinde hem maliyet hem de ileri yaştaki insanların daha konforlu hissetmesi açısından önemlidir. Bu sistemler. Giyilebilir elektroniklerin sağlık ekosistemleri ile entegre edilmesi son zamanda çalışılan önemli konulardandır. Giyilebilir sistemler sayesinde elde edilen veriler kişilere ait sağlık kayıtlarını oluşturmakta ve bu veri tabanı uygun ekosistemler sayesinde sağlık uzmanlarına ulaştırılmaktadır. Bu aşamada gerekli durumlarda elde edilen veriler yapay zeka ve farklı algoritmalarla analiz edilmekte, yorumlanabilmekte ve hasta veya hastalar için gerekli önlemler önceden alınabilmektedir. Bu alandaki çalışmalar oldukça yeni olup, binlerce dataya ihtiyaç duyulmaktadır (Hickey et al., 2021; Khan et al., 2019; Kubicek et al., 2022; Mirjalali et al., 2022; Panch et al., 2018; Pang et al., 2020; Passos et al., 2021; Soh et al., 2015; Yue et al., 2022) .

3.2 Akıllı Giysiler

Akıllı giysiler, giyilebilir elektroniklerin bir başka formudur. Bu yapılar, vücudu kolayca sarabilmesi ve birçok elektroniği kolayca taşıyabilme gibi avantajları sayesinde son zamanlarda oldukça popülerdir. Akıllı giysilerdeki en önemli gelişmeler tekstil üretim teknolojilerindeki ve malzeme, elektronik alanlarındaki gelişmelerle yakından ilişkilidir. Akıllı giysilerde sensörler, aktüatörler, enerji hasat etme sistemleri, kablosuz iletişim sistemleri, antenler, devreler gibi bileşenlerden oluşmaktadır. Bu yapılar dokuma, örme, baskı, kaplama, üç boyutlu baskı, elektro eğirme gibi tekniklerden birisi veya birkaçının kombinasyonu ile üretilebilmektedir. Akıllı giysilerdeki son zamanlardaki en önemli gelişmeler esneme ve uzatılabilme yeteneği olan, kendi kendini iyileştirebilen, tamir edebilen polimerik yapıların geliştirilmesidir. Akıllı giysiler sağlık izleme sistemlerinde, bir önceki kısımda anlatılan aktivitelerin gerçekleştirilmesini sağlayabilmektedir. Buna ilave olarak vücut ısısının dengelenmesi için, ısıtma veya soğutma elemanları ile donatılmış akıllı tekstiller de son zamanlarda geliştirilen giyilebilir elektroniklerdendir. Yine benzer şekilde tekstil yapılarına aydınlatma sağlayan elemanlar uyarlanarak gerek karanlıkta kullanılabilen güvenlik amaçlı gerekse moda amaçlı yapılar geliştirilebilmektedir. Son zamanlarda popüler olan bir diğer konu da akıllı tekstillerden enerji hasadı yapmaktır. Bu yapılarda güneş enerjisinden, hareket enerjisinden, sürtünmeden, ısı farkından dolayı enerji elde edilebilmektedir. Bu sistemler kendi enerjini sağlayabilen sistemler olarak adlandırılmaktadır. Giyilebilir elektroniklere geleneksel tekstillerde olduğu gibi farklı antimikrobiyal vb. bitim işlemleri de yapılabilmektedir. Elektronik tekstiller son zamanlarda

akıllı polimerlerle üretilip, bu yapıların sıcaklık, nem, elektriksel alan vb. dış uyaranlara bağlı olarak özelliklerini değiştirebilmektedirler. Bu ürünlerin hem elektronik hem de tekstil ürünü olarak kullanılabilmesi, bakım-yıkama gibi etkenlere dayanıklı olmalıdır. Bu alanda yapılan çalışmalarla özel enkapsülasyon yapıları geliştirilmektedir. Diğer giyilebilir elektroniklerde olduğu gibi, kablosuz iletişim sistemleri ile entegre edilebilmektedir (Bairagi et al., 2023; Cochrane et al., 2007; H. Lee & Roh, 2019; T. Lee et al., 2016; Zheng et al., 2022).

3.3 Enerji Hasadı

Giyilebilir cihazların enerji gereksinimi her geçen gün önem kazanmaktadır. Şarj edilebilen pillerin maliyetlerinin her geçen gün artması elektroniğin maliyetini de artırmaktadır. Bu yüzden kendi enerjisini üretebilen elektronikler günümüzde en çok konsantre olunan konular başında gelmektedir. Bu sistemlerde, güç üretmek için güneş enerjisi, vücut ısısını veya vücut hareketi gibi farklı formdaki enerjiler kullanılabilir. Bu amaçla kullanılan malzemelerden birisi piezoelektrik özellik gösteren malzemelerdir. Bu malzemeler, mekanik titreşimlerden veya basınçtan enerji elde etmek için yaygın olarak kullanılmaktadır. Bu alanda özellikle giyilebilir elektronikler için bu özellikteki polimerler veya polimer kompozitler kullanılmaktadır. Son gelişmeler, giysi ve ayakkabı gibi giyilebilir cihazlara entegre edilen piezoelektrik jeneratörlerin verimliliğini ve esnekliğini artırmaya odaklanmaktadır. Enerji hasadında meydana gelen gelişmelerden birisi de triboelektrik jeneratörlerin giyilebilir formda üretilmesidir. Bu yapılar farklı yüzeylerin sürtünmesi sonucu ortaya çıkan enerjinin hasat edilmesini sağlamaktadır. Bu alandaki gelişmeler de malzeme bilimi ve mikro elektroniklerin gelişmesine paralel olarak ilerlemektedir. Giyilebilir enerji üretebilen sistemlerdeki önemli bir diğer gelişme de esneyebilen, bükülebilen ve performansında önemli değişiklikler olmayan yapıların geliştirilmesidir. Bu yapılar bir önceki kısımda verildiği gibi, tekstil ürünlerine adapte edilebilmekte veya tekstil ürününden üretilmektedir. Benzer şekilde güneş enerjisi üreten mini panellerin giyilebilir forma getirilmesi ile de bu enerji değerlendirilebilmektedir. Bu alandaki gelişmeler ince film ve organik fotovoltaik teknolojilerine paralel bir şekilde ilerlemektedir. Bir diğer sistem de sıcaklık farkı ile enerji üretimini sağlayan termoelektrik jeneratörlerdir. Giyilebilir cihazlar genellikle vücut ve çevre arasındaki sıcaklık değişiminden yararlanmaktadır. Bu sistemlerde enerjinin depolanabilmesi için geliştirilen esnek piller veya süper kapasitörler de bu alandaki önemli gelişmelerdendir. Bu sayede, giyilebilir cihaz için sürekli ve stabil bir güç kaynağı elde edilmiştir. Bu alandaki çalışmalardaki gelişmeler esnek

termoelektrik malzemelerin geliştirilmesi ve boyutlarının küçültülmesi ile gerçekleşmektedir. Bu sistemlerin her birinin avantajlarından faydalanmak için kombine edilebilmekte ve hibrit sistemler üretilebilmektedir (Enescu, 2019; Khaligh & Onar, 2017; Li et al., 2019; Rodrigues-Marinho et al., 2023; Ryu et al., 2019; Snyder, 2009; Thainiramit et al., 2020; Vallem et al., 2021; Xiahou et al., 2023; Zou et al., 2019) .

3.4 Sürdürülebilirlik

Giyilebilir elektroniklerin tüketiminin artması dolayısıyla son zamanlarda çevresel etkileri konusunda giderek artan bir farkındalık söz konusudur. Bu amaçla sürdürülebilir, geri dönüştürülebilir malzeme kullanılabilir. Bunun yanında biyolojik olarak parçalanabilen ve biyo-bazlı malzemelerin kullanımı üzerine çalışmalar yapılmaktadır. Bu sayede çevresel ayak izinin azaltılmasına yardımcı olmaktadır. Giyilebilir cihazların uzun ömürlü, tamir edilebilir, enerji tasarruflu, sürdürülebilir ambalajların kullanılması, üretim sırasında minimum enerji ve malzeme kullanılması, zararlı bileşenlerin minimize edilmesi ve geri dönüştürülebilir bileşenlerden oluşması da bir diğer katkıdır (Han & Yoon, 2021; Manjunatheshwara & Vinodh, 2021).

Sonuçlar ve Tartışma

Giyilebilir elektronikler sağlık takibinden, spora, güvenlik sistemlerinden, enerji üretimine kadar birçok alanda kullanılmaktadır. Pazar payı her yıl yaklaşık %7-8 oranında artış gösteren giyilebilir elektronikler, malzeme, mikroelektronik teknolojilerindeki gelişmelere paralel olarak her geçen gün

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CHALLENGES, ARCHITECTURE, AND FUTURE TRENDS IN INTRUSION DETECTION SYSTEMS

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Abstract

Intrusion Detection Systems (IDS) play a critical role in safeguarding networks and systems from security threats. This report provides an overview of IDS, discussing their types, advantages, limitations, and components. Additionally, it explores the evaluation metrics used to assess IDS performance. The report highlights the challenges faced by IDS, such as evolving threats, false positives and negatives, encrypted traffic, scalability, insider threats, and zero-day attacks. Emerging trends in IDS, including machine learning, deep learning, big data analytics, cloud-based architectures, threat intelligence integration, behavior-based analysis, and integration with Security Orchestration, Automation, and Response (SOAR), are also discussed. Furthermore, the report emphasizes the importance of IDS in early threat detection, enhanced incident response, compliance, network visibility, defense-in-depth strategy, continuous monitoring, and threat intelligence. It concludes by underscoring the significance of IDS in maintaining a strong security posture and reducing the risk of cyber-attacks. The insights provided in this report will assist researchers, practitioners, and organizations in understanding the evolving landscape of IDS and making informed decisions to enhance their cybersecurity defenses.

Keywords: Intrusion Detection Systems, Cyber Security, Architecture

INTRODUCTION

Intrusion Detection Systems (IDS) are security mechanisms designed to monitor and detect unauthorized or malicious activities within computer networks or systems such as unauthorized access attempts, malware infections, or abnormal behaviors. These systems analyze network traffic, system logs, and other relevant data sources in real-time to identify potential intrusions or security breaches (Sharafaldin, 2018). The primary goal of an IDS is to provide timely and accurate detection of security incidents, allowing for prompt response and mitigation measures. By analyzing network packets, system logs, or user behaviors, IDS can identify patterns and signatures associated with known attacks or detect anomalies that deviate from normal system behavior (Akinyele, 2020). These functional attributes signify IDS as essential components of cybersecurity that help organizations detect and respond to potential unauthorized activities or intrusions within their computer networks or systems and therefore, mitigate possible damages caused by cyber threats. Early threat detection provided by Intrusion Detection Systems present before the world, proactive security measures which address vulnerability stances in modern-day security systems.

It is worth noting that IDS can be standalone systems or integrated into other security solutions, such as Intrusion Prevention Systems (IPS) or Security Information and Event Management (SIEM) systems. Standalone IDS focuses on detection and alerting, while integrated systems often incorporate prevention or response capabilities alongside detection (Akinyele, 2020). In practice, organizations often deploy a combination of these IDS types to achieve a more comprehensive and layered approach to intrusion detection. Network-based IDS provides visibility into network traffic, host-based IDS focus on individual systems, anomaly-based IDS detects deviations from normal behavior, and signature-based IDS identifies known attacks. This combination helps organizations detect a wider range of threats and enhances overall intrusion detection capabilities (Kim, 2015).

The components of typical IDS were evaluated and the role of integration and systemic architecture in successful intrusion detections were studied. This followed the determination of evaluation metrics in intrusion detection techniques implemented on a vast scale. This paper aims to delve into the types and mechanics of Intrusion Detection Systems, the techniques associated with intrusion detection, and their significance followed by the current challenges and prospects towards achieving optimum security.

TYPES OF INTRUSION DETECTION SYSTEMS

Intrusion Detection Systems can be classified into several main types (Alazab, 2012):

Network-Based IDS (NIDS):

Network-Based IDS monitors network traffic at strategic points within a network infrastructure. They analyze network packets, looking for patterns, anomalies, or known attack signatures. NIDS can be deployed at network boundaries, such as routers or firewalls, or within internal network segments. They inspect network traffic in real-time and generate alerts when suspicious or malicious activities are detected. NIDS are effective in detecting network-level attacks, such as port scans, denial-of-service (DoS) attacks, or unauthorized access attempts.

Advantages:

- NIDS can monitor network traffic at strategic points, providing broad visibility into network activities and potential threats.
- NIDS are effective in detecting network-level attacks, such as port scans, DoS attacks, or unauthorized access attempts.
- NIDS can monitor large-scale networks and handle high volumes of network traffic.
- NIDS operate independently of individual host systems, making them suitable for detecting attacks targeting multiple hosts simultaneously.

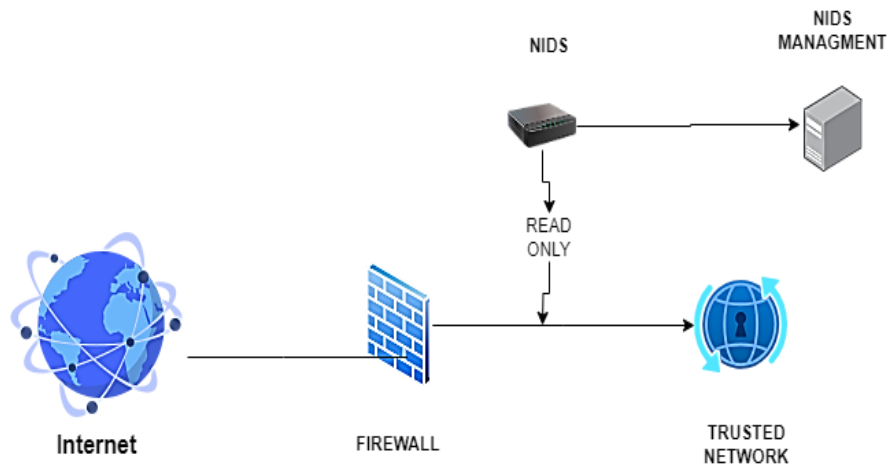


Figure 1. Network-Based Intrusion Detection System NIDS architecture

Limitations:

- NIDS have limited visibility into host-level activities and may not detect attacks that bypass network-level defenses and occur at the host level.
- NIDS faces challenges in analyzing encrypted network traffic as it may be difficult to inspect the content of encrypted packets.

- NIDS may generate false positive alerts, especially when detecting anomalies in network traffic, leading to unnecessary investigations and resource consumption.

Host-Based IDS (HIDS):

Host-Based IDS are installed on individual host systems and monitor activities occurring on those systems. They analyze system logs, file integrity, user activities, and other host-specific data to detect signs of unauthorized access or malicious behavior. HIDS provides visibility into the activities happening at the host level, enabling the detection of attacks that may bypass network-level defenses. They are effective in detecting host-level attacks, such as privilege escalation, file tampering, or malware infections (Kim, 2015).

Advantages:

- HIDS provides detailed visibility into activities occurring at the host level, detecting attacks that bypass network-level defenses.
- HIDS can analyze system logs, file integrity, and user activities, allowing for a deeper understanding of the context and potential impact of detected events.
- HIDS are effective in detecting attacks targeting specific host systems, such as privilege escalation, file tampering, or malware infections.
- HIDS generate fewer false positive alerts compared to network-based IDS since they analyze activities occurring directly on the host system.

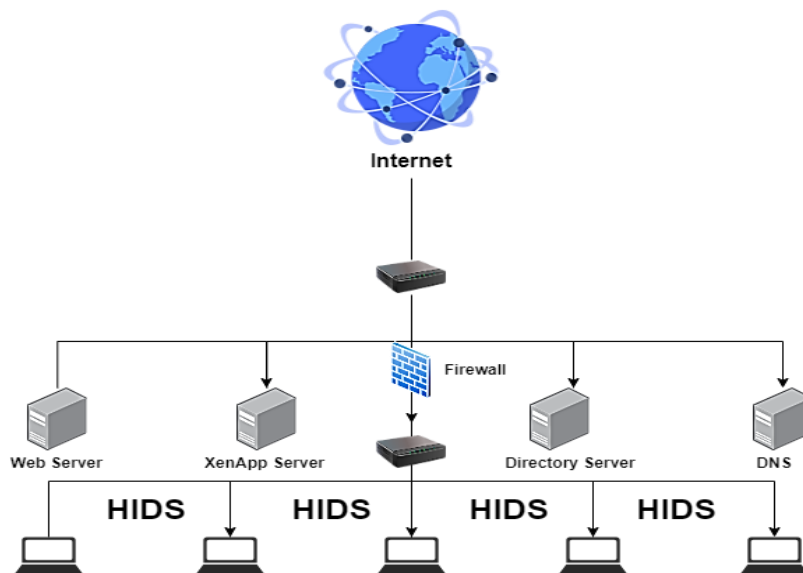


Figure 2. Host-Based Intrusion Detection System Work Station

Limitations:

- HIDS focuses on individual host systems and may not capture network-level attacks or threats targeting other hosts.
- HIDS can consume system resources, impacting host performance, particularly when monitoring and analyzing large amounts of data.
- HIDS's effectiveness can be influenced by the host's configuration, and attackers who gain administrative access to the host may manipulate or disable the HIDS.

Anomaly-Based IDS:

Anomaly-Based IDS detects intrusions by comparing observed behavior against a baseline of normal behavior. They establish a profile or model of what is considered normal system or network behavior. Any deviations from this baseline are flagged as potential intrusions. Anomaly-based IDS are effective in detecting previously unknown or zero-day attacks because they don't rely on known attack signatures. However, they require a period of training and learning to establish the baseline behavior accurately.

Advantages:

- Anomaly-based IDS can detect previously unknown or zero-day attacks by identifying deviations from established baselines or normal behavior.
- Anomaly-based IDS can adapt to changes in the network or system behavior and adjust the baseline accordingly.
- Anomaly-based IDS do not rely on frequent signature updates, making them useful in detecting new or evolving attack techniques.

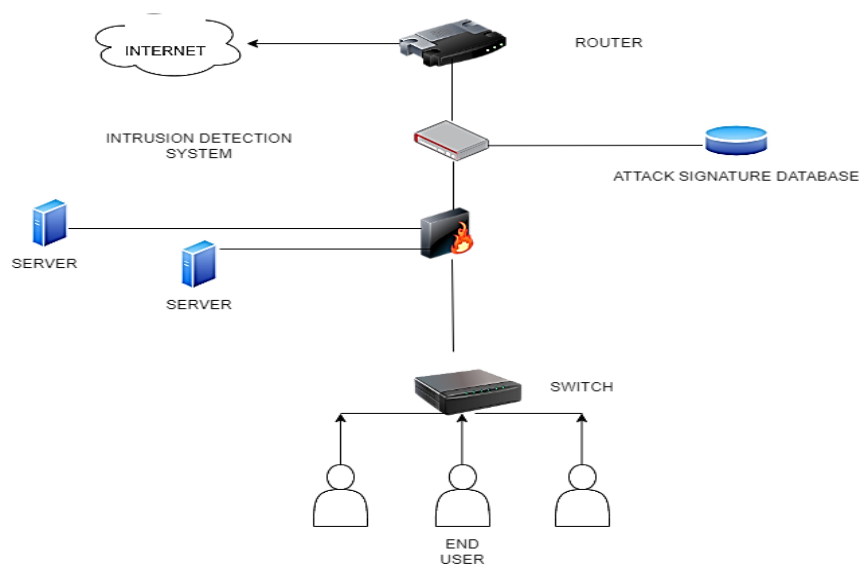


Figure 3. Anomaly-based Intrusion Detection System

Limitations:

- Anomaly-based IDS requires a period of training and learning to establish accurate baselines, which may result in a higher rate of false positives during the initial stages.
- Anomaly-based IDS can generate false positive alerts, especially in dynamic network environments or when legitimate activities deviate from the baseline.
- Configuring and fine-tuning anomaly-based IDS can be complex due to the need to balance sensitivity to detect intrusions and minimize false positives.

Signature-Based IDS:

Signature-Based IDS uses a database of known attack signatures or patterns to detect potential intrusions. They match observed network packets, system logs, or other data against the signatures in their database. If a match is found, it indicates the presence of a known attack or malicious activity. Signature-based IDS are effective in detecting known attacks and are relatively quick to implement. However, they may struggle with detecting new or evolving attack techniques that do not match any existing signatures (Alazab, 2012).

Advantages:

- Signature-based IDS can quickly and effectively detect known attacks or threats for which signatures are available.
- Signature-based IDS tend to have a lower false positive rate since they focus on known attack signatures.
- Minimal Resource Consumption: Signature-based IDS are relatively lightweight and consume fewer system resources compared to other types of IDS.

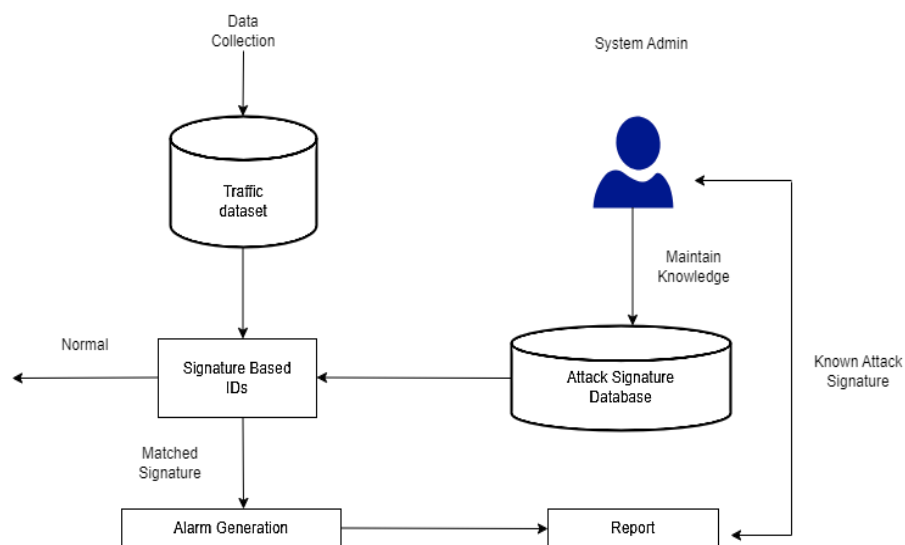


Figure 4. Signature-Based Intrusion Detection System

Limitations:

- Signature-based IDS heavily depend on up-to-date signature databases. They may miss newly emerging or evolving attacks until the signatures are updated.
- Signature-based IDS may fail to detect attacks that do not match any known signatures, making them less effective against zero-day or novel attack techniques.
- Signature-based IDS may generate a large number of alerts due to the sheer volume of signatures, making it challenging to prioritize and manage the alerts effectively.

1. ARCHITECTURE AND TECHNIQUES OF IDS

IDS consists of several components and follows a specific architecture to ensure methodical monitoring and control and can vary depending on specific implementation, deployment, environment, and organizational requirements (Sharafaldin, 2018).

Sensors or Data Sources:

IDS relies on various sensors or data sources to collect relevant information for analysis. These can include network sensors that capture network traffic, system logs from individual hosts, security event logs, application logs, or other sources of data that provide insights into the system and network activities.

Collection and Preprocessing:

The collected data from sensors undergo a collection and preprocessing phase. This involves aggregating and normalizing the data to ensure consistency and compatibility for subsequent analysis. During this phase, data may be filtered, compressed, or transformed to reduce redundancy and optimize storage and processing efficiency.

Analysis Engine:

The analysis engine is the core component of an IDS responsible for detecting potential intrusions. It applies detection algorithms, rules, or models to the preprocessed data to identify signs of suspicious or malicious activities. The analysis engine can employ various techniques such as signature matching, anomaly detection, or heuristics-based analysis to detect intrusions.

Signature Database or Models:

Signature-based IDS rely on a database of known attack signatures or models. This database contains predefined patterns, behaviors, or characteristics associated with known attacks. The analysis engine compares the observed data against this database to identify matches and raise alerts when a signature or model is detected.

Anomaly Detection Models:

Anomaly-based IDS uses statistical models, machine learning algorithms, or behavioral profiles to establish baselines of normal system or network behavior. These models identify deviations or anomalies that deviate from the established baseline, indicating potential intrusions or abnormal activities.

Alert Generation:

When the analysis engine detects a potential intrusion or security incident, it generates alerts or notifications. Alerts typically contain information about the event, its severity, and relevant details to facilitate incident response. Alerts can be sent to security personnel, and administrators, or integrated with a Security Information and Event Management (SIEM) system for centralized monitoring and management.

Response and Notification:

Upon receiving alerts, security personnel or administrators can initiate appropriate response actions. This may involve further investigation, mitigation measures, blocking suspicious traffic, isolating compromised hosts, or engaging incident response procedures. IDS can also trigger notifications to stakeholders or response teams, ensuring timely incident awareness and coordinated actions.

Reporting and Logging:

IDS generates reports and logs to provide documentation and evidence of security events, alerts, and responses. These logs are valuable for post-incident analysis, compliance reporting, forensic investigations, or audit purposes. They help in understanding attack patterns, identifying vulnerabilities, and enhancing the overall security posture of the organization.

Integration with Other Security Systems:

IDS can integrate with other security systems, such as firewalls, Intrusion Prevention Systems (IPS), SIEM platforms, or threat intelligence feeds. The integration enables collaboration between different security components, enhances threat visibility, and allows for coordinated responses to detected intrusions.

2. EVALUATION METRICS FOR IDS

When evaluating the effectiveness and performance of an Intrusion Detection System (IDS), several metrics are commonly used (Alazab, 2012).

True Positive (TP): The number of correctly identified intrusions or attacks by the IDS. It represents the instances where the IDS correctly detects and alerts about a genuine security threat.

False Positive (FP): The number of alerts generated by the IDS for events that are not actual intrusions. False positives occur when the IDS incorrectly identifies normal or benign activities as malicious or suspicious.

True Negative (TN): The number of correctly identified non-intrusive events or legitimate activities by the IDS. It represents the instances where the IDS accurately recognizes and ignores normal network or system behavior.

False Negative (FN): The number of undetected or missed intrusions by the IDS. False negatives occur when the IDS fails to detect a genuine security threat, allowing it to go unnoticed.

Detection Rate or True Positive Rate (TPR): The percentage of actual intrusions correctly identified by the IDS. It is calculated as $TP / (TP + FN)$ and represents the IDS's ability to detect true positives.

False Alarm Rate (FAR): The percentage of false positives generated by the IDS compared to the total number of non-intrusive events. It is calculated as $FP / (FP + TN)$ and indicates the rate of false alerts raised by the IDS.

Accuracy: The overall correctness or accuracy of the IDS's detection. It is calculated as $(TP + TN) / (TP + FP + TN + FN)$ and represents the proportion of correctly classified events (both intrusions and non-intrusive events) by the IDS.

Precision: The proportion of correctly identified intrusions among all the events classified as intrusions by the IDS. It is calculated as $TP / (TP + FP)$ and represents the accuracy of the positive predictions made by the IDS.

Recall or Sensitivity: The proportion of correctly identified intrusions out of all the actual intrusions. It is calculated as $TP / (TP + FN)$ and indicates the IDS's ability to detect all the positive instances (intrusions) present in the dataset.

F1 Score: A combined metric that balances precision and recall. It is the harmonic mean of precision and recall and provides an overall measure of the IDS's performance. F1 Score is calculated as $2 * (Precision * Recall) / (Precision + Recall)$.

3. RESULTS AND DISCUSSIONS

5.1 Significance of IDS

Early Threat Detection: IDS serves as a proactive defense mechanism by detecting and alerting potential security threats at an early stage. By monitoring network and system activities

in real time, IDS can identify suspicious behaviors, anomalies, or known attack signatures, allowing organizations to respond promptly and mitigate risks.

Enhanced Incident Response: IDS provides valuable insights and alerts that facilitate incident response efforts. By promptly notifying security teams about potential intrusions, IDS enables rapid investigation, containment, and mitigation of security incidents. This helps minimize the impact of attacks and reduces the time to detect and respond to security breaches.

Defense against Unknown Threats: IDS equipped with anomaly-based detection techniques and machine learning capabilities can detect unknown or zero-day attacks. These attacks may not have known signatures but can be identified by analyzing deviations from normal behavior. IDS plays a crucial role in identifying novel attack patterns and enhancing the security posture of organizations.

Compliance and Regulatory Requirements: IDS assists organizations in meeting compliance and regulatory requirements, such as the Payment Card Industry Data Security Standard (PCI DSS) or General Data Protection Regulation (GDPR). By monitoring and analyzing network and system activities, IDS helps organizations demonstrate due diligence in protecting sensitive data and maintaining compliance with industry-specific regulations.

Network and System Visibility: IDS provide valuable visibility into network and system activities, offering organizations a comprehensive understanding of their infrastructure's security posture. This visibility helps identify vulnerabilities, suspicious activities, or misconfigurations that could potentially be exploited by attackers. With this knowledge, organizations can take proactive measures to strengthen their security defenses.

Defense-in-Depth Strategy: IDS is an integral component of a defense-in-depth strategy, which involves layering multiple security controls to provide comprehensive protection. By complementing other security measures such as firewalls, Intrusion Prevention Systems (IPS), and endpoint security solutions, IDS add an extra layer of defense, increasing the likelihood of detecting and preventing security threats.

Continuous Monitoring and Threat Intelligence: IDS enable continuous monitoring of network and system activities, ensuring a proactive security posture. They can integrate with threat intelligence feeds, providing organizations with real-time information on emerging threats, attack vectors, and indicators of compromise. This integration enhances the IDS's ability to detect and respond to evolving threats effectively.

3.2 Challenges, Future, and Emerging Trends in IDS

Challenges and emerging trends in IDS are continually evolving due to the dynamic nature of cybersecurity threats and advancements in technology (Akinyele, 2020).

- Attackers are constantly developing sophisticated and stealthy techniques to bypass traditional IDS defenses. IDS must keep up with the ever-evolving threat landscape and adapt to detect new attack vectors effectively.
- IDS often generate false positive alerts, leading to alert fatigue and reduced trust in the system. False negatives, where genuine intrusions go undetected, pose significant risks. Balancing the detection accuracy while minimizing false alerts is a constant challenge.
- The increasing use of encryption, especially Transport Layer Security (TLS), makes it challenging for IDS to inspect the content of network traffic. IDS needs to develop mechanisms to effectively analyze encrypted traffic without compromising privacy.
- IDS must handle high-volume network traffic, making scalability and performance critical. Processing and analyzing vast amounts of data in real time without impacting network performance can be challenging.
- IDS face difficulties in detecting insider threats, as malicious activities from trusted users may not exhibit typical attack signatures. Behavioral analysis and anomaly detection techniques are required to identify abnormal behaviors of authorized users.
- IDS heavily rely on known attack signatures, making them vulnerable to zero-day attacks, which exploit vulnerabilities unknown to the security community. IDS should incorporate anomaly-based detection techniques and threat intelligence to detect unknown attacks.

Future Prospects

- Machine learning and artificial intelligence techniques are being integrated into IDS to enhance detection capabilities. These technologies enable IDS to learn from patterns, behaviors, and anomalies, improving accuracy and adaptability to new and evolving threats.
- Deep learning techniques, such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), are being explored to improve the accuracy and efficacy of IDS. These models can learn complex patterns and behaviors, enabling more advanced threat detection.

- IDS is leveraging big data analytics to process and analyze large volumes of network and system data. By applying data mining and analytics techniques, IDS can identify hidden patterns, correlations, and anomalies that may indicate malicious activities.
- With the increasing adoption of cloud computing, IDS is moving towards cloud-based architecture. Cloud-based IDS can scale dynamically, leverage cloud resources for analysis, and provide centralized management and monitoring of distributed environments.
- IDS is incorporating threat intelligence feeds and sharing platforms to enhance detection capabilities. By integrating real-time threat intelligence, IDS can proactively detect and respond to emerging threats and indicators of compromise.
- IDS are increasingly focusing on behavior-based analysis, looking for deviations from normal activities and user behavior. By establishing baselines and monitoring for anomalies, IDS can detect zero-day attacks, insider threats, and other advanced attacks.
- IDS are being integrated with SOAR (Security Orchestration, Automation, and Response) platforms to enable automated response and remediation actions. This integration streamlines incident response processes and facilitates coordinated actions between different security systems.
- User and Entity Behavior Analytics (UEBA) techniques are being incorporated into IDS to analyze user behaviors, detect anomalies, and identify potential insider threats or compromised accounts.

4. CONCLUSION

In today's rapidly evolving threat landscape, where new attack techniques are constantly emerging, organizations need robust and effective intrusion detection capabilities. IDS provide organizations with the visibility, early warning, and incident response capabilities necessary to protect their critical assets and maintain a strong security posture. By investing in IDS and staying abreast of emerging trends and technologies, organizations can significantly enhance their cybersecurity defenses and reduce the risk of successful cyber-attacks.

IDS are not only essential for detecting and responding to cyber-attacks but also for preventing them from happening in the first place. By analyzing network traffic and system activities, IDS can identify and block malicious or anomalous behavior before it causes any damage. IDS can also help organizations comply with regulatory and industry standards, such as PCI DSS, HIPAA, and NIST, by providing evidence of security controls and incident management.

Furthermore, IDS can enable organizations to improve their security posture by providing insights into their vulnerabilities, threats, and risks, and by facilitating continuous monitoring and improvement of their security policies and practices.

However, IDS also faces some challenges and limitations that need to be addressed. One of the main challenges is the trade-off between accuracy and performance. IDS needs to balance the detection rate (the percentage of attacks that are detected) and the false positive rate (the percentage of benign activities that are misclassified as attacks). A high detection rate is desirable, but it may also result in a high false positive rate, which can cause unnecessary alerts, waste resources, and reduce user trust. A low false positive rate is desirable, but it may also result in a low detection rate, which can leave some attacks undetected and cause serious damage. Therefore, IDS need to optimize their accuracy and performance by using appropriate algorithms, techniques, and parameters.

Another challenge is the scalability and adaptability of IDS. As the network size, complexity, and diversity increase, IDS needs to cope with the increasing volume, variety, and velocity of data. IDS need to process large amounts of data in real time, without compromising their detection capabilities or causing network congestion. Moreover, IDS needs to adapt to the changing network environment and user behavior, as well as the evolving threat landscape and attack techniques. IDS need to learn from new data and feedback, update their models and rules, and incorporate new features and methods.

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ATIK KIRPINTI KAĞITLARDAN LEVHA ÜRETİMİ

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Özet

Bu çalışmada, hammadde kaynaklarımızın rantabl değerlendirilmesi çerçevesinde, mümkün mertebede alternatif kaynaklardan yararlanmak amacıyla, geri dönüşümle tekrar yeni bir ürüne dönüştürülmesi hedeflenmiştir. Bu amaçla belli oranlarda atık ofis kırpıntı kağıtlar kullanılarak üretilen kompozit malzemenin bazı teknolojik (fiziksel ve mekanik) özellikleri incelenmiştir. Kompozit levha üretiminde tutkal olarak üre formaldehit, sertleştirici olarak amonyum klorür, hidrofobik madde olarak da parafin kullanılmıştır. Levha üretimi % 0, % 10, % 20, %30, %40, %50 oranlarında atık kağıtlardan oluşmuş olup fabrikadan temin edilen normal odun yongaları ile karıştırılarak gerçekleştirilmiştir. Kompozit levhalar, ilgili TS-EN standartlarına göre fiziksel ve mekanik özellikleri araştırılmıştır. Elde edilen sonuçlara göre, kırpılmış ofis kağıt parçacıklarının levha üretiminde % 20 oranına kadar değerlendirilmesi mümkün olduğu görülmüştür. Kaynakların geri dönüşümle tekrar ürüne dönüştürülmesi, levha sektöründe üretim maliyetlerini kısmen azaltabileceği için çevresel ve ekososyal açıdan katkılar sağlayabilir.

Anahtar Kelimeler: Kompozit levha, atık kağıt, fiziksel ve mekanik özellikler

PARTICLEBOARD PRODUCTION FROM WASTE SCRAP PAPER

Abstract

In this study, we aim to recycle our raw material resources into a new product to benefit from alternative resources as much as possible within the framework of profitable evaluation. For this purpose, composite panels were produced using waste office scrap papers and their technological properties were examined. In the production of composite panels, urea formaldehyde was used as glue, ammonium chloride was used as a hardener, and paraffin was used as a hydrophobic substance. Board production consists of waste paper at rates of 0%, 10%, 20%, 30%, 40%, and 50%, mixed with industrial wood particles supplied from the factory. The physical and mechanical properties of composite panels were investigated according to relevant TS-EN standards. Based on the obtained results, it has been observed that it is possible to use office paper particles up to 20% in board production. Converting resources back into products by recycling can provide environmental and eco-social contributions as it can partially reduce production costs in the board industry.

Keywords: Composite board, waste paper, physical and mechanical properties

Giriş

Geri dönüşüm, atık çöp miktarını azaltmakta, kaynakların tükenmesini önlemekte ve kaynakların lüzumsuz kullanımının önüne geçmektir. Ayrıca katı atıkların taşınması ya da depolanması gibi sorunlarına da büyük ölçüde çözüm sağlamaktadır. Kaynakların rantabl kullanılması çevreye ve ekonomiye önemli katkılar sağlar. Hammaddesi yine orman emvali olan atık kağıtları yonga levha teknolojisiyle geri kazandırmanın, orman ürünleri endüstrisinde kıymetli bir adım olacağı düşünülebilir.

Ağaç, ilk çağlardan günümüze kadar geçen süreç içerisinde barınma amacından, mobilya olarak kullanımına kadar çeşitli şekillerde kullanılagelen bir malzeme olmuştur. 1900'li yılların başlarına kadar mobilya üretiminde her türlü ihtiyaç masif ağaçla karşılanmıştır (Yaman, 2002).

Masif ağaç ile yapılan ürünlerde maliyetin ve zayıtın fazlalığı, minimum malzeme ile maksimum fayda sağlamayı engellemektedir. Buna binaen; Dünya nüfusundaki artış ve orman kaynaklarındaki azalma da dikkate alındığında, mobilya üretiminde en büyük hammadde kaynağı olan ağaçtan optimum faydalanma ihtiyacı ister istemez kaçınılmaz hale gelmektedir. Bu nedenle, mobilya üretiminde masif ağaç malzeme yerine odun, vb. malzemelerin artıklarından elde edilen kompozit malzemeler daha fazla kullanılır hale gelmiştir. Yonga levhalar da bu kompozit malzemelerden olup, ağaç levha endüstrisinde en büyük üretim payına sahip malzemedir (Nemli ve Kalaycıoğlu, 2000).

Atık kağıtlar, hammaddeler arasında önemli bir yere sahiptir. 1970'lerin ortalarından itibaren bu kaynak sürekli büyümeye başlamıştır. Hammadde ve enerjinin tüketimini sınırlandırmak, yüksek fiyatlar, odun hammaddesi kıtlığı gibi olumsuz şartlar diğer yandan teknolojik gelişmeyi de modife etmiştir. Lif fiyatlarının yüksek olması odun arzının kıtlığı gibi konular teknik gelişmeyi harekete geçirerek kaynakların kullanım alanları ve yeniden kazanım ve tekrar kullanım oranlarında dünya genelinde artışa yol açmıştır.

1990'lı yıllarda Avrupa da lif ve liflevha tüketiminin %37'si tekrar kullanılmak üzere geri kazanılmıştır. Kağıt ve karton üretiminde kullanılan lifin üçte birinden fazlası atık kağıttan sağlanmıştır. Sağlam bir atık sektörü oluşabilmesi için pek çok şartın yerine getirilmesi gerekir. Düzgün bir kent oluşumu ve nüfus potansiyeli önemlidir. Dağınık ve kırsal kesimlerde atık kağıt toplanması pahalı bir işlemdir. Toplamayı düzenlemek için iyi bir organizasyon alt yapısı ile "ekolojik-toplumsal" bilinç gerekmektedir.

Son dönemlerde artan çevre bilincine paralel olarak gerek kirlilik kaygılarının artması gerekse kağıt endüstrisi için işletme ve yatırım maliyetlerinin yüksek olması, atık kağıtların hammadde olarak tekrar kullanılmasını zorlaştırmaktadır. Özellikle kağıt hamuru üretimi için gerekli üretim girdilerinin pahalı olduğu ülkelerde atık kağıtların geri kazanımı önemli bir yer tutmaktadır. Çevre kirlenmesi problemlerinin gittikçe artan baskısı sonucu atık kağıt kullanımının önemi giderek daha çok önem kazanmaktadır.

Atık kağıt kullanım oranlarının artırılmasıyla hammadde kullanımında genel olarak oduna bağımlı olan kağıt endüstrisi, hammadde temini yönünden bir ölçüde rahatlamakta olduğu söylenebilir (Güler, 2005). Böylece ülke ormanlarımız üzerindeki baskı da azaltılabilecektir. Atık kağıt kullanımı, çevresel etki ve enerji tasarrufu yönlerinden odundan kağıt hamuru üretimine göre daha avantajlıdır. Kullanım yerlerine uygun olarak üretilen atık kağıt hamurunun daha ucuza imal edilerek çok sayıda kağıt karton türünün yapımına uygun bir kaynak olabileceği anlaşılmıştır. Atık kağıtların değerlendirilmesiyle bu endüstri dalındaki hammadde açığına büyük oranda katkı sağlanacak ikinci defa kullanıldığı halde her kalitede (yazı tabı, gazete, oluklu mukavva, ambalaj, temizlik ürünleri vb.) kağıdın üretimi mümkün olacaktır (Akgül, Güler 2002).

Çizelge 1. 2022 Yılı Türkiye İthal ve Yerli Kağıt Toplam Miktarı (ton) (Anon., 2023)

İTHAL					YERLİ					GENEL TOPLAM
Oluklu ve Kraft Torba	Gazete	1.Hamur	Karışık	İthal Toplam	Oluklu ve Kraft Torba	Gazete	1.Hamur	Karışık	Yerli Toplam	
699.447	53.001	2.516	590.080	1.345.044	2.161.372	12.663	344.932	1.094.131	3.613.098	4.958.142

Yonga levha bitkisel veya odunsu yongaların tutkal ilavesi ile belirli özelliklerde oluşturulan levha taslağının preslenmesi sonucu elde edilen bir üründür. Yonga levhaların özgül ağırlıkları 0.50-0.80 g/cm³ arasında değişir.

Yonga levhalar, özgül kütleye göre üç grupta toplanmaktadır (Bozkurt ve Göker, 1990);

a- Düşük özgül kütledeki yonga levhalar: özgül kütlesi 0.59 g/cm³'ten daha az olan levhalardır.

b- Orta özgül kütledeki yonga levhalar: özgül kütlesi 0.59-0.80 g/cm³ arasında olan levhalardır.

c- Yüksek özgül kütledeki yonga levhalar: özgül kütlesi 0.80 g/cm³'ten daha yukarı olan levhalardır.

Yonga levha üretiminde hammadde olarak levha ağırlığının yaklaşık % 90'ından fazlasını odun oluşturmakta, yapıştırıcı olarak sentetik reçineler kullanılmaktadır. Yonga levha üretiminde kullanılan hammaddeler arasında başta iğne yapraklı ağaçlar olmak üzere geniş yapraklı ağaçlar ve bunların endüstriyel atıkları ve çeşitli yıllık bitkilerin odunsu kısımları yonga levha endüstrisinde değerlendirilmektedir.

Ülkemizdeki hammadde kaynaklarının daha rasyonel olarak kullanılması gerekmektedir. Orman ürünleri endüstrisinin temel girdilerinden biri durumundaki yongalevhanın belli oranda kırılmış kağıt atıklarının değerlendirilmesine yönelik çalışmalar hem bu ürünün hammadde kaynaklarını genişletecek hem de teknolojik özelliklerine yeni nitelikler kazandıracaktır.

Bu çalışmada atık kırıntı kağıtlardan belirli oranlarda karıştırılarak levha üretilmiştir. Böylece her yıl yakılarak yada değişik amaçlarla kullanılagelen kırıntı atık kağıtların orman ürünleri endüstrisinde hammadde kaynağına destek olarak değerlendirilmesi hedeflenmiştir.

MATERYAL VE METOT

Kağıt atıkları Düzce Üniversitesi Orman Fakültesinden, endüstriyel odun yongaları ise Yıldız Entegre AŞ. Mudurnu tesislerinden temin edilmiştir. Denemelerde kullanılacak kompozit malzemenin üretiminde kırıntı atık kağıtlar ve yongalar belirli oranlarda karıştırılarak uygulanmıştır. Taslakların hazırlanmasında özel bir yöntem uygulanarak kapalı ortamda tutkal pülverize yöntemi ile karıştırma işlem yapılmıştır. Karışım oranları % 10, 20, 30, 40 ve 50 olarak belirlenmiştir. Üretilen kompozit malzeme kalınlığı 18 mm, 150 °C ısıda 7 dk süre ile preslenmiştir. Üretimde % 55 lik üre formaldehit, ve % 33 lük Amonyum klorür sertleştirici olarak kullanılmıştır. Her gruptan ikişer levha üretimi gerçekleştirilmiştir. Levhaların üretim planı Çizelge 2'de gösterilmiştir.

Çizelge 2. Levha Üretim Planı

	Kağıt (%)	Yonga (%)
A	10	90
B	20	80
C	30	70
D	40	60
E	50	50
H	100	0
I	0	100

Laboratuvar koşullarında üretilen levhaların üretim parametreleri Çizelge 3 de, üre formaldehit tutkalının genel özellikleri çizelge 4'te gösterilmiştir.

Çizelge 3. Levha Üretim Parametreleri

Parametreler	değer
Pres sıcaklığı ($^{\circ}\text{C}$)	140-150
Pres süresi (dak.)	7
Pres basıncı (N/mm^2)	2.4-2.6
Levha kalınlığı (mm)	18
Boyutlar (mm)	440x440

Çizelge 4. Üre formaldehit tutkalının özellikleri.

Özellikler	
Katı madde oranı (%)	65
Viskozite (cps)	280
Akma zamanı (sn)	95
pH	8.3-8.5
Yoğunluk (kg/m^3)	1280
Serbest formaldehit oranı	0.14
Jelleşme süresi (sn)	45-49
Depolama süresi (gün)	90

Yöntem

Levha üretiminde kullanılan hammaddeler resim 1 ve 2’de, üretim aşamaları resim 3-6, deney örneklerinin hazırlanması resim 7-10’da gösterilmiştir.



Resim 1. Atık Kırpıntı Kağıt



Resim 2. Odun Yongası



Resim 3. Tutkallama İşlemi



Resim 4. Levha Taslağının Oluşturulması



Resim 5. Levha Taslağının Preslenme İşlemi



Resim 6. Pres Sonrası Yonga Levha



Resim 7. Eğilme direnci numuneler



Resim 8. Deney örnekleri



Resim 9. Eğilme Direnci ve Elastikiyet Modülü Testi



Resim 10. Birim Hacim Ağırlık ve Kalınlığına Artımı Tayini

Araştırma aşamasında, birim hacim ağırlık tespiti ve suya daldırma işleminden sonra kalınlığına şişme tayini testleri için, ilk ağırlık ve hacimleri tespit edilen numuneler sırasıyla 2 saat ve 24 saat olmak üzere tamamen su altında bırakılmış; her aşamadan sonra tekrar kumpas ve hassas terazi yardımıyla ağırlıkları ve hacimleri tespit edilmiştir (Resim 11).



Resim 11. Ağırlık ve Hacim Ölçüm Aletleri

Araştırmada numune alma, kesme ve muayene, deney Numunelerinin Seçimi, kesimi ve deney sonuçlarının Gösterilmesi (TS EN 326-1, 1999), fiziksel özelliklerden birim hacim ağırlık, (TS EN 323/1999), Su içerisine daldırma işleminden sonra kalınlığına şişme tayini (TS EN 317/1999), mekanik özelliklerden Eğilme Dayanımı ve Eğilme Elastikiyet Modülünün Tayini (TS EN 310/1999)'e göre yapılmış olup, standartlarda uygunluğu yönünden yonga levhaların özellikleri (TS EN 312/2012) ye göre değerlendirmeler yapılmıştır.

BULGULAR VE TARTIŞMA

Farklı gruplara ait yoğunluk, kalınlık artımı ve standart sapma değerleri Çizelge 5'te gösterilmiştir.

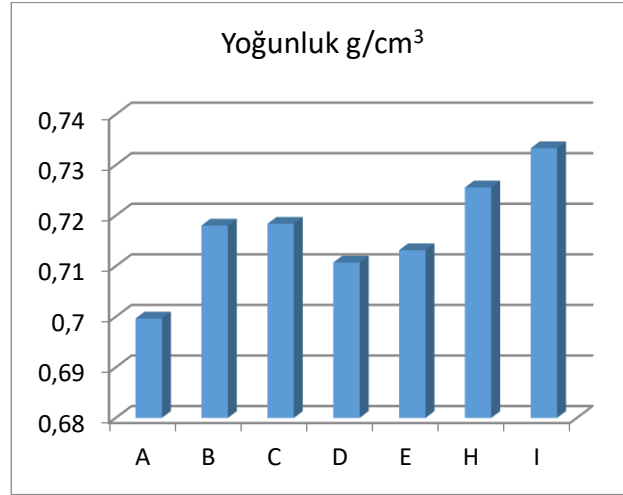
Çizelge 5. Levhaların fiziksel özellikleri (ortalama \pm standart sapma).

Levha	Yoğunluk (g cm ³)	Kalınlık Artımı (%)	
		2 Saat	24 Saat
A	0.700 (0.01)	21,12 (2.28)	27,06 (2.54)
B	0.718 (0.02)	25.44 (3.29)	32.43 (5.06)
C	0.718 (0.024)	29.24 (5.04)	38.01 (2.43)
D	0.710 (0.04)	24.50 (2.68)	30.31(2.81)
E	0.713 (0.018)	27.23 (2.17)	32.44 (2.24)
H	0.725 (0.033)	22.08 (1.60)	25.49 (1.30)
I	0.733 (0.02)	19.23 (1.31)	29.32 (1.90)

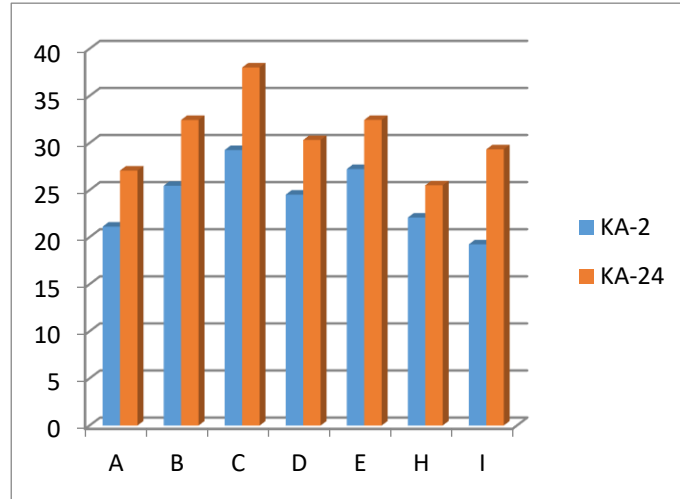
*Parantez içerisinde standart sapmalar gösterilmiştir.

Levhaların yoğunluğu 0.70-0.73 g/cm³ arasında değişmektedir (Şekil, 1). Yoğunluk levhanın direnç özelliklerini önemli ölçüde etkilemektedir. TS-EN 312 (2012)'ye göre levhadaki ortalama yoğunluğa dair tolerans \pm %10 olabilir denilmektedir. Ancak levha içerisinde ortalama yoğunluk dağılımı homojen olup standartlara uygundur.

Kalınlık artımı 2 saat suda bekletme sonucunda en düşük A grubu levhalarda %21.12, en yüksek C grubu levhalarda %29.24 olarak tespit edilmiştir. 24 saat için ise, en düşük H grubu levhalarda % 25.49, en yüksek C grubu levhalarda % 38.01 olarak tespit edilmiştir (Şekil 2). TS 312 (2012)'e göre nemli şartlarda kullanılan yük taşıyıcı olmayan levhalar (tip-P3)'e göre $13 < t \leq 20$ mm kalınlığında olan levhalar için kalınlık artımı 24 saatte en fazla % 14 olması gerektiği belirtilmiştir. Buna göre kalınlık artımı 24 saat için tüm gruplarda standart değerden yüksek bulunmuştur. Ancak levha içerisindeki atık kağıt oranı arttıkça genelde kalınlık artışı olduğu söylenebilir.



Şekil 1. Yoğunluk



Şekil 2. Kalınlık artışı (%)

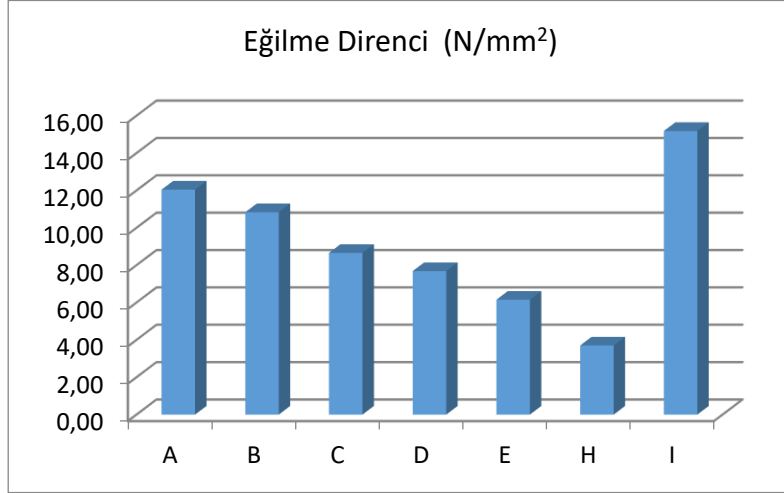
Eğilme direnci ve elastikiyet modülü ortalama değerleri Çizelge 6'da gösterilmiştir.

Çizelge 6. Deneme levhalarına ait mekanik özellikler (ortalama \pm standart sapma).

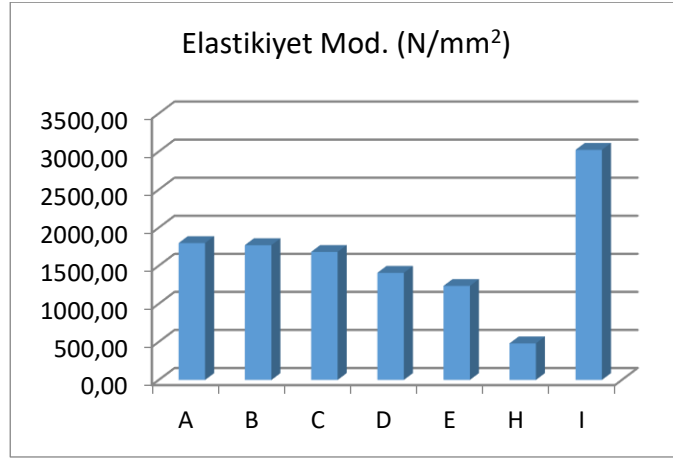
Levha	Eğilme Direnci (N mm²)	Elastikiyet Modülü (N mm²)
A	12.05 (0.986)	1798.17 (120.97)
B	10.84 (0.409)	1770.81 (233.00)
C	8.66 (0.394)	1682.37 (407.82)
D	7.68 (1.22)	1407.30 (364.59)
E	6.15 (0.831)	1235.32 (282.26)
H	3.70 (0.323)	480.83 (39.32)
I	15.18 (2.09)	3022.80 (600.90)

Eğilme direnci en yüksek A grubu levhalarda 12 N/mm², en düşük H grubu levhalarda 3.70 N/mm² olarak tespit edilmiştir. Burada levha içerisindeki kağıt oranı arttıkça eğilme direncinde azalma meydana gelmektedir (Şekil 3). TS EN 312 (2012)'de kuru şartlarda kullanılan genel amaçlı levhalar (Tip P1) için gerekli özelliklerde 13 < t ≤ 20 kalınlıklarda eğilme mukavemeti minimum 10 N/mm² olması öngörülmüştür. Buna göre A ve B grubu levhalarda eğilme direnci standartlara uygun olup % 20'ye kadar kırpıntı kağıt karışımlarda kompozit malzeme üretiminde kullanılabilceğini göstermektedir.

Eğilmede elastikiyet modülü, eğilme direncine paralel olarak en yüksek A grubu levhalarda 1798 N/mm², en düşük H grubu levhalarda 480 N/mm² olarak tespit edilmiştir. Burada levha içerisindeki kağıt oranı arttıkça eğilme direncinde olduğu gibi elastikiyet modülünde de düşme olduğu görülmüştür (Şekil 4). TS EN 312 (2012) kuru şartlarda iç donanımlarda (mobilya dahil) kullanılacak 20 mm kalınlığa kadar olan yonga levhalar için elastikiyet modülü minimum 1600 N/mm² olması öngörülmüştür. Buna göre A,B ve C ile kontrol I grubu levha gruplarında elastikiyet modülü standartlara uygun olup %30'a kadar kırpıntı kağıt uygun karışımlarda kompozit malzeme üretiminde kullanılabilceğini göstermektedir.



Şekil 3. Eğilme Direnci



Şekil 4. Elastikiyet Modülü

SONUÇ VE ÖNERİLER

Elde edilen verilere göre atık kağıtlardan üretilen levhaların, gerek fiziksel ve gerekse mekanik özellikleri bakımından levha içerisinde % 20 oranına kadar kullanımının uygun olduğu görülmüştür. Ağaç malzemeye olan talep gün geçtikçe daha çok artış göstermektedir. Dolayısı ile oluşan talebe bağlı olarak orman kaynaklarında azalma, kaliteli ağaç malzemeye ulaşmada zorluklar ve malzeme fiyatlarında yüksek artışlar yaşanmaktadır. Bu nedenle; Kağıt atıkların, geri dönüşüm sonucunda tekrar üretimi sağlanarak yeni ve kaliteli ürünlerin kazandırılması hammadde açığında önemli ve etkin bir rol oynayabilir. Kağıt atıklar, yakılmayarak atmosfere salınmadığı için tekrar üretime kazandırılması ile karbon emisyonunun azaltılmasına katkı sağlaması söz konusudur.

Ayrıca atıkların geri dönüşüm yoluyla yeni bir kullanım alanı yaratılarak değerlendirilmesi çevre sorunlarının azalmasında, hammadde rezervlerinin korunmasında ve yeni iş kolları ile istihdam alanlarının yaratılarak ekonomik açıdan kalkınmada önemli katkılar sağlayabilir. Tüm dünyada olduğu gibi Türkiye’de de bu konu ile ilgili yapılan araştırmalar ve akademik çalışmalar her geçen gün büyük önem kazanmaktadır. Buna göre kaynakların geri dönüşümle tekrar ürüne dönüştürülmesi, levha sektöründe üretim maliyetlerini kısmen azaltabileceği için çevresel ve istihdam koşullarına katkılar sağlayabilir.

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EVLİ BİREYLERİN BİLİŞSEL DUYGU DÜZENLEME BECERİLERİ, EVLİLİK DOYUMU VE BENLİK AYRIŞMASI DÜZEYLERİ

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Özet

Aile, toplumun temel birimi olarak kabul edilir ve bireylerin yaşamlarında önemli bir rol oynar. Evlilik doyumu, bireylerin kendi mutluluklarını artırabilir. Evlilik, insanların iyi hissetmelerini, sosyal bağlantılarını güçlendirmelerini ve psikolojik iyilik hallerini artırmalarını destekler. Bu nedenle, evlilik doyumunun artırılması ve sağlıklı bir evliliğin sürdürülmesi, sosyal ve psikolojik açıdan büyük bir öneme sahiptir. Bilişsel duygu düzenleme, duygusal deneyimlerimizi anlama, yönetme ve düzeltebilme yeteneğini ifade eder ve bu yetenekler, bir bireyin evlilikteki rolünü ve duygusal reaksiyonlarını şekillendirir. Aynı şekilde, benlik ayrışması da bir bireyin kimlik algısı ve evlilikteki rolünü etkileyebilir. Bu üç kavramı ebeveyn davranış stillerinin de etkilediği hakkında çalışmalar bulunmaktadır. Evlilik doyumu, benlik ayrışması ve bilişsel duygu düzenleme becerilerinin çocuk dönemindeki anne baba tutumları ile ilişkilendirip evlilik hayatına yansımalarını inceleyen bir araştırma bulunmamaktadır. Bu noktada, evlilik doyumu, benlik ayrışması ve bilişsel duygu düzenleme becerilerinin çocukluk dönemindeki ebeveyn tutumlarıyla ilişkisi üzerine odaklanacak bir araştırmanın önemi ortaya çıkıyor. Bu çalışma, çocukluk döneminde ebeveynlerin sergilediği tutumların, evlilik doyumu, benlik ayrışması ve bilişsel duygu düzenleme becerileri üzerindeki etkilerini anlamak için kapsamlı bir araştırma tasarımı gerektirebilir. Ayrıca, bu tür bir çalışma, bireylerin yetişme süreçlerindeki deneyimlerin, yetişkinlikteki ilişkilerine olan etkilerini anlamak için genişlemiş bir psikolojik model sunabilir. Sonuç olarak, bu araştırma, çocukluk dönemindeki aile dinamiklerinin, yetişkinlerin evlilik hayatlarındaki duygusal, bilişsel ve ilişkisel özellikleri üzerindeki etkisini anlamak adına önemli bir katkı sağlayabilir.

Anahtar kelimeler: Evlilik, Evlilik Doyumu, Bilişsel Duygu Düzenleme Stratejileri, Benlik Ayrışması

**COGNITIVE EMOTION REGULATION SKILLS, MARRIAGE SATISFACTION
AND SELF-DISSOCIATION LEVELS OF MARRIED INDIVIDUALS**

Abstract

Family is considered the essential unit of community and plays an important role in the lives of people. Marital satisfaction can increase individuals' own happiness. Marriage supports people in feeling good, strengthening social connections, and enhancing their psychological well-being. Therefore, increasing marital satisfaction and maintaining a healthy marriage is of great social and psychological importance. Cognitive emotion regulation refers to the ability to understand, manage, and adjust our emotional experiences, and these abilities shape an individual's role and emotional reactions in marriage. Likewise, self-dissociation can affect an individual's sense of identity and role in marriage. There are studies showing that these three concepts are also affected by parental behavioral styles. There is no research examining the relationship between marital satisfaction, self-dissociation and cognitive emotion regulation skills with parental attitudes during childhood and their reflections on married life. This study may require a comprehensive research design to understand the effects of parental attitudes during childhood on marital satisfaction, self-differentiation, and cognitive emotion regulation skills. Furthermore, a study of this nature could present an expanded psychological model to comprehend how individuals' experiences during their formative years impact their relationships in adulthood. As a result, this research could provide a significant contribution towards understanding the impact of family dynamics during childhood on the emotional, cognitive, and relational characteristics in adults' married lives.

Keywords: Marriage, Marital Satisfaction, Cognitive Emotion Regulation Strategies, Self-Dissociation

Giriş

Evlilik, bireylerin duygusal ve sosyal ihtiyaçlarını karşılamak, destek bulmak ve birlikte büyüme amacıyla önemli bir kurumsal birlikteliktir. Evlilik, yaşam boyu sürebilen bir yolculuğun başlangıcıdır ve kişilerin hayatlarını bir araya getirmek için karmaşık bir süreçtir. Bu sürecin başarısı, çiftlerin aralarındaki ilişkinin niteliği ve her bir eşin kişisel tatmini ile yakından ilişkilidir. Evlilik doyumu, bu ilişkisel başarıyı ölçen temel bir faktördür.

Evlilik doyumu, bir çiftin evliliklerindeki memnuniyet düzeyini yansıtan bir kavramdır ve bu memnuniyet, birçok faktöre dayanmaktadır. Bu faktörlerden biri, bireylerin bilişsel duygu düzenleme becerileri ve benlik ayrışması gibi psikolojik özellikleri olabilir. Bilişsel duygu düzenleme becerileri, kişilerin duygusal tepkileri anlama, yönetme ve düzeltebilme yeteneğini ifade eder. Benlik ayrışması ise bir bireyin kendi kimliğini ve kendisini nasıl algıladığını tanımlar. Bu psikolojik özellikler, bir kişinin evliliğindeki rolünü ve duygusal tepkilerini nasıl dengelediğini etkileyebilir.

Ebeveyn tutumları da, bireylerin kişisel gelişimi üzerinde önemli bir etkiye sahiptir. Ebeveynlerin çocuklarına olan yaklaşımı ve tutumları, çocukların benlik ayrışması ve duygu düzenleme becerilerini şekillendirebilir. Bu nedenle, ebeveyn tutumlarının evlilik doyumu, bilişsel duygu düzenleme stratejileri ve benlik ayrışması üzerindeki etkisini incelemek, evlilik araştırmaları açısından önemlidir.

Bu araştırmanın amacı, benlik ayrışmasının evlilik doyumuyla ve bilişsel duygu düzenleme stratejileriyle ilişkisini daha ayrıntılı anlamak üzere bu konularda yapılmış ulaşılabilen araştırmaları incelemektir.

2- EVLİLİK DOYUMU

Evlilik doyumu, çiftlerin birbirleriyle olan ilişkilerinde tatmin edici bir seviyeye ulaşmalarınıdır. Evlilik doyumu, çiftlerin birbirine karşı duygusal, fiziksel ve cinsel olarak tatmin olması ile ilgilidir. Evlilik doyumu, birçok faktöre bağlıdır. Bunlar arasında iletişim, dürüstlük, saygı, bağlılık, güven, benzer değerler ve hedefler gibi faktörler yer alır. Aynı zamanda, cinsel uyum, duygusal yakınlık ve çiftlerin birbirine karşı romantik hissetmeleri de evlilik doyumunu etkileyen faktörler arasındadır. Evlilik doyumunun düşük olması, çiftlerin arasında sorunlara ve çatışmalara neden olabilir. Bununla birlikte, evlilik doyumunun yüksek olması, çiftlerin arasındaki bağları güçlendirir ve ilişkilerini daha tatmin edici hale getirir.

Evlilik doyumunu artırmak için, çiftlerin birbirleriyle açık, dürüst ve yapıcı bir şekilde iletişim kurmaları önemlidir. Çiftlerin birbirlerinin ihtiyaçlarına saygı duymaları, birbirlerini

desteklemeleri ve birlikte zaman geçirmeleri de evlilik doyumunu artırabilir. Ayrıca, çiftlerin birbirine karşı romantik ve cinsel olarak ilgi duymaları, evlilik doyumunu artıran diğer faktörler arasındadır. Evlilik doyumu, çiftlerin birbirleriyle tatmin edici bir ilişki kurmaları ve birlikte mutlu bir hayat sürdürmeleri için önemlidir. Evlilik doyumunu artırmak için, çiftlerin birbirleriyle açık, dürüst ve yapıcı bir şekilde iletişim kurmaları, birbirlerine saygı duymaları ve birlikte zaman geçirmeleri önemlidir. Anne-baba tutumlarının evlilik doyumuyla ilişkili olduğu düşünülmektedir. Araştırmalar, tutarlı ve sevgi dolu bir anne-baba tutumunun, çocukların ileride evlilik doyumlarının daha yüksek olmasıyla ilişkili olduğunu göstermektedir. Örneğin, sıcaklık ve ilgi gösteren bir anne-baba tutumu, çocukların duygusal olarak daha sağlıklı yetişmelerine ve dolayısıyla evliliklerinde daha tatmin edici bir ilişki kurmalarına yardımcı olabilir. Bunun yanı sıra, çocukların anne-baba ile sağlıklı bir iletişim kurabilmesi, onların evliliklerinde de açık ve sağlıklı bir iletişim kurmalarına yardımcı olabilir. Bununla birlikte, baskıcı, eleştirel veya tutarsız bir anne-baba tutumunun, çocukların ileride evliliklerinde daha düşük bir doyum seviyesine sahip olmalarıyla ilişkili olduğu bulunmuştur. Bu tür bir anne-baba tutumu, çocukların duygusal ihtiyaçlarını karşılamakta zorlanmalarına ve kendilerini yeterince sevildiklerine inanmamalarına neden olabilir. Buda, çocukların evliliklerinde mutsuzluk, iletişim sorunları ve diğer sorunlara neden olabilir. Sevgi dolu, tutarlı ve destekleyici bir anne-baba tutumu, çocukların duygusal ihtiyaçlarını karşılamalarına ve sağlıklı bir şekilde yetişmelerine yardımcı olabilir. Buda, çocukların ileride daha tatmin edici bir evlilik kurmalarına katkıda bulunabilir.

3- BİLİŞSEL DUYGU DÜZENLEMENİN STRATEJİSİ

Bilişsel duygu düzenlemenin tanımında, bireylerin genel yaşam olaylarında veya stresli durumlarda duygularını kontrol etmesini ve bu süreçte kullandıkları başa çıkmaya yönelik stratejiler yer alır. Duygular, kişinin bilişsel, davranışsal ve fizyolojik tepkileri aracılığıyla ortaya çıkabilir (Lopes, Salovey, Beers ve Cote, 2005). Belirli tekniklerle duyguların devamı, azalması ya da artması düzenlenebilir; özellikle üst düzey bilişsel yetenekler bu düzenlemeyi gerçekleştirmede etkili olabilir. Gross ve ark. (2003), duyguların uygun bir şekilde düzenlendiğinde genel iyilik halini artırabileceğini iddia etmişlerdir. Ancak, uygun olmayan bir düzenleme, fiziksel rahatsızlıklara ve iyilik halinin azalmasına yol açabilir.

Bilişsel süreçler, duyguları tanıma, düzenleme ve kontrol etme sürecinde işlevsel bir rol oynar. Bu süreçler, bilinçli ve bilinçdışı olarak iki aşamada gerçekleşir. Bilinçli bilişsel süreçler, bilişsel duygu düzenleme sürecinde önemli bir rol oynar. Bilişsel duygu düzenleme stratejileri, uyumlu ve uyumsuz olarak sınıflandırılır. Uyumlu stratejiler arasında kabul etme, plana

odaklanma, olumlu tekrar odaklanma, olumlu tekrar değerlendirme ve olayın değerini azaltma bulunur. Uyumsuz stratejiler ise kendini suçlama, başkalarını suçlama, ruminasyon ve felaketleştirmeyi içerir. Bilişsel duygu düzenleme stratejileri, bireylerin duygu ve stresle baş etme yöntemleri olarak tanımlanabilir. Bu stratejiler, bir olaya verilen tepkiyi, düşünce kalıplarını değiştirme veya doğrudan duygulara ve davranışlara müdahale ederek değiştirme amacını taşır.

4- BENLİK AYRIŞMASI

Benliğin farklılaşması, kişinin hem duygu ve düşüncelerinin farkındalığını hem de başkalarıyla ilişkisiz biçimde onlardan bağımsız olmasını ifade eder. Düşük farklılaşma durumunda, kişi gerçek durumlarla duygularını ayırt etmede güçlük yaşar ve genellikle duygusal tepkiler vererek davranış sergiler ya da karar alırlar ve savunmasız durumda olduklarından ailede içinde çatışmalar yaşanır. Diğer taraftan, yüksek farklılaşma düzeyine sahip bireyler, düşünce ve duygularının farkında olup, her ikisine de yaşamlarında yer tutar. Ancak duygularının mantıksal süreçlerini yönlendirmesine engel olurlar. Durumlar karşısındaki duruşları açık ve net olup, çeşitli durumlara kolayca uyum sağlarlar (Polat ve İlhan, 2018). Benlik ayrışması, bir kişinin kendisi hakkında bütüncül bir algıya sahip olamaması ve farklı kişilik özelliklerinin, tutumların veya düşüncelerin çelişkili bir şekilde bir araya gelmesi durumudur. Bu durum, kişinin kendisi hakkında tutarlı bir benlik algısı oluşturamamasına ve başkalarıyla ilişkilerinde güçlük çekmesine neden olabilir. Benlik ayrışması genellikle çocukluk döneminde başlayabilir ve birçok nedeni olabilir. Örneğin, duygusal istismar veya ihmal, aile içi şiddet, ayrılık veya kayıp gibi çocukluk travmaları, benlik ayrışması için risk faktörleri olabilir. Ayrıca, bazı psikiyatrik bozukluklar, özellikle borderline kişilik bozukluğu gibi kişilik bozuklukları, benlik ayrışması ile ilişkilendirilir. Benlik ayrışması, kendini zarar verme davranışları gibi ciddi sonuçlara da yol açabilir. Tedavi, genellikle terapi ve psikoterapi yoluyla yapılır. Tedavi amaçlarından biri, bireyin bütüncül bir benlik algısı geliştirmesine yardımcı olmaktır. Terapi ayrıca, kişinin geçmişte yaşadığı travmaları işlemesine, duygusal yönelimini iyileştirmesine ve kişilik özelliklerini daha tutarlı hale getirmesine yardımcı olabilir.

5- ÇALIŞMANIN AMACI VE YÖNTEMİ

Bu araştırmanın amacı ulaşılabilen çalışmaların bulgularından hareketle evli bireylerde evlilik doyumu, bilişsel duygu düzenleme stratejileri ve benlik ayrışmasına ilişkin faktörleri belirlemektir. Bu amaç nedeniyle bu çalışmada sistematik derleme yöntemi kullanılmıştır. Bu yöntem, araştırma kapsamındaki kavramlarla ilgili araştırmaların kapsamlı incelenmesi ve çeşitli dâhil etme ve dahil etmeme kriterleri kullanılarak hangi çalışmaların incelemeye

alınacağıının belirlenmesi, ayrıca dâhil edilen arařtırmalardaki bulguların analiz edilmesini ierir (Karaam, 2013). Bu arařtırmada sistematik derleme yntemi kullanılarak evli bireylerde evlilik doyumu, biliřsel duygu dzenleme stratejileri ve benlik ayrıřması kavramalarına iliřkin 2015- 2023 yılları arasındaki ulařılabilen arařtırma makalelerin ve yapılan tezlerin deęerlendirilmesi yapılmıřtır. Bu arařtırmalara ulařmak iin akademik veri tabanlarında tarama yapılmıřtır. Bu arařtırmanın amacına ynelik olarak ařaęıdaki sorular oluřturulmuřtur.

1. Evli bireylerde evlilik doyumu ile iliřkili faktrler nelerdir?
2. Evli bireylerde biliřsel duygu dzenleme stratejileri ile iliřkili faktrler nelerdir?
3. Evli bireylerde benlik ayrıřması ile iliřkili faktrler nelerdir?

Bu alıřmaya iliřkin oluřturulan sorulara uygun řekilde uygulanan sistematik derleme srecindeki taramaya ynelik aramalarda ‘evli bireyler* evlilik doyumu’ ‘benlik ayrıřması* biliřsel duygu dzenleme stratejileri’ ve ‘ebeveyn tutumları’ řeklinde aramalar yapılmıřtır. Ulařılan yayınlarda incelemeye alınan 15 arařtırmanın 5 tanesi evlilik doyumu, 5 tanesi biliřsel duygu dzenleme stratejileri ve 5 tanesi benlik ayrıřması ile ilgili olduęu belirlenmiřtir. Bu arařtırmaların incelenmesinde arařtırmaların amaları ve soruları bařlıca etken olmuřtur.

Sistematik derlemenin tanımında aıklandığı řekilde bu arařtırmada eřitli dahil etme ltleri kullanılmıřtır. Bu ltlerin; yayınların 2015-2023 tarihlerinde yayınlanması, evli bireylerde evlilik doyumu ile ilgili olması, biliřsel duygu dzenleme stratejileri ile ilgili olması, benlik ayrıřması ile ilgili olması,  deęiřkeni iermesi genlik yařantıları ve evli bireyleri kapsamasına dikkat edilmiřtir.

6- BULGULAR

Bu arařtırmada incelemeye alınan 22 yayının, 15’i, yayının tr, yayınlanma yılı, alıřma adı ve uygulandıęı yař dzeyi řeklinde ana bařlıklar dikkate alınarak incelenmiřtir ve ulařılan bilgiler liste řeklinde verilmiřtir. Biliřsel duygu dzenleme becerilerine iliřkin ulařılan alıřmalar ile ilgili olarak ařaęıda kısa aıklama ve bilgiler sunulmuřtur.

Konu	Çalışmanın Başlığı	Yaş Aralığı	Yıl	Yayın Türü
Bilişsel duygu düzenleme becerileri	Bilişsel Esnekliğin Bilişsel Duygu Düzenleme Üzerindeki Etkisi	18-26 yaş	2020	makale
	Genç Yetişkinlerin Çocukluk Çağındaki Olumsuz Yaşantıları, Öz-şefkati ve Duygu Düzenleme Becerileri Depresyon Belirtilerini Yordaması	18-25 yaş	2020	makale
	Genç yetişkinlerde bilişsel duygu düzenlemenin tarzları ve ilişkisel bağımlılık benlik kurgusu	18-39 yaş	2017	Makale
	İstismar-İhmal Geçmişi ve Romantik İlişkideki Bağlanma: Bilişsel Duygu Düzenlemenin Ve Erken Dönem Uyumsuz Şemalarının Rolü	18-65	2023	Doktora Tezi

Kocabıyık ve arkadaşları (2017), genç yetişkinlerdeki bilişsel duygu düzenlemeye ilişkin tarzlar ve ilişkisel bağımlı benliğin kurgusu üzerine yaptıkları araştırmada, ilişkisel bağımlı benlik kurguları ile belirli bilişsel duygu düzenleme stratejileri arasında farklılıklar olduğunu ve bazı stratejilerin daha fazla ilişkilendirildiğini, bazılarının ise bu kurgularla daha az bağlantılı olduğu sonucuna ulaşmıştır.

Çocukluk çağındaki olumsuz yaşantıların, özşefkatin ve duygu düzenlemeye yönelik becerilerin genç yetişkinlerdeki depresyon belirtilerini nasıl etkilediği üzerine Akcan ve Taşören (2020) tarafından yapılan çalışmada elde edilen bulgulara göre, depresyon belirtileri, sosyal yalıtılmışlık belirtileri ile pozitif yönde ilişkili bulunmuştur.

Kubin Mete'nin (2023) yaptığı çalışmada çocukluk çağı travmalarının duygu düzenleme güçlükleri ile ilişkisi incelenmiştir ve çocukluk çağındaki travmaların uyumlu biçimdeki duygu düzenlemeyi negatif yönde, uyumsuz biçimdeki duygu düzenlemeyi ise pozitif yönde yordadığı belirlenmiştir. Aşağıda evlilik doyumu ile ilgili incelenen yayınlara ilişkin özet bilgi ve açıklamalar verilmiştir.

Konu	Araştırmanın Başlığı	Yaş Aralığı	Yıl	Yayın Türü
Evlilik doyumunu	Evli Bireylerin Evlilik Doyumunun Yaşam Doyumuyla İlişkisinde Benlik Saygısının Aracı Rolü	30-40 yaş	2016	Makale
	Evli Bireylerde Evlilik Değerleri, Evlilik Doyumu ile Evlilik Tipleri	36-40 yaş ort.	2019	Makale
	Evlilik Doyumunda Anne Baba Tutumlarının Etkisi	Yaş ort. 32.76	2016	Makale
	Evlilikteki Empatinin, Evlilik Doyumunun Affetme ile İlişkisinde Evlilik Farkındalığındaki Aracı Rol	18 yaş ve üstü	2020	Doktora Tezi
	Evli Bireylerde Evlilik Değeri, Evlilik Doyumu ve Evliliğin Tipleri	40.50. yaş ort	2019	Doktora Tezi

Yıldız ve Baytemir'in (2016) yaptığı araştırmada evlilik doyumunun yaşam doyumuyla olumlu yönde doğrudan ilişkili olduğu ve evlilik doyumunun yaşam doyumunu üzerindeki toplam etkisinin anlamlı düzeyde olduğu belirlenmiştir.

Demirli ve Kendir'in (2016) yaptığı araştırmada evlilik doyumunun demokratik anne baba tutumuyla anlamlı düzeyde ilişkili olduğu; bireylerin demokratik tutum düzeyinin evlilik doyum düzeyini artırdığı bulunmuştur ve evlilik doyumunu üzerinde eşler arasındaki yaş farkının, gelir düzeyinin, eğitim durumunun, çocuk sayısının anlamlı düzeyde farklılaşmaya neden olduğu belirlenmiştir.

Şahin'in (2020) yaptığı araştırmada evlilikte farkındalık, evlilik doyumunu ve evlilikte empati düzeyi arasında anlamlı düzeyde ilişki tespit edilmemiştir.

Çatal ve Kalkan'ın (2019) yaptığı çalışmada evlilikteki tiplerin ve evlilikteki değerlerin evlilikteki doyum düzeyini önemli düzeyde yordadığı saptanmıştır.

Ceylan (2023) tarafından araştırmada toplumsal cinsiyet rollerine yönelik tutumların ile kişilerin arası affetme düzeyi arasında pozitif yönlü önemli düzeyde ilişki; benliğin farklılaşması düzeyi arasında ise önemli düzeyde ilişki olmadığı; benliğin farklılaşması ve kişilerarası affetme düzeyi arasında ise negatif yönde anlamlı ilişki olduğu gösterilmiştir. Aşağıda benlik ayrışmasına ilişkin ulaşılan yayınlar ile ilgili özet açıklama ve bilgiler sunulmuştur.

Konu	Çalışmanın Başlığı	Yaş Aralığı	Yıl	Yayın Türü
Benlik Ayırışması	Evli Bireylerin Çift Uyumunda ve Psikolojik Belirtilerde Benlik Farklılaşması	20-60 yaş	2018	Makale
	Evliliğin İlişki Kalitesinin Benlik Yönünden Değerlendirmesi: Benlik Farklılaşmasında ve İlişki Özgünlüğü	18-63 yaş	2019	Makale
	Evli Bireylerde Erken Dönemdeki Uyumsuzluk Şemaları ve Benliğin Farklılaşmasının Evlilik İlişisini Yordaması	25-44 yaş	2021	Makale
	Romantik İlişkilerin Algılanan İstismarı: Şemalar, Cinsiyet Rollerini, Affetmenin Ve Benlik Farklılaşması	18 -40 yaş	2023	Doktora tezi
	Yetişkinlerdeki Çocukluk Çağı Travmaları, Benlik Farklılaşması Ve Psikolojik Sağlık Düzeyi	19-70 yaş	2023	YL tezi

Polat ve İlhan'ın (2018) yaptığı araştırmanın sonuçlarına göre, iç içe geçme ve duygusal tepkisellik alt boyutları ile çift uyumu arasında anlamlı düzeyde ilişki olmadığı saptanmıştır.

Kalkan ve Aydoğan'ın (2019) yaptığı çalışmada, farklılaşmış bir benlik yapısına sahip olmanın evlilik ilişkisi kalitesine olumlu katkı sağladığı ve başkalarına bağımlı olmak yerine ilişkilerde sağlıklı bir denge kurabilen, net ve özerk bir benlik yapısına olmanın kaliteli bir evlilik ilişkisi yaşama olasılıklarının artabileceği sonucuna ulaşmıştır. Çanakçı'nın (2023) çalışmasında benlik farklılaşmasının cinsiyete göre değiştiğini ve gelir düzeyinin de bu durumu etkilediği ve kişilerin çocukluk çağı travması ve benlik farklılaşması düzeyleri arasında negatif yönde anlamlı bir ilişki olduğu bulgusuna ulaşılmıştır.

Tönbül ve Kocayörük (2021) tarafından gerçekleştirilen çalışmada, evli bireylerde erken dönemki uyumsuz şemaların ve benliğin farklılaşma düzeylerinin evlilik ilişkisine ilişkin inançları nasıl etkilediği incelenmiştir ve evlilik ilişkisiyle ilgili akılcı olmayan inançların erken dönemdeki uyumsuz şema alanlarıyla pozitif yönde ve orta düzeyde ilişkili olduğu tespit edilmiştir. Bu bulgulara dayanarak, erken dönemdeki uyumsuz şemaların artmasıyla birlikte, evlilik ilişkisindeki akılcı olmayan inançların artma eğiliminde olduğu belirlenmiştir.

7. SONUÇ VE ÖNERİLER

Akcan ve Taşören'in (2020) çocukluk çağındaki olumsuz yaşantıların, öz-şefkatin ve duygu düzenleme becerilerinin genç yetişkinlerin depresyon belirtilerini etkilediği üzerine yaptıkları çalışma, bu faktörlerin depresyonla ilişkili olduğunu göstermiştir. Bulgulara göre, çocukluk

çağdaki olumsuz yaşantıların, duygu düzenlemeyle ilgili becerilerinin ve öz-şefkatteki eksikliğin depresyon belirtileriyle ilişkili olduğu ve ebeveyn tutumlarının, özellikle duygusal ihtiyaçların karşılanması, öz-şefkatin gelişimi ve duygu düzenleme becerilerine etkisinin önemini vurgulanmaktadır. Ebeveynlerin duygusal destek ve çocukların duygusal ihtiyaçlarını karşılamaya yönelik tutumları, ileriki dönemde bireylerin duygusal sağlığı ve depresyon belirtileriyle ilişkili olabilir. Bu bağlamda, duygusal ihtiyaçların dikkate alınması, duygusal düzenleme ve öz-şefkat becerilerinin geliştirilmesine yönelik önemli bir adımdır.

Ceylan'ın (2023) çalışmasında değerlendirilen diğer değişkenler arasında, toplumsal cinsiyet rolleri tutumları ile yüksek standartlar, zedelenmiş sınırlar ve diğeri yönelimlilik şema alanları arasında pozitif yönde anlamlı ilişki tespit edilmiştir. Kişiler arası affetme düzeyi ile pozitif yönde anlamlı ilişki saptanmıştır. Benliğin farklılaşması düzeyi ile anlamlı yönde ilişki bulunmamıştır. Ancak, benliğin farklılaşması ve kişilerarası affetme düzeyi arasında negatif yönlü anlamlı düzeyde ilişki bulunmuştur. Çatal ve Kalkan'ın (2019) çalışması, evlilik tipleri ve evlilik değerlerinin evlilik doyumunu anlamlı bir şekilde yordadığını göstermiştir. Geleneksel, ilişkisi özerk ve özerk evlilik tipleri ile bireylerin evlilik değerlerinin evlilik doyumunu etkilediği sonucuna varılmıştır.

Bu bağlamda, demokratik anne baba tutumu ve demokratik tutum düzeyinin evlilik doyumunu artırıcı etkisi göz önünde bulundurularak, aile içi iletişim ve ebeveyn tutumlarına dikkat edilmelidir. Ayrıca, bireyler arasındaki farklı şema alanları ile benlik farklılaşması ve affetme düzeyleri arasındaki ilişkilerin incelenmesi, bireylerin duygusal sağlığı ve ilişkisel dinamikler üzerinde derinlemesine anlayış sağlayabilir. Son olarak, evlilik tipleri ve evlilik değerlerinin evlilik doyumuna etkisi göz önünde bulundurularak, çiftler arasındaki uyum ve değer odaklı bir iletişim, sağlıklı bir evlilik ilişkisi için destekleyici olabilir.

Çanakçı'nın (2023) araştırması, benlik farklılaşmasının cinsiyete ve gelir düzeyine bağlı olarak değiştiğini ve çocukluk çağı travmasının benlik farklılaşması düzeyleriyle negatif yönde ilişkili olduğunu bulmuştur. Özellikle çocukluk döneminde yaşanan istismarın, benlik farklılaşmasının iç içe geçme boyutunu anlamlı şekilde etkilediği gözlemlenmiştir. Bu bulgular, çocukluk çağı travmalarının uzun vadeli etkilerinin fiziksel, zihinsel ve duygusal sorunlara yol açabileceği yönünde önemli bir göstergedir. Ayrıca, Tönbül ve Kocayörük'ün (2021) çalışması, erken dönem uyumsuz şemalar ile evlilik ilişkisine yönelik akılcı olmayan inançlar arasında pozitif yönlü ve orta düzeyde bir ilişki olduğunu ortaya koymuştur. Bu, erken dönem uyumsuz şemaların artmasıyla birlikte evlilik ilişkisine yönelik akılcı olmayan inançların da artabileceği fikrini desteklemektedir. Bu bağlamda, çocukluk çağı travmaları ile benlik farklılaşması

arasındaki ilişki ve erken dönem uyumsuz şemaların evlilik ilişkisi inançları üzerindeki etkisi, terapötik müdahalelerde dikkate alınmalıdır. Evlilik öncesi danışmanlık süreçlerinde, bu faktörlerin göz önünde bulundurulması, çiftlerin daha sağlıklı ve sürdürülebilir bir ilişki geliştirmelerine yardımcı olabilir. Ayrıca, bireylerin çocukluk çağı deneyimlerinin ve erken dönem şemalarının evlilik ilişkisine etkisi, psikolojik destek ve danışmanlık hizmetlerinin planlanması ve sunulması açısından önemlidir.

Alanyazın incelemesinde yurtdışı çalışmalarında özellikle 2015 öncesinde daha çok araştırma olduğu görülmektedir. Belirlenen tarih aralıklarındaki çalışmalara bakmak araştırmayı sınırlandırmıştır. Bu çalışmanın sonuçlarına dayanarak, gelecekteki araştırmaların aile dinamiklerini daha derinlemesine incelemeye odaklanması önerilebilir. Özellikle, ebeveyn tutumlarının çocukların bilişsel duygu düzenleme becerileri ve benlik ayrışması üzerindeki etkilerini daha fazla araştıran çalışmalara ihtiyaç vardır.

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ŞALVAR GÜREŞİ YAPMIŞ GENÇ GÜREŞÇİLERE UYGULANAN PLİOMETRİK ÇALIŞMALARIN SEÇİLMİŞ BAZI MOTOR BECERİLER ÜZERİNE AKUT ETKİSİ

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Özet

Yapmış olduğumuz çalışmamızın amacı, şalvar güreşi yapmış genç güreşçilere uygulanan pliometrik çalışmaların seçilmiş bazı motor beceriler (uzun atlama, esneklik, denge, çeviklik, 20 m) üzerine akut etkisinin araştırılmasıdır. Bu amaçla çalışmaya katılan şalvar güreşi yapmış 19 genç güreşçi randomize şekilde kontrol (n=9) ve deney (n=10) gruplarına ayrılmıştır. Deney grubu genel ısınmanın öncesinde ip atlama, squat, diz çekme, engel üzerinden yana atlama ve durarak uzun atlama gibi egzersizleri yaptıktan sonra ısınma egzersizlerini yaparak güreş çalışmasına geçtiler. Kontrol grubu ise sadece geleneksel güreş ısınma egzersizlerini yaparak güreş çalışmasına geçtiler. Verilerin analizinde SPSS 21.0 programından yararlanılmıştır. Normallik sınaması için Shapiro-Wilk testi uygulandı. İstatistiksel sonuçlar 0.05 anlamlılık düzeylerinde değerlendirildi. Grupların ön test ve son testleri arasındaki farkın analizi için Paired Sample T testi, gruplar arasındaki ön test ve son test farkın analizi için ise Independent Sample T testi kullanılmıştır. Veriler ortalama, standart sapma olarak sunuldu. Yapılan istatistiki değerlendirme sonucunda deney grubunun uzun atlama, esneklik ve 20 m ölçümlerinde son test lehine anlamlılık bulunurken ($p<0.05$), kontrol grubunun test değerlerinde anlamlılık tespit edilememiştir. Deney ve kontrol grubunun ön test değerleri karşılaştırılmasında anlamlılık bulunmazken, son test değerlerinde ise deney grubu lehine esneklik değerinde anlamlılık tespit edilmiştir. Sonuç olarak; şalvar güreşi yapmış genç güreşçilere antrenmandan önce uygulanan uyarıcı nitelikli egzersizlerin akut olarak bazı motor becerilerde olumlu yönde etkiler sağladığı bazı becerilerde ise bir olumlu ya da olumsuz etki göstermediği söylenebilir. Bundan sonra yapılacak olan çalışmalarda şalvar güreşi yapmış sporculara yönelik uygulanacak uyarıcı nitelikli antrenmanların daha geniş zamanı içerecek şekilde programlanması önerilebilir.

Anahtar Kelimeler: Motor beceri, pliometrik çalışma, şalvar güreşi

**ACUTE EFFECT OF PLYOMETRIC WORKS APPLIED TO YOUNG WRESTLERS
WHO PERFORMED SHALWAR WRESTLING ON SOME SELECTED MOTOR
SKILLS**

Abstract

The aim of our study is to investigate the acute effect of plyometric exercises applied to young wrestlers who have practiced shalwar wrestling on some selected motor skills (long jump, flexibility, balance, agility, 20 m). For this purpose, 19 young wrestlers who participated in the study and participated in shalwar wrestling were randomly divided into control (n = 9) and experimental (n = 10) groups. Before the general warm-up, the experimental group did exercises such as jumping rope, squats, knee pulls, sideways jumping over obstacles and standing long jump, and then they started wrestling by doing warm-up exercises. The control group moved on to wrestling training by doing only traditional wrestling warm-up exercises. SPSS 21.0 program was used to analyze the data. Shapiro-Wilk test was applied to test normality. Statistical results were evaluated at 0.05 significance levels. Paired Sample T test was used to analyze the difference between the pretest and posttest of the groups, and the Independent Sample T test was used to analyze the difference between the pretest and posttest between the groups. Data are presented as mean and standard deviation. As a result of the statistical evaluation, there was a significance in favor of the post-test in the long jump, flexibility and 20 m measurements of the experimental group ($p < 0.05$), while no significance was detected in the test values of the control group. While there was no significance in comparing the pre-test values of the experimental and control groups, a significance was detected in the flexibility value in favor of the experimental group in the post-test values. As a result; It can be said that the stimulating exercises applied to young wrestlers who have practiced shalwar wrestling before training have acute positive effects on some motor skills, and do not have a positive or negative effect on some skills. In future studies, it may be suggested that stimulating training sessions for athletes who have performed shalwar wrestling should be programmed to include a longer period of time.

Keywords: Motor skills, plyometric training, shalwar wrestling

Giriş

Güreş, iki güreşçinin ya da sporcuların boyutları belli olan özel yapılmış bir brandalı minder üzerinde, araç kullanmaksızın Dünya Güreş birliğinin belirlediği kurallara uygun biçimde teknik, beceri, kuvvet ve zekâlarını kullanarak birbirlerine üstünlük kurma mücadelesi olarak tanımlanır. Bu mücadele sırasında gereksinim duyulan enerji ihtiyacının karşılanması ve meydana gelen yorgunluğa karşı konulabilmesi için maksimum oranda vücut sistemlerinin çalışmasına da ihtiyaç duyulur. Böylece yapısal (antropometrik) ve fonksiyonel (fizyolojik) özellikler güreşte performansın önemli belirleyici kriterleri olarak ifade edilmektedir (Kürkçü ve ark., 2009). Güreş sadece rakibi yenmek için yapılan ayak tekniklerinden oluşan mücadele olmayıp aynı zamanda yüksek dayanıklılık (aerobik, anaerobik, solunum fonksiyonları), kuvvet, sürat, çabukluk, esneklik, denge, reaksiyon ve strateji gibi sportif performans ve kontrol gerektiren bir spordur (Akyüz ve ark., 2010).). Türklerin örf, adet, gelenek göreneklere içerisinde güreşin yeri her zaman ayrı tutulmuştur. Diğer taraftan Türkiye'nin hemen her bölgesinde birbirinden farklı karakucak güreşi, yağlı pehlivan güreşleri, şalvar güreşi, aba güreşi gibi güreş müsabakaları yapılmakta ve yarışmalar düzenlenmektedir (Özdamar, 1988; Demirci, 1999). Şalvar güreşi; ismini kıyafetinden alır. Ayrıca bu kıyafet, İslam öncesi Türk geleneğine dayanmaktadır. Şalvar güreşi keçi kılından sağlamca dokuma, diz kapağı üstünde şort uzunluğundaki giysiyle yapılan geleneksel bir güreştir (Türkmen ve Ark, 2011). Şalvar güreşinin diğer geleneksel güreşlere kıyasla minder güreşine en yakın güreş olduğu söylenebilir. Fakat şalvar güreşinde tüm hareketler ayakta icra edilir. Minder güreşinde uygulanan tek paça, şalvar oyunu, dış çangal, deve bağlama, gıcırı bağlama, boşa kaldırma, Karakucak, aşirtma, eşek bağdası, yan çangal, boşa kaldırma vb. oyunların tamamı ayakta yapılmaktadır. Bu nedenle pehlivanın göbeği ya da dizleri yere değdiği zaman müsabaka tekrar ayakta başlamaktadır. Mücadelede yenilgi, rakibin oyunu ile pehlivanın göbeğinin gökyüzünü görmesiyle oluşmaktadır. Ayrıca müsabaka sonunda rakibini yenen pehlivanın, yendiği güreşçi tarafından en az iki kişi ile güreş yapmadan şalvarı çıkarması yasaklanmıştır (İşler 1997).

Pliometrik antrenman, temel olarak patlayıcı kuvvet gerektiren durumlarda is gücünü artırmak için yapılan bir antrenman türüdür (Ergun ve Baltacı, 1997). Pliometrik çalışmalarda hedef, daha fazla elastik kuvvetle alakalı olmakla beraber kasın ekzantrik kasılmadan sonra, konsantrik kasılmada kısa sürede maksimum kuvvetin çok hızlı bir şekilde uygulanmasını meydana getirmektir. Bundan dolayı yüksek süratte bir kasılma ile kas-sinir sisteminin mukavemetinin aşılması sonucunda elastik kuvvet meydana getirir. Bu çalışma pozitif- negatif yönlü bir kuvvet çalışması olmakla birlikte, kinetik enerjiyi olabildiğince hızlı ve verimli bir

biçimde kullanmayı amaç edinir ve patlayıcı sıçrama kuvvetinin performansını artırır (Brown ve ark., 1986). Pliometrik antrenman, doruk kuvvet ile patlayıcı güç arasındaki ilişkiyi geliştirmektedir. Pliometrik antrenmanlar bugün süratli bir şekilde kuvvetin yerine getirilmesinde ve güç üretiminde çok etkili antrenman metodu olarak yaygın bir kullanıma sahiptir. Koşmaya, sıçramaya, sekmeye, atlamaya, yükselmeye ve fırlatmaya dayalı sporlarda pliometrik zorunlu bir antrenman olarak kullanılır hale gelmiştir (Yüksel, 2001). Pliometrik çalışmaların temel amacı öncelikle elastik kuvvetle alakalı olarak kısa zamanda büyük seviyede çabuk bir şekilde tatbik edilerek performansta kazanımlar elde etmektir.

MATERYAL VE METOT

Çalışma Dizayını

Bu çalışmaya, şalvar güreşi yapmış 19 genç güreşçi katılmış bu güreşçiler ise randomize şekilde kontrol (n=9) ve deney (n=10) gruplarına ayrılmıştır. Deney grubu genel ısınmanın öncesinde ip atlama, squat, diz çekme, engel üzerinden yana atlama ve durarak uzun atlama gibi egzersizleri yaptıktan sonra ısınma egzersizlerini yaparak güreş çalışmasına geçmiştir. Kontrol grubu ise sadece geleneksel güreş ısınma egzersizlerini yaparak güreş çalışmasına geçmiştir. Yapılan antrenman sonunda her iki grubun durarak uzun atlama, esneklik, denge, çeviklik ve 20 metre sürat test ölçümleri kayıt altına alınmıştır.

Performans Testleri

Durarak uzun atlama testinde mesafeyi belirlemek için mezura kullanılmıştır. Katılımcı, kollarını geriye alarak squat pozisyonunda ve her iki ayağı birbirine paralel olarak başlama çizgisinin gerisinde bekler. Daha sonra kollarını öne yukarı doğru hareket ettirerek sıçrar. Ayakları yerden ayrılır ayrılmaz bacaklarını büker ve kollarını öne doğru sallamaya devam eder. Katılımcı; ayakları paralel olarak, gövdesi bükülü ve kolları öne uzanmış olarak yere düşer. Durarak uzun atlama testinde, başlangıç çizgisi ile katılımcının çizgiye en yakın temas ettiği yer arasındaki mesafe, cm cinsinden ölçülmüştür. Test iki defa yapılmış ve iyi olan değer kaydedilmiştir. Esneklik ölçümü için; test sehpası; uzunluk 35 cm, genişlik 45 cm, yükseklik 32 cm olan Otur-Eriş testi esnekliğinin ölçülmesi için kullanıldı. Denekler ayak tabanlarını Otur-Eriş sehpasının kendilerine bakan yüzüne yerleştirdiler. Elleri ile sehpanın üzerine doğru dizlerini bükmeden ileri uzanabildiği kadar uzandılar ve 2 saniye sabit olarak beklediler. Uzanılabilen mesafe santimetre olarak kaydedildi (Karakaş, 2017). Araştırmaya katılan deneklerin denge ölçümleri Flamingo denge aleti ile ölçüldü. Denek, 50 cm. uzunluğunda, 4 cm. yüksekliğinde ve 3 cm. genişliğinde tahta bir denge aletin üzerine çıkarak 1 dk boyunca

dengede kalmaya çalıştı. Denge bozulduğunda (ayağını tutarken bırakırsa, tahtadan yere düşerse, vücudunun herhangi bir bölgesiyle yere dokunursa ve benzeri) süre-zaman durduruldu. Denek, denge aletine çıkarak dengesini tekrar sağladığında, süre kaldığı yerden devam etti. Bir dakika süreyle test bu şekilde devam etti. Süre tamamlandığında, araştırma grubunun her denge sağlama teşebbüsü (düşükten sonra) sayıldı ve bu sayı test bitiminde bir dakika süre tamamlandığında, araştırma grubunun puanı olarak kaydedildi (Deforche ve ark., 2003). Sporcuların çeviklik değerini ölçmek için Pro-agility çeviklik testi kullanılmıştır. Pro-agility çeviklik test alanı, başlangıç çizgisinin 4,57 m soluna ve sağına işaretlerin yerleştirilmesi şeklinde belirlenmiştir. Başlangıç çizgisine fotosel kapısı yerleştirilmiştir. Tekrarlı geçiş zamanları bu sayede alınabilmektedir. Teste başlamadan önce katılımcı başlangıç çizgisinde hazır hale gelir. Teste başladığında önce sağdaki işarete, sonra da soldaki işarete dokunarak başlangıç çizgisinden geçerek testi sonlandırır (Bayraktar, 2013; Özbay ve ark., 2018). Denekler, 20 m belirlenmiş alanda yüksek çıkış ile maksimal hız ile 20 m koşar. Koşulan süre sn cinsinden süreölçer ile kaydedilir. Çalışmaya katılanlara test iki defa tekrar edilerek en iyi sonuç kaydedilmiştir (Öktem ve Şentürk, 2017).

İstatistiksel Analiz

Araştırma sonunda elde edilen verilerin; tasnif edilmesinde ve yüzdeler farklarının hesaplanmasında Excel programı (Microsoft Office, sürüm 2013, Microsoft Corp., Redmond, WA, ABD), istatistiksel olarak analiz edilmesinde ise SPSS paket programı (SPSS for Windows, sürüm 22.0, SPSS Inc., Chicago, Illinois, ABD) kullanıldı. Veriler ortalama, standart sapma olarak sunuldu. Normallik sınaması için Shapiro-Wilk testi uygulandı. İstatistiksel sonuçlar 0.05 anlamlılık düzeylerinde değerlendirildi. Grupların ön test ve son testleri arasındaki farkın analizi için Paired Sample T testi, gruplar arasındaki ön test ve son test farkın analizi için ise Independent Sample T testi kullanılmıştır. Veriler ortalama, standart sapma olarak sunulmuştur.

BULGULAR

Tablo 1. Çalışmaya katılan grupların tanımlayıcı özellikleri

		N	Min,	Maks,	Ort,	SS
Deney Grubu	Yaş (yıl)	10	21,00	24,00	22,50	1,18
	Boy (cm)	10	1,67	1,82	1,74	0,050
	Kilo (kg)	10	65,00	95,00	76,10	9,62
Kontrol Grubu	Yaş (yıl)	9	21,00	25,00	22,67	1,32
	Boy (cm)	9	168,00	183,00	174,78	4,60
	Kilo (kg)	9	60,00	90,00	74,22	10,02

Tablo 2. Grupların ön test ve son test grup içi karşılaştırmaları

			Ort,	SS	p	
Deney grubu	Uzun Atlama	Ön Test	218,10	26,81	0,035*	
		Son Test	221,30	25,09		
	Esneklik	Ön Test	34,00	1,83	0,010*	
		Son Test	36,00	2,21		
	Denge	Ön Test	5,20	3,55	0,299	
		Son Test	4,70	3,37		
	Çeviklik	Ön Test	5,02	0,43	0,158	
		Son Test	4,89	0,36		
	20 metre	Ön Test	3,22	0,20	0,048*	
		Son Test	3,31	0,13		
	Kontrol Grubu	Uzun Atlama	Ön Test	223,11	14,60	0,182
			Son Test	227,00	9,87	
Esneklik		Ön Test	34,11	2,15	0,438	
		Son Test	33,44	2,74		
Denge		Ön Test	5,11	3,76	0,482	
		Son Test	4,67	2,40		
Çeviklik		Ön Test	4,88	0,20	0,566	
		Son Test	4,86	0,16		
20 metre		Ön Test	3,27	0,14	0,420	
		Son Test	3,29	0,09		

*(P<0,050)

Tablo 2’de deney grubunun ön test son test değerleri incelendiğinde uzun atlama, esneklik ve 20 m. değerlerinde son test lehinde istatistiksel açıdan anlamlılık bulunmuştur (p<0.05). Kontrol grubunun ön test son test değerleri incelendiğinde ise uzun atlama, esneklik, denge,

çeviklik ve 20 m. değerlerinde akut değerlendirmeye göre anlamlılık tespit edilememiştir ($p < 0.05$).

Tablo 3. Grupların ön test değerlerinin karşılaştırılması

	Grup	N	Ort,	SS	t	p
Uzun atlama	Kontrol Grubu	9	223,11	14,60	0,497	0,625
	Deney Grubu	10	218,10	26,81		
Esneklik	Kontrol Grubu	9	34,11	2,15	0,122	0,904
	Deney Grubu	10	34,00	1,83		
Denge	Kontrol Grubu	9	5,11	3,76	-,053	0,958
	Deney Grubu	10	5,20	3,55		
Çeviklik	Kontrol Grubu	9	4,88	0,20	-,937	0,362
	Deney Grubu	10	5,02	0,43		
20 metre	Kontrol Grubu	9	3,27	0,13	0,099	0,561
	Deney Grubu	10	3,22	0,20		

Tablo 3’de verilmiş olan istatistiksel analiz sonuçlarına göre grupların ön test değerlerinde uzun atlama, esneklik, denge, çeviklik ve 20 m. değerlerinde $p < 0.05$ düzeyinde anlamlılık olmadığı tespit edilmiştir.

Tablo 4. Grupların son test değerlerinin karşılaştırılması

	Grup	N	Ort,	SS	t	p
Uzun atlama	Kontrol Grubu	9	227,00	9,87	0,637	0,532
	Deney Grubu	10	221,30	25,09		
Esneklik	Kontrol Grubu	9	33,44	2,74	-2,246	0,032
	Deney Grubu	10	36,00	2,21		
Denge	Kontrol Grubu	9	4,67	2,40	-,025	0,981
	Deney Grubu	10	4,70	3,37		
Çeviklik	Kontrol Grubu	9	4,86	0,16	-,246	0,809
	Deney Grubu	10	4,89	0,36		
20 metre	Kontrol Grubu	9	3,29	0,09	-,391	0,701
	Deney Grubu	10	3,31	0,13		

Tablo 3’de verilmiş olan istatistiksel analiz sonuçlarına göre grupların son test değerlerinin kıyaslamasında esneklik değerlerinde $p < 0.05$ düzeyinde deney grubu lehine anlamlılık tespit edilirken, uzun atlama, denge, çeviklik ve 20 m. değerlerinde ise anlamlılık olmadığı ortaya çıkmıştır.

TARTIŞMA VE SONUÇ

Vücuttaki etki mekanizmalarına göre güreş; ağırlıklı olarak anaerobik enerji sisteminin kullanıldığı, sporcularda esneklik, hız, kuvvet ve dayanıklılık gibi fizyolojik özelliklerin gelişmesine olanak sağlayan spor dallarından birisi olarak bilinmektedir. Bu çalışmada şalvar güreşi yapmış genç güreşçilere uygulanan pliometrik çalışmaların seçilmiş bazı motor beceriler (uzun atlama, esneklik, denge, çeviklik, 20 m) üzerine akut etkisinin araştırılması amaçlanmıştır. Ortaya çıkan sonuçlara göre deney grubunun durarak uzun atlama, esneklik ve 20 metre sürat değerlerinde son test lehinde anlamlılık bulunurken ($p<0.05$), denge ve çeviklik değerlerinde iyileşmeler olsa da anlamlılık ortaya çıkmamıştır. Kontrol grubunun test değerlerine de herhangi bir anlamlılık tespit edilmemiştir. Gruplar arasındaki ön test değerleri karşılaştırılmasında anlamlılık bulunmazken son test değerleri karşılaştırılmasında deney grubu lehine esneklik değerlerinde anlamlılık tespit edilmiştir ($p<0,05$).

Gerçekleştirilen bir çalışmada 15-16 yaş güreşçilerin durarak uzun atlama değerleri 219 ± 15.84 cm ve 17-18 yaş grubu güreşçilerin ise 220.73 ± 16.06 cm olduğu tespit edilmiştir (Aydos ve Kürkçü 1997). 12-14 yaşındaki güreşçiler üzerine yapılan bir araştırmada uzun atlama değeri ön test ölçümünde 194,10 cm ve 8 haftalık çalışmanın sonrasındaki ölçümde ise 198,00 cm olarak bulunmuştur (Bağcı 2016). Durarak uzun atlama sonuçları 14 yaş grubu güreşçilerde 181,94 cm, 15 yaş grubu güreşçilerde 197,95 cm olduğu belirtilmektedir (Bayraktar ve ark., 2012). Müsabakalarda ve çalışmalarda karmaşık beceriler gerektiren güreşte başarılı olmak için esnekliğin de önemli bir faktör olduğu kaçınılmaz bir gerçektir. Esneklik becerisi iyi olan güreşçi geniş orandaki hareketlerin uygulanmasında ve tekniklerin tatbik edilmesinde pozitif avantaja sahip olarak görülmektedir. Güreşte tüm sezonda gerçekleştirilen çalışmalarda güreşçilerin tüm performans öğelerinde olduğu gibi esnekliğin de yüksek değerde olması amacı güdülmektedir (Cicioğlu ve ark. 2007). Güreş çalışmalarına ilave olarak gerçekleştirilen esneklik antrenmanları güreşçilere daha geniş olarak hareket edebilme olanağı sağlamaktadır. Yapılan bir akademik çalışmada genç güreşçilerin esneklik değeri $29,8\pm 5$ cm olduğu ortaya çıkmıştır (Baykuş, 1989). Ümit milli takım düzeyinde müsabık 18 güreşçinin esneklik değeri $31,8\pm 6$ cm olduğu ortaya çıkmıştır (Ziyagil,1991). Başka bir araştırmada 17-18 yaşında olan ve serbest güreş milli takım sporcusu 32 güreşçinin esneklikleri $36,4\pm 5$ cm olduğu tespit edilmiştir (Şahin,2000).

Farklı branşlardaki sporcuların denge performansları karşılaştırılmış boy uzunluğu arttıkça dominant ve nondominant statik denge skorlarının arttığı yani, kısa boylu sporcuların

dengelerini sağlamada daha başarılı oldukları tespit edilmiştir (Erkmen ve ark., 2007). Era ve arkadaşları (1996) tarafından yapılan bir araştırmada vücut ağırlığı arttıkça statik denge skorlarının da arttığı, vücut ağırlığının artmasının denge performansını olumsuz yönde etkilediği belirlenmiştir. Genç elit güreşçilerin fiziksel ve fizyolojik özelliklerinin karşılaştırılmasının yapıldığı bir çalışmada güreşçilerin çeviklik özelliklerini belirlemek için illionis çeviklik testi uygulanmış, milli takıma seçilen güreşçilerin çeviklik test ortalaması $16,3 \pm 0,6$ olduğu, milli takıma seçilmeyen güreşçilerin çeviklik test ortalaması $17,0 \pm 0,9$ olduğu bulunmuştur (Demirkan ve ark., 2012). İri, Engin ve Aktuğ (2018) tarafından yapılan bir araştırmada güreşçi çocuklara uygulanan 8 haftalık denge antrenmanlarının statik-dinamik denge, çeviklik ve sürat performansına etkisi araştırılmıştır. Çalışmanın neticesinde 8 haftalık denge antrenmanlarının vücut yağ yüzdelerinde azalma, statik-dinamik denge ve çeviklik performanslarında artış sağladığı belirtilmiştir.

Çabuk kuvvet antrenmanları öncesinde 16-17 yaşındaki güreşçilerin 20 metre sürat koşusu değerleri, deney grubu 2,85 sn, antrenman sonrası 2,78 sn, kontrol grubu antrenman öncesi 2,87 sn, antrenman sonrası 2,91 sn olarak tespit edilmiştir (Gökdemir ve ark., 1999). Güreşçilere 12 hafta antrenman programı uygulandıktan sonra 20 metre koşu değerleri antrenman programı öncesinde 2,76 sn antrenman sonrası ise 3,71 sn olarak tespit edilmiştir (Kürkçü ve ark., 2009). Kılıç, tarafından 14–16 yaşındaki güreşçilere çabuk kuvvet antrenmanı uygulanmış ve 20 m koşu test sonuçları çalışma grubu antrenman öncesi 3.48 sn, antrenman sonrası 3.39 sn, kontrol grubunun antrenman öncesi 3.61 sn, antrenman sonrası 3.49 sn olarak tespit edilmiştir.

ÖNERİLER

Geleneksel güreşler arasında yer alan şalvar güreşi modern güreşlere en yakın özellikte bir güreştir. Dolayısıyla şalvar güreşindeki elde edilecek fiziksel ve psikolojik kazanımlar modern güreş müsabakalarında da sporculara büyük katkılar sağlayacaktır. Şalvar güreşi yapmış güreşçiler üzerinde yapmış olduğumuz bu çalışmada akut olarak sporculara uygulanan pliometrik çalışmaların deney grubunun bazı motorik beceriler üzerine olumlu katkılar sağladığı söylenebilir.

Çalışmada elde edilen sonuçlara göre antrenör ve sporcuların içerisinde birçok motorik özelliği barındıran güreşte bu özelliklerin geliştirilmesi ve müsabakalarda başarının sağlanabilmesi için antrenman planlamalarına pliometrik çalışmaları da dahil etmenin sporcuların başarıları üzerinde olumlu sonuçlar ortaya çıkarabileceği düşünülmektedir.

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GENÇ BAYANLARA UYGULANAN 8 HAFTALIK TEMEL HAREKET EĞİTİMİ ATLETİK PERFORMANSI ETKİLER Mİ?

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Özet

Çalışmada daha önce spor yapmamış genç bayanlara uygulanan 8 haftalık temel hareket eğitiminin atletik performansı etkileyip etkilemediğini belirleme amaçlanmıştır. Araştırmaya deney grubu n=14 (yaş 18,36) kontrol grubu n=13 (yaş 19,15) olarak iki grup dâhil edilmiştir. Deney grubuna 8 hafta boyunca haftada 2 gün olacak şekilde belirlenmiş temel hareket eğitimlerini içeren antrenman programı uygulanmış, kontrol grubuna ise herhangi bir antrenman programı uygulanmamıştır. Atletik performans değerlerini belirlemek için şınav, mekik, esneklik, uzun atlama, çeviklik ve 20 metre değerleri ölçümleri yapılmıştır. Verilerin analiz edilmesinde SPSS 21.0 programı kullanılmıştır. Yapılan istatistiksel değerlendirme sonucunda deney grubunun ön test son test değerlendirmesinde son test lehine şınav, mekik, uzun atlama, çeviklik ve 20 metre değerlerinde anlamlılık tespit edilmiştir. Kontrol grubu değerlerinde ise ön test son test değerleri arasında herhangi bir anlamlılık olmadığı tespit edilmiştir. Grupların ön test değerleri arasında herhangi bir anlamlılık tespit edilmemiştir. Grupların son test değerlerinin kıyaslanmasında ise deney grubunun grup ortalamalarının kontrol grubunun ortalamalarına göre daha iyi olduğu fakat gruplar arasında istatistiksel olarak anlamlılık olmadığı tespit edilmiştir. Sonuç olarak; genç bayanlara uygulanan temel hareket eğitimleri atletik performansı olumlu yönde etkilediği söylenebilir. Bundan sonra yapılacak çalışmalarda uygulanacak olan temel hareketlerin daha çeşitli olarak belirlenmesi, yüklenmelerin giderek artırılması ve hareket eğitiminin daha uzun süre uygulanmasının sonuçlara daha fazla etki yapacağı düşünülmektedir.

Anahtar kelimeler: Atletik performans, genç bayan, temel hareket

**DOES 8 WEEKS BASIC MOVEMENT TRAINING APPLIED TO YOUNG WOMEN
AFFECT ATHLETIC PERFORMANCE?**

Abstract

The aim of the study was to determine whether 8-week basic movement training applied to young women who had never done sports before affected athletic performance. Two groups were included in the research: experimental group n=14 (age 18.36) and control group n=13 (age 19.15). A training program containing basic movement training was applied to the experimental group 2 days a week for 8 weeks, while no training program was applied to the control group. To determine athletic performance values, push-up, shuttle, flexibility, long jump, agility and 20 meter values were measured. SPSS 21.0 program was used to analyze the data. As a result of the statistical evaluation, in the pre-test post-test evaluation of the experimental group, a significance was determined in the values of push-ups, sit-ups, long jump, agility and 20 meters in favor of the post-test. In the control group values, it was determined that there was no significance between the pre-test and post-test values. No significance was detected between the pre-test values of the groups. When comparing the post-test values of the groups, it was determined that the group averages of the experimental group were better than the averages of the control group, but there was no statistical significance between the groups. As a result; It can be said that basic movement training applied to young women positively affects athletic performance. It is thought that determining more variety of basic movements to be applied in future studies, gradually increasing the loads and applying movement training for a longer period of time will have a greater impact on the results.

Keywords: Athletic performance, young woman, basic movement

Giriş

Hareket insanoğlunun yaşamında en temel özellik olarak yer almasının yanında insanlara oldukça büyük katkılarda sağlamaktadır. Bireylerin sağlıklı olması, sağlığını koruması ve temel ihtiyaçlarını karşılaması için harekete ihtiyaç duyulmaktadır. Teknolojinin gelişmesiyle birlikte insanoğlunun hayatında olumlu gelişmeler olmasıyla birlikte olumsuz etkiler de ortaya çıkmaktadır. Bu olumsuz etkilerin başında ise hareketsizlik yer almaktadır. Küçük yaşlarda itibaren bireyler teknolojik cihazlarla iç içe hayat sürmekte, günün büyük bölümünü telefon, tablet ve bilgisayar gibi elektronik cihazlar başında geçirmektedir.

Hareket eğitimi günümüzde oldukça önemli bir yere sahiptir. Çağımızda önemli yere sahip olan bu hareket eğitiminin farklı tanımlamaları da yapılmıştır. Hareket eğitimi; paylaşma, duyguları ifade etme, bireysel amaç ve hedef belirlemeyi öte yandan bireyin bir şeylerden yada birilerinden bağımsız olarak hareket etme duygusunu kazanmak için birden fazla olanaklar sağlamaktadır. Hareket eğitimi; gündelik hayat ve fiziksel olarak aktif yaşamayı ifade etmektedir (Tüfekçioğlu, 2003). Hareket eğitiminin eğitime küçük yaşlarda başlanması gerekmektedir. Bireylerin gündelik stresten uzaklaşması, başkalarıyla paylaşmayı öğrenmesi, daha etkin ve verimli düşünmesinin yanında hareket tepkisinin de kazanılması için tercih edilecek bir yöntemdir. Hareket eğitiminin temel amacı esas olarak, bireylerin kendi bedenini tanıması, bedenini etkili ve verimli olarak kullanması, kendisinde bulunan kapasiteyi arttırması, koordinasyonunu geliştirilmesi, dayanıklılık ve kuvvet gibi fiziksel özelliklerinin arttırılmasıdır. Diğer taraftan ise temel hareketin en temel amacı, bireylerin yaşamı süresince düzenli olarak fiziksel çalışmalara katılım sağlaması ve bireyin benliğindeki gelişimine paralel olarak zihinsel ve toplumsal olarak da gelişimlerine katkı sağlamaktır. Erken çocukluk döneminde kazanılan temel devinim becerileri, gelecek dönemdeki bireylerin fiziksel çalışmalara da etkili bir şekilde katılmasına olanak sağlamaktadır (Gallahue, 1982). Bireylere uygulanacak hareket eğitimi planlaması yapılırken mevcut grup özelliklerinin bilhassa göz önüne alınması gerekmektedir (Özer, 2000).

Hareket eğitimi uygulamalarında hedeflenen noktalara varılabilmesi için çalışmaları yapacak kişilerin bazı önemli noktalara dikkat etmesi kaçınılmazdır (Kırıcı, 2008).

- Çalışmaları uygulayacak bireylerin mutlaka öğretim yöntemlerine hâkim olması gerekmektedir.
- Çalışmaların uygulanacağı grubun sayıyı makul düzeyde olması gerekmektedir.

- Çalışmaya katılan her bireyin farklı olabileceği düşüncesi dikkate alınarak öğretilen becerilerin bireylerin öğrenme seviyesine ve düzeyine uygun hale getirilmesi gerekmektedir.

Bireylerdeki mevcut olan motor gelişim, vücudun kontrolünü ve koordinasyonunu ifade etmektedir. Bu gelişim ise temel hareketlerin temelini meydana getirmektedir. Söz konusu hareketler ise, sıçrama, koşma, tırmanma, takla atma, yakalama gibi hareketler olarak karşımıza çıkmaktadır. Bireylerde ortaya çıkacak becerilerin geliştirilmesi ve öğrenilmesi hareket eğitimi çalışmalarının temelini oluşturmaktadır. Hareket eğitimi çalışmaları içerisinde bireylerde bütünsel olarak gelişim olanağı sağlanabilir. Bireylerdeki kazanılan beceriler onların çalışmalardan zevk almasına ve grup adaptasyonunu oldukça kolay bir şekilde elde etmesine katkı sağlamaktadır. Bireylerin kazanmış oldukları beceriler oluşabilecek boş zamanlarını değerlendirmesi ve boş zamanlarını nasıl kullanacaklarını bilmesinin neticesinde yaşam biçimlerinin de etkilenmesine olanak sağlamaktadır (Aracı, 2004).

MATERYAL VE METOT

Çalışma Dizaynı

Çalışmamıza daha önce spor yapmamış 27 genç bayan katılmış, bu bayanlar ise randomize bir deney (n:14) grubu ve kontrol (n:13) grubu olarak gruplara ayrılmıştır. Deney grubu uyarlanmış 8 haftalık haftada 2 gün olacak şekilde temel hareket antrenman programı uygulanmış, kontrol grubuna ise herhangi bir çalışma programı uygulanmamış bireyler rutin yaşamlarına devam etmiştir. Bireylerin atletik performans değerlerini belirlemek için şınav, mekik, esneklik, durarak uzun atlama, çeviklik ve 20 metre değerleri ölçümleri yapılarak kayıt altına alınmıştır.

Tablo 1. Temel hareket antrenman programı

1. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)		40 dakika yürüme, koşma, zıplama, kayma adımları, galop hareketleri çalışması
2. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)	10 Dakika önceki ders tekrarı	30 eğilme, esnetme, bükülme, çekme, dönme, itme ve çekme hareketleri çalışması
3. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)	10 Dakika önceki ders tekrarı	30 dakika öne ve geriye toplu takla hareketleri çalışması
4. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)	10 Dakika önceki ders tekrarı	30 dakika şınav, mekik, squat, plank hareketi çalışması
5. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)	10 Dakika önceki ders tekrarı	30 dakika pliometrik (squat jump, split squat jump, tuck jumps, bounding) çalışmaları
6. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)	10 Dakika önceki ders tekrarı	30 dakika Denge hareketleri çalışması
7. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)	10 Dakika önceki ders tekrarı	30 dakika Kısa mesafe koşu çalışması
8. Hafta	10 dakika ısınma koşusu	10 dakika hayvan yürüyüşleri (ayı yürüyüşü, yengeç yürüyüşü, ördek yürüyüşü, timsah yürüyüşü, kedi yürüyüşü, kanguru zıplaması, kurbağa hareketi, tırtıl hareketi, fil yürüyüşü)	10 Dakika önceki ders tekrarı	30 dakika Şınav, mekik, squat, plank, burpee hareketleri çalışması

Performans Testleri

Sporcuların 30 sn mekik testi için 1/1000 hassasiyetli el kronometresi kullanıldı. Sporculara, sırt üstü yatar durumda, dizler bükülü, eller ensede ve ayak tabanları yere temasta iken başla komutuyla 30 sn süreyle tekrar edebildikleri kadar mekik yaptırıldı. Mekik çekme esnasında ayakların yerden temasının kesilmemesi için ayaklar tutuldu ve test başlamadan önce her deneğe bir deneme yaptırıldı. Sporcuların yere yattıklarında omuzlarının yere, doğrulduklarında ise dirseklerinin dizlerine değmesine dikkat edildi, 30 saniye içerisinde tekrar edebildiği mekik sayısı kaydedildi (Pekel, 2007). Sporcuların 30 sn şınav testi için 1/1000 hassasiyetli el kronometresi kullanıldı. Sporculara, başla komutuyla 30 sn süreyle şınav yaptırıldı. Sporcular yere uzanmış vaziyette yüzleri yere bakacak şekilde, ayaklar dizlerden gergin ve diz yere temas etmeden gergin vaziyette vücut ağırlığı ayakuçları ile kollar üzerinde iken vücutlarını kaldırıp indirerek yapıldı. 30 saniye içerisinde tekrar edebildiği şınav sayısı kaydedildi (Pekel, 2007). Esneklik ölçümü için; test sehpası; uzunluk 35 cm, genişlik 45 cm, yükseklik 32 cm olan Otur-Eriş testi esnekliğinin ölçülmesi için kullanıldı. Denekler ayak tabanlarını Otur-Eriş sehпасının kendilerine bakan yüzüne yerleştirdiler. Elleri ile sehpanın üzerine doğru dizlerini bükmeden ileri uzanabildiği kadar uzandılar ve 2 saniye sabit olarak beklediler. Uzanılabilen mesafe santimetre olarak kaydedildi (Karakaş, 2017).

Durarak uzun atlama testinde mesafeyi belirlemek için mezura kullanılmıştır. Katılımcı, kollarını geriye alarak squat pozisyonunda ve her iki ayağı birbirine paralel olarak başlama çizgisinin gerisinde bekler. Daha sonra kollarını öne yukarı doğru hareket ettirerek sıçrar. Ayakları yerden ayrılır ayrılmaz bacaklarını büker ve kollarını öne doğru sallamaya devam eder. Katılımcı; ayakları paralel olarak, gövdesi bükülü ve kolları öne uzanmış olarak yere düşer. Durarak uzun atlama testinde, başlangıç çizgisi ile katılımcının çizgiye en yakın temas ettiği yer arasındaki mesafe, cm cinsinden ölçülmüştür. Test iki defa yapılmış ve iyi olan değer kaydedilmiştir. Sporcuların çeviklik değerini ölçmek için Pro-agility çeviklik testi kullanılmıştır. Pro-agility çeviklik test alanı, başlangıç çizgisinin 4,57 m soluna ve sağına işaretlerin yerleştirilmesi şeklinde belirlenmiştir. Başlangıç çizgisine fotosel kapısı yerleştirilmiştir. Tekrarlı geçiş zamanları bu sayede alınabilmiştir. Teste başlamadan önce katılımcı başlangıç çizgisinde hazır hale gelir. Teste başladığında önce sağdaki işarete, sonra da soldaki işarete dokunarak başlangıç çizgisinden geçerek testi sonlandırır (Bayraktar, 2013; Özbay ve ark., 2018). Denekler, 20 m belirlenmiş alanda yüksek çıkış ile maksimal hız ile 20 m koşar. Koşulan süre sn cinsinden süreölçer ile kaydedilir. Çalışmaya katılanlara test iki defa tekrar edilerek en iyi sonuç kaydedilmiştir (Öktem ve Şentürk, 2017).

İstatistiksel Analiz

Araştırma sonunda elde edilen verilerin; tasnif edilmesinde ve yüzdelik farkların hesaplanmasında Excel programı (Microsoft Office, sürüm 2013, Microsoft Corp., Redmond, WA, ABD), istatistiksel olarak analiz edilmesinde ise SPSS paket programı (SPSS for Windows, sürüm 22.0, SPSS Inc., Chicago, Illinois, ABD) kullanıldı. Veriler ortalama, standart sapma olarak sunuldu. Normallik sınaması için Shapiro-Wilk testi uygulandı. İstatistiksel sonuçlar 0.05 anlamlılık düzeylerinde değerlendirildi. Grupların ön test ve son testleri arasındaki farkın analizi için Paired Sample T testi, gruplar arasındaki ön test ve son test farkın analizi için ise Independent Sample T testi kullanılmıştır. Veriler ortalama, standart sapma olarak sunulmuştur.

BULGULAR

Tablo 1. Çalışmaya katılan grupların tanımlayıcı özellikleri

		N	Min,	Maks,	Ort,	SS
Deney Grubu	Yaş (yıl)	14	18,00	20,00	18,36	0,63
	Boy (cm)	14	158,00	173,00	164,29	4,36
	Kilo (kg)	14	46,00	65,00	55,64	4,89
Kontrol Grubu	Yaş (yıl)	13	18,00	21,00	19,15	0,99
	Boy (cm)	13	158,00	177,00	166,31	5,41
	Kilo (kg)	13	49,00	63,00	56,08	4,82

Tablo 2. Grupların ön test ve son test grup içi karşılaştırmaları

			Ort,	SS	t	p
Deney grubu	Şınav (adet)	Ön Test	23,71	9,53	-3,686	0,003*
		Son Test	27,14	8,59		
	Mekik (adet)	Ön Test	23,43	8,15	-3,733	0,003*
		Son Test	26,07	7,24		
	Esneklik (cm)	Ön Test	31,29	6,17	-2,084	0,057
		Son Test	32,64	6,74		
	Uzun atlama (cm)	Ön Test	176,07	22,93	-4,855	0,001*
		Son Test	184,93	22,79		
	Çeviklik (sn)	Ön Test	5,78	0,42	4,212	0,001*
		Son Test	5,63	0,40		
	20 Metre (sn)	Ön Test	4,84	0,49	4,014	0,001*
		Son Test	4,75	0,48		
Kontrol Grubu	Şınav (adet)	Ön Test	24,77	6,51	1,617	0,132
		Son Test	23,23	6,00		
	Mekik (adet)	Ön Test	25,77	4,62	1,760	0,104
		Son Test	25,15	4,58		
	Esneklik (cm)	Ön Test	32,15	3,91	,331	0,746
		Son Test	32,00	4,10		
	Uzun atlama (cm)	Ön Test	186,62	13,29	2,133	0,054
		Son Test	175,38	19,05		
	Çeviklik (sn)	Ön Test	5,44	0,36	-1,079	0,302
		Son Test	5,58	0,40		
	20 Metre (sn)	Ön Test	4,94	0,42	-1,202	0,253
		Son Test	5,13	0,57		

*(P<0,050)

Tablo 2’de deney grubunun ön test son test değerleri incelendiğinde şınav, mekik, uzun atlama, çeviklik ve 20 metre değerlerinde son test lehinde istatistiksel açıdan anlamlılık bulunmuş (p<0.05), esneklik değerlerinde ise anlamlılık bulunamamıştır. Kontrol grubunun ön test son test değerleri incelendiğinde ise şınav, mekik, esneklik, uzun atlama, çeviklik ve 20 metre değerlerinde anlamlılık tespit edilememiştir (p<0.05).

Tablo 3. Grupların ön test değerlerinin karşılaştırılması

	Grup	N	Ort.	SS	t	p
Mekik (adet)	Deney	14	23,71	9,53	-,333	0,742
	Kontrol	13	24,77	6,51		
Şınav (adet)	Deney	14	23,43	8,15	-,908	0,373
	Kontrol	13	25,77	4,62		
Esneklik (cm)	Deney	14	31,29	6,17	-,433	0,669
	Kontrol	13	32,15	3,91		
Uzun atlama (cm)	Deney	14	176,07	22,93	-1,446	0,161
	Kontrol	13	186,62	13,29		
Çeviklik (sn)	Deney	14	5,44	0,36	2,231	0,035*
	Kontrol	13	5,78	0,42		
20 Metre (sn)	Deney	14	4,84	0,49	-,531	0,600
	Kontrol	13	4,94	0,42		

Tablo 3’de verilmiş olan istatistiksel analiz sonuçlarına göre grupların ön test değerlerinde deney grubunun lehine çeviklik değerinde $p < 0.05$ düzeyinde anlamlılık olduğu, şınav mekik, esneklik, uzun atlama ve 20 değerlerinde ise anlamlılık olmadığı görülmektedir.

Tablo 4. Grupların son test değerlerinin karşılaştırılması

	Grup	N	Ort.	SS	t	p
Mekik (adet)	Deney	14	26,07	7,24	1,361	0,186
	Kontrol	13	25,15	4,58		
Şınav (adet)	Deney	14	27,14	8,592	0,390	0,700
	Kontrol	13	23,23	6,00		
Esneklik (cm)	Deney	14	32,64	6,74	0,296	0,769
	Kontrol	13	32,00	4,10		
Uzun atlama (cm)	Deney	14	184,93	22,79	1,176	0,251
	Kontrol	13	175,38	19,05		
Çeviklik (sn)	Deney	14	5,58	0,40	0,335	0,741
	Kontrol	13	5,63	0,40		
20 Metre (sn)	Deney	14	4,75	0,48	-1,895	0,070
	Kontrol	13	5,13	0,57		

Tablo 3’de verilmiş olan istatistiksel analiz sonuçlarına göre grupların son test değerlerinin kıyaslamasında şınav, mekik, esneklik, uzun atlama, çeviklik ve 20 metre değerlerinde ortalama olarak deney grubunun kontrol grubuna göre daha iyi sonuçlara sahip olduğu, ancak gruplar arasında herhangi bir anlamlılık olmadığı görülmektedir.

TARTIŞMA VE SONUÇ

Temel hareket eğitimi, hareketlerin keşfedilerek üretilmesi veya ortaya çıkarılması olarak tanımlanmaktadır (Kuruoğlu 2016). Dikkatin sağlanması, düşüncenin belirli bir noktaya odaklanması gibi temel yeteneklerin gelişimi için kullanılan bir yöntemdir. Bu bilgiler ışığında çalışmamızda genç bayanlara uygulanan 8 haftalık temel hareket eğitiminin atletik performansa (şınava, mekik, esneklik, uzun atlama, çeviklik ve 20 metre) olan etkilerinin belirlenmesi amaçlanmıştır. Elde edilen sonuçlara göre deney grubu ön test son test değerlendirmesinde son test lehine şınava, mekik, uzun atlama, çeviklik ve 20 metre değerlerinde anlamlılık olduğu ortaya çıkmıştır ($p < 0.05$) tespit edilmiştir. Gruplar arası son test değerlerinin kıyaslanmasında ise deney grubunun grup ortalamalarının kontrol grubunun ortalamalarına göre daha iyi olduğu fakat gruplar arasında istatistiksel olarak anlamlılık olmadığı tespit edilmiştir.

Kız yüzücüler üzerinde yapılan bir araştırmada, denek grubu ön test dikey sıçrama (cm) ortalaması $25,104 \pm 3,35762$, esneklik ortalaması $162,000 \pm 9,08295$, 20 metre sürat (sn) ortalaması $4,226 \pm 0,26255$, denek grubu son test dikey sıçrama (cm) ortalaması $24,488 \pm 4,08437$, esneklik ortalaması $159,000 \pm 4,18330$, 20 metre sürat (sn) ortalaması $4,072 \pm 0,25696$ olarak tespit edilmiştir (Kuruoğlu, 2016). Yapılan bir çalışmada dikey sıçrama ortalamaları $18,03 \pm 5,28$, 20 metre sürat ortalamaları ise $4,47 \pm 0,94$ olarak bulunmuştur (Ayan ve ark., 2008).

Temel hareket eğitimi deney grubu ön ve son test durarak uzun atlama, dinamik denge, statik denge sol, çabukluk parametrelerinde istatistiksel açıdan anlamlı farklılık olduğu tespit edilmiştir (Yıldırım, 2023). Gerçekleştirilen bir çalışmada durarak uzun atlama performansı açısından özel beden eğitimi uygulayan grup lehine anlamlı fark ($p < 0,05$) tespit etmiştir (Şen, 2004). Yapılan bir araştırmada deney ve kontrol grubunun sabit uzun atlama puanlarının deney öncesinden deney sonrasına anlamlı bir farklılık gösterdiğini bulmuştur (Şen, 2004). Hareket eğitimi uygulaması ile gerçekleştirilen bir çalışmada, uygulanan hareket eğitimi programı ile katılımcıların motor becerileri arasındaki ilişki incelenmiş ve sonuç olarak, deneysel grubu çabukluk değerlerinde son test lehine anlamlılık olduğu tespit edilmiştir (Özbar, 2007). Akgün (2019)'nün yapmış olduğu çalışmada, planlı bir hareket eğitimi uygulamasını 8 hafta süresince sürdürmüş ve ön test son test karşılaştırmalarında, hareket eğitimi alan grupta çabukluk becerisi de dâhil olmak üzere birçok motor becerinin iyileştiği, geliştiği saptanmıştır sonucuna ulaşmıştır (Akgün, 2019). 6-8 yaşlarındaki siyah ve beyaz çocuğa esneklik, çeviklik, uzun atlama ve koşu testleri uygulanan bir çalışmada; çeviklik, uzun atlama ve koşu performansının

yaşla birlikte arttığını, esneklik performansının ise yaşla birlikte azaldığını belirlemiştir (Milne ve ark., 1976).

ÖNERİLER

Temel hareket eğitimi çocukluk çağında itibaren bireylere uygulanmakta ileri yaşlardaki bazı temel becerilerin kazanılmasına katkı sağlamak için tercih edilmektedir. Geçmiş dönemde temel hareket eğitimi almamış bireylere ilerleyen dönemlerde verilecek temel hareket eğitimlerinin de bazı atletik performansı olumlu yönde etkileyeceği düşünülmektedir. Performansta ortaya çıkan olumlu sonuçlar neticesinde bireyler arasında sağlıklı olmak ve sağlığı korumak için temel hareket eğitimini tercih edilmesinde zamanının geç olmadığı her yaşta yapılan çalışmaların katkılarının olacağına farkına varmalarının sağlanması gerektiği önerilebilir. Yapılacak çalışmalarda eğitimlerin 8 haftalık sürenin uzatılması (10-12 hafta) gibi gelişimler daha fazla olabilir. Çalışmalara katılım sayısının artırılmasıyla daha kapsamlı sonuçlar ortaya çıkabilir. Çalışma programlarının haftada iki günden fazla planlanması yapılabilir. Yapılacak çalışmalarda içeriğin geliştirilerek planlanması sonucunda atletik performans üzerine oluşabilecek etkilerine bakılabilir.

Bireylerin bazı temel becerileri elde edebilmesi için küçük yaşlarda temel hareket eğitimi alması sağlanması, bu eğitimi almamış olsa bile ilerleyen dönemlerde bu eğitime tabi tutularak bu temel becerilerin kazanılması sağlanabilir.

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**VERİ ODAKLI HALKLA İLİŞKİLER:
BÜYÜK VERİ ANALİTİĞİ VE ÖLÇÜMLEME YÖNTEMLERİNİN ROLÜ**

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Özet

Günümüzün hızla dijitalleşen dünyasında, iletişim stratejileri giderek karmaşıklaşmakta ve geleneksel yöntemlerin ötesine geçmektedir. Bu ortamda, halkla ilişkilerin temel dinamikleri de evrilmekte ve Veri Odaklı Halkla İlişkiler bu dönüşümün öncüsü olarak öne çıkmaktadır. Geleneksel halkla ilişkiler stratejilerinden ayrılan bu yaklaşım, veri ve analitik kullanımını merkeze alarak iletişim kampanyalarının şekillenmesinde yeni bir perspektif sunmaktadır. Bu perspektifin kritik önemini anlamak, günümüzün halkla ilişkiler profesyonelleri için vazgeçilmezdir. Veriye dayalı halkla ilişkiler, işletmelerin daha etkili iletişim sağlaması ve hedef kitleleri daha iyi anlaması için güçlü bir araç olarak öne çıkmaktadır. Bu yaklaşım, günümüzün veri odaklı iş dünyasında önemli bir rol oynamakta ve başarılı iletişim stratejilerinin temelini oluşturmaktadır. Veriye dayalı halkla ilişkiler, halkla ilişkiler kampanyalarını ve faaliyetlerini optimize etmek amacıyla veri ve analitik yöntemlerin kullanılmasını ifade etmektedir. Bu stratejik yaklaşım, halkla ilişkiler stratejilerinin ölçümlerini ve etkinliğini izlemeyi içermektedir. Büyük veri analitiği ve ölçüm yöntemleri hedef kitlelerin, müşteri davranışlarının ve pazar eğilimlerinin anlaşılmasında önemli bir rol oynamaktadır. Bu verilere dayalı bilgiler, karar alıcıları yönlendirerek daha etkili iletişim stratejileri oluşturmayı ve daha iyi sonuçlar elde etmeyi mümkün kılmaktadır. Bu çalışmada veri odaklı halkla ilişkilerin temel halkla ilişkiler prensipleri açıklanarak bu yaklaşımın halkla ilişkiler alanındaki konumlandırılması tartışılmıştır. Büyük veri analitiği ve ölçüm yöntemlerinin bu yaklaşımdaki rolüne odaklanılarak, bu tekniklerin nasıl daha etkili iletişim stratejileri oluşturmak için kullanılabileceğini incelenmiştir. Ayrıca bu çalışmada veri odaklı halkla ilişkilerin günümüzün hızla değişen iletişim ortamında nasıl işlev gördüğünü ve bu yaklaşımın halkla ilişkilerin gelecekteki rolünün ne olabileceği ele alınmıştır. Bu yeni perspektif, iletişim stratejilerinin daha veri odaklı ve etkili bir şekilde yönetilmesine imkan sağlayarak başarıyı yakalamak isteyen halkla ilişkiler uzmanları için kritik bir öneme sahiptir. Günümüz halkla ilişkiler alanında büyük veri analitiği ve ölçüm yöntemlerinin rolü giderek artmaktadır. Veriye dayalı halkla ilişkiler stratejilerinin uygulanması kuruluşların veri ve araştırmaya dayalı bilinçli kararlar almasını sağlamaktadır. Bu şekilde kuruluşlar elde ettikleri verilerden çıkan farkındalıkla yeni iş fırsatları belirleyebilir, müşterilere daha iyi hizmet sunabilir, satışları artırabilir ve genel performanslarını daha üst seviyelere taşıyabilirler.

Anahtar Kelimeler: Veri, Büyük Veri Analitiği, Halkla İlişkiler

**DATA-DRIVEN PUBLIC RELATIONS:
THE ROLE OF BIG DATA ANALYTICS AND MEASUREMENT GUIDELINES**

Abstract

In today's rapidly digitising world, communication strategies are becoming increasingly complex and go beyond traditional methods. In this environment, the fundamental dynamics of public relations are also evolving, and data-driven public relations is at the forefront of this transformation. This approach, which differs from traditional public relations strategies, offers a new perspective on the design of communication campaigns by centralising the use of data and analytics. Understanding the critical importance of this perspective is essential for today's PR professionals. Data-driven public relations is a powerful tool for companies to communicate more effectively and better understand their target audiences. This approach plays an important role in today's data-driven business world and forms the basis of successful communication strategies. Data-driven public relations refers to the use of data and analytical methods to optimise public relations campaigns and activities. This strategic approach involves monitoring the metrics and effectiveness of public relations strategies. Big data analytics and measurement methods play an important role in understanding target audiences, customer behaviour and market trends. This data-driven information enables decision-makers to create more effective communication strategies and achieve better results. This study outlines the basic principles of data-driven public relations and discusses the positioning of this approach in the field of public relations. It focuses on the role of big data analytics and measurement methods in this approach, and examines how these techniques can be used to create more effective communication strategies. It also explores how data-driven public relations works in today's rapidly changing communications environment and what the future role of public relations might be. This new perspective is critical for PR professionals who want to succeed by enabling more data-driven and effective management of communication strategies. The role of big data analytics and measurement methods is growing in today's public relations field. Implementing data-driven PR strategies enables organisations to make informed decisions based on data and research. As a result, organisations can take the awareness generated by data to new levels, identify business opportunities, better serve customers, increase sales and improve overall performance.

Keywords: Data, big data analytics, public relations

Giriş

Modern halkla ilişkilerde veriler, halkla ilişkiler stratejilerini ve karar alma süreçlerini bilgilendirmede çok önemli bir rol oynamaktadır [1]. Büyük miktarda veriyi toplama ve analiz etme yeteneği, halkla ilişkiler profesyonellerinin hedef kitleleri hakkında bilgi edinmeleri, medyadaki gelişmeleri izlemeleri ve kampanyalarının başarısını takip etmeleri için yeni fırsatlar yaratmıştır. Halkla İlişkiler uzmanları, verilerden yararlanarak varsayımlar veya tahminler yerine gerçek dünyadaki öngörülere dayanan daha hedefe yönelik ve etkili stratejiler geliştirmektedirler. Bu, daha iyi kampanya sonuçlarına ve daha iyi genel sonuçlara yol açmaktadır.

Halkla ilişkilerde veri kullanmanın en önemli faydalarından biri kampanya başarısını ölçebilme yeteneğidir [2]. Halkla ilişkiler uzmanları, web sitesi trafiği, sosyal medya etkileşimi ve medyada yer alma oranları gibi ölçümleri izleyerek kampanyalarının nasıl performans gösterdiğine dair daha derin bir anlayış kazanabilirler. Bu, kaynakların nasıl tahsis edileceği ve stratejilerini maksimum etki için nasıl ayarlayacakları konusunda veriye dayalı kararlar almalarına imkan tanımaktadır. Ayrıca veriler, halkla ilişkiler uzmanlarının iyileştirilecek alanları tespit etmelerine ve zaman içinde taktiklerini geliştirmelerine yardımcı olarak gelecekte daha da iyi sonuçlara ulaşmalarına yardımcı olabilir.

Bununla yanında veriler, halkla ilişkiler çabalarını sürekli olarak iyileştirmek ve standartların ilerisinde kalmak için kullanılabilir[3]. Halkla ilişkiler uzmanları, sektör trendlerini izleyerek, rakiplerin faaliyetlerini takip ederek ve izleyici davranışlarını analiz ederek yeni fırsatları belirleyebilir ve stratejilerini buna göre uyarlayabilir. Bu onların rekabette önde olmalarına ve zaman içinde hedef kitleleriyle daha güçlü ilişkiler kurmalarına yardımcı olabilir. Bununla birlikte veriler, halkla ilişkiler profesyonellerinin potansiyel sorunları büyük sorunlara dönüşmeden önce tespit etmelerine yardımcı olabilir ve bu sorunları çözmek ve olumlu bir itibarı korumak için proaktif adımlar atmalarına imkan tanır[4]. Genel olarak, günümüzün hızlı tempolu, veri odaklı dünyasında halkla ilişkilerde veri kullanımı giderek daha önemli hale gelmekte ve bu eğilimi benimseyen halkla ilişkiler profesyonellerinin, daha iyi sonuçlar ve daha iyi genel sonuçlar açısından önemli faydalar görmektedir[5].

1. Veri Odaklı Halkla İlişkiler

Veriye dayalı halkla ilişkiler, halkla ilişkiler kampanyalarını ve faaliyetlerini bilgilendirmek ve şekillendirmek için veri ve analitiği kullanmayı içeren stratejik bir yaklaşımdır. Bu yaklaşım, veriye dayalı halkla ilişkilerin özü olan halkla ilişkiler stratejilerinin metriklerinin ve etkinliğinin izlenmesini içerir [6]. Veriye dayalı halkla ilişkiler, karar vermeyi yönlendirmek ve daha iyi sonuçlar elde etmek için verileri kullanmakla ilgilidir. Hedef kitleler, müşteri davranışları ve pazar eğilimleri hakkında fikir edinmek için büyük veri analitiği ve ölçüm yöntemlerinin kullanılmasını içerir [7]. Özünde, veriye dayalı halkla ilişkiler, halkla ilişkiler kampanyalarını ve faaliyetlerini bilgilendirmek ve optimize etmek için verileri kullanmak, daha etkili iletişim ve daha iyi iş sonuçları elde etmekle ilgilidir.

Büyük veri analitiği ve ölçüm yöntemleri, veriye dayalı halkla ilişkilerde kritik bir rol oynar. Büyük veri analitiği, gizli kalıpları, korelasyonları ve pazar eğilimlerini ortaya çıkarmak için büyük veri kümelerini incelemeyi içerir [8]. Bu yaklaşım, halkla ilişkiler profesyonellerinin hedef kitleleri hakkında bilgi edinmelerine, daha etkili mesajlaşma stratejileri geliştirmelerine ve kampanyalarının etkisini ölçmelerine imkan tanır [9]. Medya izleme, duyarlılık analizi ve sosyal medya analitiği gibi ölçüm yöntemleri, halkla ilişkiler uzmanlarına kampanyalarının başarısını izlemek ve veri odaklı kararlar almak için ihtiyaç duydukları verileri sağlar [10][11]. Halkla ilişkiler uzmanları, büyük veri analitiği ve ölçüm yöntemlerinden yararlanarak hedef kitlelerini daha iyi anlayabilir ve daha etkili iletişim stratejileri geliştirebilir.

Dijital medya ve sosyal ağların yükselişiyle birlikte, halkla ilişkiler profesyonellerinin kampanyalarını bilgilendirmek ve optimize etmek için kullanılacak zengin veri kaynakları vardır [12]. Veriye dayalı halkla ilişkileri benimseyen halkla ilişkiler uzmanları, daha etkili iletişim stratejileri geliştirerek, müşteri katılımını iyileştirerek ve daha iyi iş sonuçları elde ederek rekabet avantajı elde edebilirler [13]. Bu nedenle, veriye dayalı halkla ilişkiler, hedef kitleleriyle etkili bir şekilde iletişim kurmak ve iş hedeflerine ulaşmak isteyen herhangi bir kuruluş için temel bir araçtır [11].

1.1. Veriye Dayalı Halkla İlişkilerin Sağladığı Yararlar

Halkla ilişkilerde büyük veri analitiğinin kullanılması, hedef kitlelerin iyileştirilmiş hedeflemesi ve segmentasyonu da dahil olmak üzere birçok avantaja sahiptir. Halkla ilişkiler uzmanları, veriye dayalı yöntemler kullanarak hedef kitlelerini daha iyi anlayabilir ve mesajlarını belirli gruplara uyarlayabilir [6]. Bu, daha etkili iletişime ve hedef kitleyle daha fazla etkileşime yol açabilir. Ek olarak, büyük veri analitiği, daha önce gözden kaçmış

olabilecek yeni hedef kitlelerin belirlenmesine yardımcı olabilir, bu da genişletilmiş erişime ve artan etkiye yol açar [14]. Bu nedenle, veriye dayalı yöntemleri halkla ilişkiler stratejilerine dahil etmek, daha iyi hedefleme ve segmentasyona yol açabilir ve sonuç olarak daha başarılı kampanyalarla sonuçlanması mümkündür.

Veriye dayalı halkla ilişkilerin bir başka yararı da, izleyici davranışını ve tercihlerini daha iyi anlamayı sağlamasıdır. Halkla ilişkiler uzmanları, izleyici etkileşimleri ve halkla ilişkiler materyalleriyle etkileşim hakkındaki verileri analiz ederek, hangi tür mesajlaşma ve iletişim yöntemlerinin en etkili olduğuna dair fikir edinebilir [15]. Bu, halkla ilişkiler stratejileri ve taktikleri hakkında daha bilinçli kararlar alınmasına ve daha etkili kampanyalara yol açabilir. Ek olarak, büyük veri analitiği, izleyici davranışındaki eğilimleri ve kalıpları belirlemeye yardımcı olabilir ve gelecekteki halkla ilişkiler çabaları için değerli bilgiler sağlar [16]. Halkla ilişkiler uzmanları bu bilgileri kullanarak daha bilinçli kararlar alabilir ve daha iyi sonuçlar elde edebilir.

Son olarak, veriye dayalı halkla ilişkiler gelişmiş karar vermeye yol açabilir. Halkla ilişkiler uzmanları, büyük veri analitiğini kullanarak stratejik karar verme sürecini bilgilendirebilecek zengin bilgilere erişebilir [17]. Bu, kitle davranışı, pazar eğilimleri ve halkla ilişkiler kampanyalarının etkinliğine ilişkin öngörülerini içerir. Halkla ilişkiler uzmanları, bu verilerden yararlanarak mesajlaşma, taktikler ve genel strateji hakkında daha bilinçli kararlar alabilir ve sonuç olarak daha başarılı kampanyalara yol açabilir [6].

Genel olarak ifade etmek gerekirse, veriye dayalı yöntemlerin kullanımı, halkla ilişkiler stratejilerini sadeleştirilmiş temel yöntemlerden daha ileri düzeye taşıyarak, gelişmiş hedefleme ve segmentasyona, kitle davranışları ile tercihlerinin daha iyi anlaşılmasına ve kararların daha etkili bir şekilde ilerlemesine imkan sağlayabilir.

1.2. Halkla İlişkilerde Büyük Veri Analitiği

Halkla ilişkiler alanında büyük veri analitiği giderek daha önemli hale gelmektedir. Bu, öngörü elde etmek ve eyleme geçirilebilir öneriler sağlamak için kullanılacak kalıpları ve eğilimleri belirlemek için büyük veri setlerinin toplanmasını ve analiz edilmesini içerir [8]. Büyük verinin yükselişiyle birlikte, veriye dayalı karar verme daha yaygın hale geldi ve halkla ilişkiler uzmanları, stratejilerini bilgilendirmek ve kampanyalarının başarısını ölçmek için verileri kullanmaktadır [14]. Büyük verinin stratejik iletişimde uygulanması için, büyük verinin kullanılacağı iletişim sürecinin aşamalarını özetleyen bir çerçeve geliştirilmiştir [15].

Verilerin toplanması ve analizi, halkla ilişkilerde modern ölçüm tekniklerinin temel bir bileşeni haline gelmiştir. Halkla ilişkiler uzmanları, bir kampanyanın başarısı hakkında veri toplayarak iddialarını destekleyebilir ve gelecekteki stratejiler hakkında veriye dayalı kararlar alabilir [9]. Büyük veri ve analitik arasındaki farklar, analiz edilen veri setlerinin hacmi, hızı ve çeşitliliğinde yatmaktadır. Büyük veri, çok büyük veri kümelerini ifade ederken, analitik bu veri kümelerini faydalı bilgilere dönüştürmeyi içermektedir [18]. Halkla ilişkiler uzmanları, büyük veri analitiğini kullanarak kampanyalarının etkinliği hakkında değerli bilgiler edinebilir ve stratejilerini geliştirmek için veriye dayalı kararlar alabilirler [8].

Büyük veri kümelerinden bilgi ve faydalı öngörüler çıkarmak, büyük veri analitiğinin önemli bir yönüdür ve bu, halkla ilişkiler de dahil olmak üzere çeşitli uygulama alanlarında akıllı karar verme için kullanılabilir [19]. Veriye dayalı karar verme, kararları yalnızca sezgiye değil, verilerin analizine dayandırmayı içerir [14]. Halkla ilişkilerde veri bilimi ve büyük veri analitiğinin kullanılması, karar vermeyi kolaylaştırabilen ve halkla ilişkiler kampanyalarının etkinliğini artırabilen büyük veri kümelerinden eyleme geçirilebilir öngörülerin ve bilgilerin çıkarılmasına imkan tanır [20]. Halkla ilişkiler analitiği, halkla ilişkiler çabalarını ölçmek, analiz etmek ve optimize etmek için verileri kullanma sürecidir ve halkla ilişkiler uzmanlarının stratejilerini düzenlemelerini ve genel başarılarının artmasını sağlar [21].

2. Veriye Dayalı Halkla İlişkilerde Ölçümlene Yöntemleri

Ölçülebilir hedefler ve temel performans göstergeleri KPI'lar (Key Performance Indicator) belirlemek, veri odaklı halkla ilişkiler için ölçüm yöntemlerinin uygulanmasında önemli bir ilk adımdır [22]. KPI'lar, önceden belirlenmiş hedeflere veya hedeflere karşı bir halkla ilişkiler kampanyasının başarısını ölçen ölçülebilir metriklerdir [23]. KPI merkezli bir yaklaşım, veri analitiği stratejisi etrafında yönetim uygulamalarının geliştirilmesini sağlamalıdır, çünkü bu, veri toplama ve analizinin iş hedeflerine ulaşmaya odaklanmasını sağlamaya yardımcı olacaktır [24]. Halkla ilişkiler uzmanları, net hedefler ve KPI'lar belirleyerek kampanyalarının etkinliğini ölçebilir ve stratejilerini optimize etmek için veriye dayalı kararlar alabilir [25].

Kampanya performansının değerlendirilmesi, veriye dayalı halkla ilişkiler ölçüm yöntemlerinin bir diğer kritik yönüdür. Veri analitiği araçları, halkla ilişkiler uzmanlarının kampanyalarının başarısını değerlendirmek için web sitesi trafiği, sosyal medya etkileşimi ve medyadan bahsetmeler gibi kampanya metriklerini izlemesine ve analiz etmesine yardımcı olabilir [9]. Halkla ilişkiler uzmanları, bu ölçümleri analiz ederek, kampanyalarını optimize etmelerine ve

gelecekte daha etkili stratejiler oluşturmalarına yardımcı olan eğilimleri ve kalıpları belirleyebilir [21].

Yatırım getirisini ROI (Return on Investment) ve etkiyi ölçmek de veriye dayalı halkla ilişkiler ölçüm yöntemlerinin önemli bir bileşenidir. Halkla ilişkiler uzmanları, kampanya maliyetleri ve sonuçları hakkındaki verileri analiz ederek kampanyalarının yatırım getirisini belirleyebilir ve çabalarının iş hedefleri üzerindeki etkisini gösterebilir [16]. Tahmine dayalı modelleme gibi gelişmiş analitik araçları, halkla ilişkiler uzmanlarının kampanyalarının potansiyel etkisini tahmin etmelerine ve stratejilerini optimize etmek için veriye dayalı kararlar almalarına yardımcı olabilir [26]. Halkla ilişkiler uzmanları, bu ölçüm yöntemlerini kullanarak çalışmalarının değerini gösterebilir ve kuruluşlarının başarısı üzerinde önemli bir etki yaratabilir [27].

2.1. Veri Odaklı Halkla İlişkilerde Sosyal Medyanın Rolü

Sosyal medya, hedef kitlenin davranışları ve tercihleri hakkında değerli bilgiler sağladığı için veriye dayalı halkla ilişkilerde çok önemli bir rol oynar. Sosyal dinleme ve izleme, halkla ilişkiler uzmanlarının markaları, endüstrileri veya rakipleriyle ilgili çevrimiçi konuşmaları takip etmelerini ve analiz etmelerini sağlar. Halkla ilişkiler uzmanları, sosyal medya kanallarını izleyerek, ortaya çıkan trendleri, tüketici duyarlılığını ve derhal ele alınması gereken potansiyel sorunları belirleyebilir. Bu bilgi, hedef kitleye ulaşmada ilgili ve etkili olmalarını sağlayarak halkla ilişkiler stratejilerini ve taktiklerini bilgilendirmek için kullanılabilir [10].

Sosyal medya ölçümlerinin analizi, veriye dayalı halkla ilişkilerin bir başka kritik yönüdür. Erişim, katılım ve duyarlılık gibi sosyal medya ölçümleri, halkla ilişkiler kampanyalarının etkinliğine ilişkin değerli bilgiler sağlayabilir [28]. Halkla ilişkiler uzmanları, bu ölçümleri analiz ederek çabalarının etkisini belirleyebilir ve kampanyalarını optimize etmek için veriye dayalı kararlar alabilir. Örneğin, bir halkla ilişkiler kampanyası istenen katılımı sağlamıyorsa, halkla ilişkiler uzmanları temel nedeni belirlemek ve stratejilerini buna göre ayarlamak için sosyal medya ölçümlerini kullanabilir [10].

Son olarak, sosyal medya stratejilerinin geliştirilmesi, veri odaklı halkla ilişkilerin temel bir bileşenidir. Sosyal medya analitiği, halkla ilişkiler uzmanlarının en iyi hedef kitleleri belirlemesine, izleyici davranışını anlamasına ve hedeflerine ulaşmak için veriye dayalı stratejiler geliştirmesine yardımcı olabilir [29]. Halkla ilişkiler uzmanları, büyük veri analitiği tekniklerinden yararlanarak sosyal ağların 5 V'sini, yani hız, hacim, değer, çeşitlilik ve doğruluk hakkında daha iyi bir anlayış kazanabilirler [30]. Bu bilgi, hedef kitlede yankı uyandıran,

katılımı artıran ve iş sonuçlarını yönlendiren hedeflenen sosyal medya stratejileri geliştirmek için kullanılabilir [15].

2.3. Geleneksel ve Dijital Halkla İlişkilerin Entegrasyonu

Günümüzün dijital çağında, geleneksel halkla ilişkiler ile dijital halkla ilişkiler stratejilerini entegre etmek, başarılı bir halkla ilişkiler kampanyası için çok önemlidir. Bu entegrasyon, hedef kitlelerle daha geniş erişim ve daha etkili iletişim sağlar. Bununla birlikte, bu tür kampanyaların başarısını sağlamak için, veriye dayalı halkla ilişkiler yöntemlerini kullanarak etkinliklerini izlemek ve ölçmek esastır [6]. Veriye dayalı halkla ilişkiler, halkla ilişkiler çabalarında kararlara ve stratejilere rehberlik etmek için verilerin kullanılmasını ifade eder [7]. Halkla ilişkiler uzmanları, geleneksel ve dijital halkla ilişkiler stratejilerini birleştirerek ve kararları yönlendirmek için verileri kullanarak, hedef kitlelerine ulaşan ve istenen sonuçları elde eden daha etkili ve verimli kampanyalar oluşturabilir.

Entegre halkla ilişkiler kampanyalarının etkinliğini ölçmek çok önemlidir. Modern ölçüm teknikleriyle, halkla ilişkiler kampanyaları artık başarılarıyla ilgili iddiaları destekleyecek verilere sahiptir. Bu veriler, gelecekteki kampanyaları bilgilendirmek ve gerektiğinde stratejileri ayarlamak için kullanılabilir. Verilerden elde edilen analitik, stratejik planlamanın, ölçmenin ve fikirleri uygulamaya koymanın önemli bir yönüdür. Veriye dayalı bir halkla ilişkiler stratejisi oluşturmak, entegrasyon, uyum, kusursuz yürütme ve sağlam bir ölçüm yaklaşımı gerektirir. Sosyal medya izleme, halkla ilişkiler uzmanları için büyük veri analizinin önemli bir yönüdür. Halkla ilişkiler uzmanları, sosyal medyadan gelen verileri analiz ederek hedef kitlelerini daha iyi anlayabilir ve kampanyalarını onların ihtiyaçlarına göre şekillendirebilir.

Veriye dayalı yöntemleri kullanan başarılı entegre halkla ilişkiler kampanyaları arasında Always'in "kız gibi" ifadesiyle ilişkili olumsuz çağrışımları değiştirmeyi amaçlayan #LikeAGirl kampanyası örnek olarak verilebilir [9]. Başka bir örnek, güzellik standartlarına meydan okumaya ve vücut pozitifliğini teşvik etmeye çalışan Dove Real Beauty kampanyasıdır [27]. Her iki kampanya da geleneksel ve dijital halkla ilişkiler stratejilerinin bir kombinasyonunu kullanmış ve bunların etkinliğini veriye dayalı halkla ilişkiler yöntemleriyle ölçmüştür. Bunu yaparak hedeflerine ulaşabildiler ve hedef kitleleri üzerinde kalıcı olumlu etkiler yaratabilmişlerdir.

2.4. Veriye Dayalı Halkla İlişkilerde Zorluklar

Veriye dayalı halkla ilişkiler, modern halkla ilişkilerin önemli bir yönü haline gelmiştir, ancak aynı zamanda çeşitli zorluklara da yol açmaktadır. En önemli zorluklardan biri veri gizliliği ve güvenlik endişeleridir. Halkla ilişkilerde veri toplama ve analizi daha yaygın hale geldikçe, şirketler tüketicilerin bilgilerini korumak için etik ve yasal yönergeleri takip ettiklerinden emin olmalıdırlar [31]. Ek olarak, veri analitiğinin karmaşıklığı önemli bir zorluk olabilir. Büyük veri analitiği, karmaşık ve zaman alıcı bir süreç olabilen kalıpları ve eğilimleri ortaya çıkarmak için çok miktarda veriyi incelemeyi içerir [8]. Bu, bir halkla ilişkiler ekibinde kolayca bulunamayan özel bilgi ve uzmanlık gerektirir.

Veriye dayalı halkla ilişkiler yöntemlerini benimsemedeki bir başka zorluk da değişime karşı dirençtir. Pek çok profesyonel, özellikle geçmişte veri analitiğine güvenmeden başarılı olmuşlarsa, yeni yöntemleri benimsemeye karşı dirençli olabilir [14]. Ancak, veriye dayalı karar vermenin faydaları göz ardı edilemez. Veriye dayalı halkla ilişkileri benimsemeyen şirketler, daha bilinçli kararlar almak için verileri kullanan rakiplerinin gerisinde kalma riskiyle karşı karşıyadır [32]. Ayrıca, yeni yöntemlerin benimsenmesi, bazı kuruluşlar için önemli bir engel olabilen kaynaklara ve eğitime yatırım yapılmasını gerektirir [33].

Zorluklara rağmen veriye dayalı halkla ilişkiler, şirketlerin iletişim stratejilerini geliştirmeleri için önemli fırsatlar sunmaktadır. Şirketler, veri analitiğinden yararlanarak, tüketici davranışları ve tercihleri hakkında öngörüler elde edebilir, bu da onların mesajlarını ve taktiklerini hedef kitlelerinde daha iyi yankı uyandıracak şekilde uyarlayabilirler[15]. Ek olarak, veriye dayalı halkla ilişkiler, şirketlerin kampanyalarının etkinliğini ölçmelerine ve etkilerini optimize etmek için gerçek zamanlı ayarlamalar yapmalarına fırsat tanır [10]. Sonuç olarak, veriye dayalı halkla ilişkilerin faydaları, zorluklardan daha ağır basar ve bu yaklaşımı benimseyen şirketlerin iletişim stratejilerinde ve genel başarılarında önemli gelişmeler görmeleri muhtemeldir.

2.5. Veri Odaklı Halkla İlişkilerin Geleceği

Halkla ilişkilerin geleceği, büyük ölçüde teknoloji ve analitikteki gelişmelere bağlıdır. Gizli kalıpları ve pazar eğilimlerini ortaya çıkarmak için büyük miktarda verinin incelenmesini içeren büyük veri analitiği, halkla ilişkiler endüstrisinde giderek daha önemli hale gelmiştir [8]. Kararları sezgi yerine veri analizine dayandırmayı içeren veriye dayalı karar verme, endüstride de popüler bir uygulama haline gelmiştir [14]. Teknoloji gelişmeye devam ettikçe, veri analizi için mevcut araçlar ve yöntemler de gelişecektir. Bu, halkla ilişkiler profesyonellerinin hedef

kitleleri hakkında daha derin öngörüler elde etmelerini, daha etkili kampanyalar oluşturmalarını ve başarıyı daha doğru bir şekilde ölçmelerini sağlayacaktır [15].

Halkla ilişkilerde verilerin önemi son yıllarda önemli ölçüde artmıştır. Modern ölçüm teknikleriyle, halkla ilişkiler kampanyaları artık ne kadar başarılı olduklarına dair iddiaları destekleyecek verilere sahiptir. Otonom veya yarı otonom veri analizi tekniklerinin kullanılmasını içeren gelişmiş analitik, halkla ilişkilerde stratejik planlama ve ölçümün kritik bir yönü haline gelmiştir [34]. Halkla ilişkiler kampanyalarından toplanan veriler, halkla ilişkiler çabaları için değerini kanıtladığı ve halkla ilişkiler uzmanlarının veriye dayalı kararlar vermesini sağladığı için herhangi bir halkla ilişkiler planı için hayati önem taşır [9]. Sonuç olarak, verileri etkili bir şekilde toplama, analiz etme ve kullanma yeteneği, halkla ilişkiler kampanyalarının başarısında kilit bir faktör olmaya devam edecektir [6].

Halkla ilişkiler uygulamalarının daha veri odaklı bir yaklaşıma doğru evrimi, yeni stratejilerin ve tekniklerin geliştirilmesine yol açmıştır. Veriye dayalı halkla ilişkiler, veri analizi tarafından yönlendirilen stratejiler ve çabaları ifade etmektedir. Artık halkla ilişkiler öğrencileri ve profesyonellerinin veriye dayalı halkla ilişkiler hakkında bilgi edinmeleri için kitaplar ve çevrimiçi topluluklar dahil olmak üzere çok sayıda kaynak mevcuttur [10][15][5]. Endüstri gelişmeye devam ettikçe, veriye dayalı halkla ilişkilerin halkla ilişkiler kampanyalarının başarısı için daha da kritik hale geleceği açıktır. Halkla ilişkiler uzmanları, hedef kitleler hakkında fikir edinmek, daha etkili kampanyalar oluşturmak ve başarıyı daha doğru bir şekilde ölçmek için verileri kullanarak eğrinin bir adım önünde kalabilir ve daha iyi sonuçlar elde edebilir.

2.6. Veri Odaklı Halkla İlişkiler Örnek Çalışmaları

Veriye dayalı halkla ilişkiler, günümüzün dijital çağında giderek daha önemli hale gelmiştir. Veriye dayalı halkla ilişkiler kampanyalarının çok sayıda başarılı örneği vardır. unlara Airbnb tarafından sağlanan ve kilit etkileyicileri belirlemek ve marka bilinirliğini artırmak için hedeflenen içerik oluşturmak için verileri kullanan bir tanesi de dahildir [9]. Başka bir örnek, Always'in hedef kitlede yankı uyandıran bir mesaj oluşturmak için verileri kullanan ve satışlarda önemli bir artış sağlayan "Like a Girl" kampanyasıdır [10]. Bu kampanyalar, veri odaklı halkla ilişkilerin belirli amaç ve hedeflere ulaşmadaki gücünü göstermektedir.

Stratejilerin ve sonuçların analizi, veriye dayalı halkla ilişkilerin önemli bir bileşenidir. Halkla ilişkiler uzmanları, verileri analiz ederek hedef kitlelerine ulaşmada ve hedeflerine ulaşmada hangi stratejilerin en etkili olduğunu belirleyebilir. Örneğin, veri analizi, sosyal medya veya

geleneksel medya kuruluşları gibi belirli bir kitleye ulaşmak için en etkili kanalların belirlenmesine yardımcı olabilir [10]. Ek olarak, bir halkla ilişkiler kampanyasının başarısını ölçmek için gösterim sayısı, katılım oranları ve dönüşümler gibi veriler kullanılabilir [11]. Bu analiz, halkla ilişkiler uzmanlarının stratejilerini iyileştirmelerini sağlar.

Alınan dersler ve en iyi uygulamalar, gelecekteki veriye dayalı halkla ilişkiler kampanyalarının başarısı için çok önemlidir. En iyi uygulamalardan biri, belirli hedefler belirlemek ve bunlara ulaşmak için veriye dayalı stratejiler geliştirmektir. Kilit paydaşları dahil etmek ve öngörülerini ve fırsatları ortaya çıkarmak için ilgili verileri toplamak da önemlidir. Ek olarak, büyük veri analitiğinin stratejik iletişimdeki rolünü anlamak önemlidir [15]. Halkla ilişkiler uzmanları, önceki kampanyalardan öğrenerek ve en iyi uygulamaları uygulayarak, veriye dayalı halkla ilişkiler çabalarını geliştirmeye ve daha büyük başarılar elde etmeye devam edebilir.

Sonuç

Sonuç olarak, halkla ilişkilerde büyük veri analitiği ve ölçüm yöntemlerinin rolü günümüzün halkla ilişkiler ortamında giderek daha önemli hale gelmiştir. Veriye dayalı halkla ilişkiler stratejilerinin kullanılması, kuruluşların verilere ve araştırmaya dayalı bilinçli kararlar almasını sağlamaktadır. Kuruluşlar, verilerden elde edilen öngörülerden yararlanarak yeni iş fırsatlarını belirleyebilmekte, müşterilere daha iyi hizmet verebilmekte, satışları artırabilmekte ve genel performansı iyileştirebilmektedir.

Veriye dayalı halkla ilişkilerin önemi, kuruluşların işlerini ölçmelerine ve işleri hakkında daha fazla bilgi sahibi olmalarına yardımcı olduğu gerçeğinde de açıktır [18]. Veri ve analitik, halkla ilişkiler stratejilerini yönlendirmede, yaklaşımı seçmede, performansı artırmada ve harekete geçirici mesajı gerçekleştirmede önemli bir rol oynamaktadır. Ayrıca, bir halkla ilişkiler kampanyasından toplanan veriler, halkla ilişkiler çabalarının değerinin kanıtını gösterdiğinden, herhangi bir halkla ilişkiler planı için hayati önem taşımaktadır [9].

Bu bulguların ışığında, halkla ilişkiler profesyonellerinin veriye dayalı yöntemleri benimsemesi ve bunları günlük uygulamalarına dahil etmesi çok önemlidir. Halkla ilişkiler ortamı gelişmeye devam ederken, başarıyı artırmak için bir adım önünde olmak ve büyük veri analitiğinin ve ölçüm yöntemlerinin gücünden yararlanmak zorundadır. Halkla ilişkiler uzmanları bunu yaparak çabalarının değerini dikkat çekmesi ve kuruluşları üzerinde önemli bir etki oluşturması mümkün hale gelecektir [12][27][6][35].

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**ELÇİ BÂKILLÂNÎ: ORTAÇAĞDA MÜSLÜMAN BİR BİLGİNİN BİZANS
SARAYINDA DİYALOGLARI VE HRİSTİYAN DİN ADAMLARIYLA
MÜNAZARALARI**

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Özet

Müslümanlar ve Bizans İmparatorluğu arasındaki ilişkiler, İslam'ın erken dönemlerinden itibaren izlenebilir. Hz. Peygamber, 628 yılında Bizans İmparatoru Herakleios'a bir davet mektubu göndermek amacıyla Dihye b. Halife'yi elçi olarak göndermiştir. Bu erken dönem temasları, zaman içinde hem savaşlar hem de diplomatik ilişkiler aracılığıyla devam etmiştir. Bu bağlamda, Bizans İmparatorluğu ile ilişki kuran devletlerden biri, Büveyhîler olarak bilinen Şîî karakterli devlettir. 10-11. yüzyıllarda (334/945-447/1055) İran ve Irak topraklarında hüküm süren Büveyhîler, Sünni Müslümanlar üzerinde egemenlik kurmuşlardır. General Bardas'ın II. Basileios dönemindeki isyanı başarısızlıkla sonuçlanmış ve sonrasında sığınak olarak Büveyhîler'e yönelmiştir. Bu olayın ardından, II. Basileios, General Bardas'ı teslim almak amacıyla Büveyhî sarayına bir elçi göndermiş, ancak olumlu bir yanıt alamamıştır. Dönemin Büveyhî hükümdarı Adudüddeve, General Bardas ile ilgili yazılı bir yanıt verme amacıyla bir elçi gönderme kararı almış ve bu görev için tanınmış İslam âlimi Bâkılânî'yi seçmiştir. Bâkılânî, hem kelim hem de fıkıh usûlünde otorite kabul edilen bir âlim olarak bilinir. Parlak zekâsı ve münazaralardaki ustalığı, dönemin hükümdarı Adudüddeve'nin dikkatini çekmiş ve Bâkılânî, yargı teşkilatının en üst düzey yöneticisi olan "Kādılkudât" makamına atanmıştır. Ayrıca Adudüddeve, Bâkılânî'yi oğlu Simnânuddeve'yi yetiştirmekle görevlendirmiş ve Bâkılânî, meşhur kelim eseri "et-Temhîd"i ona ithaf etmiştir. Bâkılânî'nin liderliğindeki Bizans İmparatorluk sarayına gönderilen elçilik heyeti, General Bardas meselesi gibi çeşitli önemli konuları içeren bir dosya taşımıştır. Bu görev, sadece diplomatik bir ziyaret olmaktan öte bir amacı ifade etmiş ve bu nedenle bir âlimin seçilmesine neden olmuştur. Bu çalışmada bir kelim ve fıkıh âlimi olan Bâkılânî'nin Bizans sarayında kurduğu diyaloglar ve Hristiyan din adamlarıyla yapmış olduğu münazara konu edinmiştir. Çalışmanın amacı, Bâkılânî'nin Bizans sarayında kurduğu diyaloglar ve Hristiyan din adamlarıyla yapmış olduğu münazaraları inceleyerek, ortaçağ döneminde İslam ve Hristiyanlık arasındaki fikri ve dini etkileşimleri değerlendirmektir.

Anahtar Kelimeler: Bâkılânî, Büveyhîler, Bizans Sarayı, İslam, Hristiyanlık.

**THE APOSTLE BĀQILLĀNĪ: A MEDIEVAL MUSLIM SCHOLAR'S DIALOGUES
AT THE BYZANTINE COURT AND DEBATES WITH CHRISTIAN CLERICS**

Abstract

Throughout Islamic history, relations between Muslims and the Byzantine Empire can be traced from the early periods of Islam. In 628, the Prophet sent Dihya b. Khalifa as an envoy to send a letter of invitation to the Byzantine Emperor Heraclius. These early contacts continued over time through both wars and diplomatic relations. In this context, one of the states that established relations with the Byzantine Empire was the Shiite state known as the Būveyhids. The Būveyhids, who ruled in Iran and Iraq in the 10th-11th centuries (334/945-447/1055), established sovereignty over Sunni Muslims. The rebellion of General Bardas during the reign of Basileios II ended in failure, after which he turned to the Buchavids for refuge. Following this event, Basileios II sent an envoy to the Būveyhî court to receive General Bardas, but did not receive a favourable response. Adud al-Dawla, the Bughawid ruler of the period, decided to send an envoy to give a written reply about General Bardas and chose al-Bāqillānī for this task. Al-Bāqillānī is known as a scholar who is considered an authority in both theology and the *usul al-fiqh*. His brilliant intellect and mastery in debates attracted the attention of the ruler of the time, Adud al-Dawla, and he was appointed to the position of "Kādilkudāt", the highest executive of the judicial organisation. Furthermore, Adud al-Dawla assigned al-Bāqillānī to educate his son Simnān al-Dawla, to whom al-Bāqillānī dedicated his famous theological work "al-Tamhīd". The embassy delegation to the Byzantine Imperial court, led by al-Bāqillānī, carried a dossier containing various important issues, such as the issue of General Bardas. This mission was more than just a diplomatic visit and therefore led to the selection of a scholar. This study focuses on the dialogues that al-Bāqillānī, a scholar of theology and *fiqh*, established in the Byzantine court and his debates with Christian clerics. The aim of the study is to evaluate the intellectual and religious interactions between Islam and Christianity in the medieval period by examining the dialogues that al-Bāqillānī established in the Byzantine court and his debates with Christian clergymen.

Keywords: al-Bāqillānī, al-Buwayhids, Byzantine court, Islam, Christianity.

Giriş

İslam'ın ortaya çıkışından itibaren, Müslümanlar ve Hristiyanlar arasında bir dizi münazara yaşandığı bilinmektedir. İlk Müslüman-Hristiyan münazarası, Hz. Peygamber ile kadim Yakubî mezhebi mensuplarından olan Necran Hristiyanları arasında gerçekleşmiştir. Daha sonraki dönemlerde bu tür münazaraların benzerleri, Emevî ve Abbâsî saraylarında da sıkça görülmüştür. Yahyâ ed-Dimeşkî'nin Emevî sarayında yaptığı Müslümanlarla münazaralar, bu etkileşimlerin ünlü örneklerinden biridir. Abbâsî Halifesi Mehdî ile Nesturî Patriği Timotheus ve Hârûnürreşîd ile Hristiyan bir tabip arasında yaşanan münazaralar ise İslam tarihindeki diyalogların önemli örneklerindedir. Halifelerin, bazen iki farklı din mensubunu huzuruna çağırarak münazara düzenlettikleri sıkça gözlemlenen bir uygulamadır (Karadaş Çağfer, 2009, s. 2).

Bizans ile diplomatik ilişkilerin kökleri Hz. Peygamber dönemine kadar gitmektedir. 628 yılında Herakleios'a gönderilen bir mektup, İslam'ı tanıtmak amacıyla atılan ilk adımlardan biridir. Ardından 629 Mûte ve 632'de Tebük savaşları, diplomatik ilişkilerin farklı bir yansıması olarak değerlendirilebilir. Dört halife dönemindeki fetih hareketleri de genellikle Bizans topraklarına yönelikti. Emeviler döneminde İstanbul'a seferler düzenlendi ve Abbasiler döneminde bu seferlere devam edildi. Savaşların acı yönlerinin yanı sıra, savaşan taraflar arasında bilimsel ve siyasi açıdan diplomatik ilişkilere yol açtığı da bilinen bir gerçektir. Müslümanlarla Bizans arasındaki savaşların, bilimsel ve siyasi birçok ilişkiye ve bazı diplomatik faaliyetlere yol açtığı, bu faaliyetlerin bazılarında münazaraların yapıldığı kaynaklarda belirtilmiştir. Bu münazaralar genellikle dini nitelik taşımaktadır. Bâkılânî'nin Bizans sarayında gerçekleştirdiği münazara da, genel olarak diğer münazara örnekleriyle benzer bir içeriğe sahiptir (Karadaş Çağfer, 2009, s. 3).

II. Basileios'un tahta çıkışında General Bardas isyan etmiş, ancak isyan başarısızlıkla sonuçlanmıştır. Bardas, başarısız isyanın ardından Diyarbakır'a sığınmış olabilir. Muhtemelen bu dönemde Diyarbakır, Şîî karakterli Büveyhî devletinin sınırları içinde yer alıyordu (İzzeddin İbnü'l-Esîr, 1987, s. 7/702-704). Bardas'ın takibinden sonra Büveyhî hükümdarı, Bardas'ı Diyarbakır'dan alarak Bağdat'ta hapsedirmiştir (Karadaş Çağfer, 2009, s. 12). İmparator, Bardas'ı teslim etmek amacıyla elçi gönderdiği halde sonuç alamamıştır.

Büveyhî hükümdarı Adudüdevle, Bizans ile ilişkilerini düzeltme amacıyla ve kendisine gönderilen mektuba cevap verme ihtiyacı hissetmiştir. Bu amaçla Bizans'a gönderilecek heyetin başkanlığını yapmak üzere Kâdî Ebu Bekr el-Bâkılânî'yi (ö. 403/1013) elçi olarak

görevlendirdi. Kaynaklarda ziyaretin 380/990 yılında gerçekleştiği belirtilse de, bu ziyaretin 371/372 yılları içinde gerçekleştiği daha makul görünmektedir. Çünkü Bâkılânî'nin elçi olarak görevlendirilmesi, Adudüdevle döneminde olmuştur. Adudüdevle ise 372/983 yılında vefat etmiştir (Karadaş Cağfer, 2009, s. 12).

Asıl adı Kâdî Ebû Bekr Muhammed b. Tayyib olan Bâkılânî'nin doğumu hakkında kesin bir bilgi bulunmamakla birlikte, genellikle 330/941-42 yıllarında doğduğuna inanılmaktadır. Ailesinin bakla ticaretiyle uğraşması sebebiyle ilk dönemlerde "İbnü'l-Bâkılânî" lakabıyla anılan Bâkılânî, daha sonra "Bâkılânî" olarak tanınmıştır (Gölcük Şerafaddin, 1991, s. 531).

Bâkılânî, İslam ilimlerinin teşekkül ettiği, felsefe ve tasavvufun gelişmeye tuttuğu 10 ve 11. Yüzyıl ortamında yetişen bir Eş'arî kelamcısı ve Mâlikî fakihidir. Pratik zekâsı, güçlü hafızası, derin vukufu, başarılı münazaraları, üstün hitabeti ve çok yönlü ilmi şahsiyetiyle tanınan Bâkılânî, döneminde öne çıkan bir âlim olarak bilinir (Gölcük Şerafaddin, 1991, s. 532). Nitekim Bâkılânî'nin uzun bir süre boyunca gece uyumadan 20 sayfa yazdığı rivayet edilmektedir (Ebü'l-Fidâ İbn Kesîr, 1990, s. 11/350). (Ebû Bekr Ahmed b. Alî b. Sâbit el-Bağdâdî, 2001, s. 3/366) belirttiği üzere yazdıkları başkalarından alıntı yapmadan, yalnızca kendi bilgi birikimiyle şekillenmiştir. Kelam ilminde öncü bir figür olmanın yanı sıra, fıkıh usulünde de Mü'tazile'nin öncü isimlerinden Kadı Abdulcebbar ile birlikte bu ilmi açıklama ve düzenleme konusunda önemli bir konumda bulunan mütekellim usulünün büyük alimlerinden biri olarak kabul edilir (Bedrüddîn, Zerkeşî, 1992, s. 1/6)

Devletlerarası ilişkilerde, elçilerin siyasi yetkinliği, deneyimi ve etkisi büyük bir öneme sahiptir. Bu faktörler, hem görev yaptıkları ülkeyi hem de bağlı oldukları devleti doğrudan etkilerdi. Bu nedenle, elçilik görevini üstlenen kişilerin siyasete hâkim, mevcut diplomatik konuları bilen bireyler arasından seçilmesine özen gösterilirdi (Gözübüyük Sevil, 2018, s. 98). Ancak, Bâkılânî'nin siyasete hâkim olmaması ve mevcut diplomatik konuları bilmemesine rağmen hükümdar Adudüdevle tarafından elçi olarak seçilmesi dikkat çekicidir. Bu durum, Bâkılânî'nin daha önce Adudüdevle'nin huzurunda güçlü bilim adamlarıyla yaptığı başarılı münazaralara dayanmaktadır.

Örneğin Bâkılânî'ye dair ilginç bir anekdot kaynaklarda şu şekilde anlatılır: Bir gün, Râfizîlerden önde gelen İbn Muallim ve arkadaşları, sohbet ettikleri sırada Bâkılânî'yi uzaktan gözlemlemişlerdir. İbn Muallim, Bâkılânî'yi görerek, "şeytan geliyor" demiştir. Bâkılânî, bu ifadeyi duyar duymaz yanlarına yaklaşmış ve onlara Kur'an'dan şu ayeti okumuştur: "Görmedin mi, biz şeytanları kâfirlerin üzerine musallat ettik..." (Meryem, 19/83). Bâkılânî'nin bu ayeti

okuma amacı, eğer kendisi "şeytan" olarak nitelendiriliyorsa, ona bu lakabı takanların "kâfir" olduğunu ifade etmektir (Bağdâdî, 2001, s. 3/364).

Günümüzde, kamu diplomasisinin etki gücünü artıran temel aktörlerden biri kültürel diplomasi olarak öne çıkmaktadır (*Türkiye'nin Yumuşak Güç Enstrümanı Olarak Kültürel Diplomasi ve İletişim*, 2022, s. 9). Kültürel diplomasiyi kullanan bir ülke, kendi kültür ve değerlerini kullanarak, uluslararası alanda kendisine yönelik hayranlık veya takdir oluşturmayı hedefler (*Türkiye'nin Yumuşak Güç Enstrümanı Olarak Kültürel Diplomasi ve İletişim*, 2022, s. 23). Bir tanıma göre kültürel diplomasi, "ulusların kendi kültürel öğelerini bir iletişim kanalı olarak kullanarak kendilerini tanıtmalarına odaklanmaktadır" (*Türkiye'nin Yumuşak Güç Enstrümanı Olarak Kültürel Diplomasi ve İletişim*, 2022, s. 13).

Bâkılânî'nin diplomatik temasları, kültürel diplomasi kavramı çerçevesinde değerlendirilebilir. (Kâdî İyâz, 1983, s. 7/57) ifadesine göre, Adudüdevle'nin Bâkılânî'yi elçi seçmesindeki temel amaç, İslam'ın izzet ve itibarını Hristiyanlar karşısında ispat etmektir.

Kültürel diplomasinin bir yararı da ilişkilerin sertleştiği durumlarda gerilimi azaltma potansiyeline sahip olmasıdır (*Türkiye'nin Yumuşak Güç Enstrümanı Olarak Kültürel Diplomasi ve İletişim*, 2022, s. 21). Örneğin, General Bardas olayında, İmparator Basilios elçi göndererek Büveyhî devletinden isyancı Generali talep ettiğinde, Adudüdevle bu durumu yumuşatmak için elçi gönderme yoluna gitmiştir. Bu noktada, bilgi ve münazara yeteneği bakımından öne çıkan Bâkılânî'nin heyetin başında gönderilmesi, ilişkileri yumuşatma amacına hizmet etmiştir. Ayrıca, bu diplomatik temaslar sırasında kültürel etkileşimlerin öne çıkması, taraflar arasında anlayış ve uyumun artmasına katkı sağlamış olabilir.

Bu çalışma, 4./10. yüzyılda Bizans'a elçi olarak gönderilen Eş'arî kelamcısı el-Bâkılânî'nin Bizans sarayında dönemin imparatoru ve patriği ile yaptığı görüşmelere odaklanmaktadır. Bu kapsamda Hz. Muhammed'in ayı ikiye böldüğü mucizesi, Hz. İsa'nın mahiyeti, Tanrı ile insanlığın tek bir bedende birleşmesi ve Hristiyan rahiplerin iffeti gibi konulara eldeki metinlerden yola çıkarak değinilecektir. Çalışmada, el-Bâkılânî'nin kendisinden bize ulaşan görüşme metinleri kültürel diplomasi çerçevesinde değerlendirmeye çalışılacaktır.

BÂKILLÂNÎ'NİN BİZANS SEYAHATI VE MÜNAZARALARI

Bâkılânî'nin Bizans'a elçi olarak gönderilmesi konusunu seyahat için yapılan hazırlıklar ve sarayda gerçekleştirdiği münazaralar şeklinde iki ana bölümde değerlendirilebilir.

1. Seyahat İçin Hazırlıklar

Büveyhî hükümdarı Adudüddavle Bizans imparatoruna bir mektupla Kadî Ebû Bekr el-Bâkılânî elçi olarak görevlendirdi. Onun bu görev için seçilmesinin nedeni (Kādî İyâz, 1983, s. 7/57) belirttiği üzere İslam'ın izzetini ve itibarını Hristiyanlar karşısında yükseltmek içindi Bâkılânî'nin kelamcı olması, pratik bir zekaya sahip olması ve münazaracı yönünün güçlü olması bu görev için nedenli isabetli bir karar olduğu ileriki açıklamalarda görülecektir.

Bâkılânî, seyahate çıkmadan önce Büveyhî veziriyle bir görüşme gerçekleştirdi. Bu görüşmede vezir, Bâkılânî'ye şans ve uğur getirmesi amacıyla bir burç aldığını ifade etti. Buna karşılık Bâkılânî, hayır ve şerrin, sevinç ve üzüntünün yıldızların hareketlerine değil, her şeyin yaratıcısı olan Allah'a bağlı olduğunu vurguladı. Ayrıca bu tür inanışların toplum içinde var olduğuna dikkat çekti (Kādî İyâz, 1983, s. 58).

Vezir, görüşmesinde ısrarlıydı, Bâkılânî'yi İbn Sûfî adında bir müneccimle münazara yapmaya ikna etmek için çaba sarf etti. Ancak İbn Sûfî, Bâkılânî'nin kelam ilmindeki bilgilerle verdiği cevaplar karşısında sadece "Ben kelamcı birisiyle münazara yapamam" dedi ve Bâkılânî ile ancak bir mantıkçıyla münazara yapabileceğini belirtti. Bunun üzerine İbn Sûfî, Ebû Süleyman adında bir mantıkçıyı çağırdı. Mantıkçıyla gerçekleştirdiği münazara sonucunda başarılı bir performans sergileyen Bâkılânî, vezir tarafından iyi dileklerle uğurlandı (Kādî İyâz, 1983, s. 7/59).

Bu münazaradan devlet geleneğinde elçilerin uğurlanmasının vezirlerin sorumluluğunda olduğu anlaşılmaktadır. Aynı zamanda, şans getirdiğine inanılan burçların hareketlerinin dikkatlice takip edildiği ifade edilebilir. Diğer bir önemli nokta ise herkesin kendi uzmanlık alanına göre hareket etmesidir. Tartışmanın devamında Bâkılânî, Ebû Süleyman adında bir mantıkçıyla münazara yaptıktan sonra Ebû Süleyman, iki ilmin birbirinden farklı olduğunu belirterek münazarada her ilim erbabının kendi alanındaki kişilerle yapmasını istemektedir (Kādî İyâz, 1983, s. 7/59).

2. Bâkılânî Bizans Sarayında

Kaynaklardan elde edilen bilgilere Bâkılânî, uzun bir yolculuktan sonra Bizans sarayına varmıştır. Heyetin geldiğini öğrenen imparator, karşılama için saraydan birisi görevlendirdi. Saray görevlisi ya gelen heyeti küçük düşürmek ya da protokol kurallarına riayet etmeleri için onların sarık ve ayakkabılarını çıkarmalarını istedi. Fakat görevli onların tülbentle imparatorun huzuruna çıkabileceğini ifade etti.

Bâkıllânî, bu uygulamayı reddetti ve görevliye kendi yerel kıyafetiyle huzura çıkarılmadığı takdirde mektubun imparatorun okunmasının yeterli olacağını belirterek geri döneceğini söyledi. Bu durum görevli tarafından imparatora bildirilir. İmparator bunun sebebini öğrenmek istediğini söyledi. Görevli Bâkıllânî'ye bunun sebebini sordu. Bâkıllânî, bunun sebebini şöyle açıkladı: "Ben, Müslümanların ilim adamlarından biriyim. Benden istediğiniz aşağılanma ve küçük düşürülmedir. Halbuki Yüce Allah bizi İslâm ile yüceltti ve Hz. Muhammed (sav) ile üstün kıldı. Ayrıca hükümdarlar, sanları gereği elçi gönderdiklerinde onların küçük düşürülmelerini değil, değerlerinin yüceltilmelerini beklerler. Üstelik heyet başkanı bir ilim adamı ise, bu daha çok beklenir." Bu durum kendisine iletildiğinde İmparator, "Bırakın o ve yanındakiler istedikleri gibi girsinler" emrini verdi (Kādî İyâz, 1983, s. 7/60-61).

Görüşme sırasında saray görevlisi tarafından sarık ve ayakkabının çıkarılma talebinin, heyetin küçük düşürülme amacını taşıdığı görülmektedir. Zira görevli, tülbentle imparatorun huzuruna çıkarılabileceklerini ifade etmektedir. Ayrıca, mektubun Büveyhî hükümdarı tarafından bizzat kaleme alındığı çıkarımı da yapılabilir. Çünkü Bâkıllânî, yerel kıyafetiyle imparatorun huzuruna kabul edilmemesi durumunda, "mektubu alın, okuyun, cevabını yazın, ve biz dönelim" demiştir. Mektubun başkaları tarafından yazılması durumu ise diplomatik krizlere yol açabilir. Bu bağlamda, günümüzdeki bir olayda (<https://www.aa.com.tr/tr/dunya/abde-bu-kez-baska-bir-diplomatik-protokol-sorunu/2210006>) Ukrayna Devlet Başkanı Zelenskiy tarafından AB Komisyonu Başkanı von der Leyen'e gönderilen resmi davet mektubuna von der Leyen'in değil, özel kalem müdürünün cevap yazdığı ortaya çıkmıştır.

Bâkıllânî, ısrarlı bir şekilde ilim adamı olduğunu vurgulayarak taviz vermeden ilim adamına yakışır bir şekilde davranmış ve özgüvenle hareket etmiştir. Onuruna verilen yemeğe ancak prensipleri doğrultusunda katılabileceğini belirterek aksi takdirde katılmayacağını ifade etmiştir. Görevli, "sofrada hoşunuza gitmeyecek bir yiyecek olmayacak. Sunulanları beğeneceğinizi umuyoruz. Çünkü siz, diğer elçiler gibi değil, yüce bir konumdasınız. Aramızda rahatsızlık yaratan domuz eti gibi şeyler soframızda bulunmamaktadır" şeklinde bir güvence vermiştir. (Kādî İyâz, 1983, s. 7/61).

Kabul onayı alınmasına rağmen, imparatorun heyeti küçük düşürme çabalarının devam ettiği söylenebilir. Çünkü Bâkıllânî, heyetle birlikte dinlenmek için ayrılan yere gittikten bir müddet sonra, imparatorun huzuruna çıkmak üzere geldiğinde, rivayetlere göre imparator, heyetin huzura girmesi için rükû pozisyonunda geçilebilecek olan kapının arkasına kendi tahtını koyar. Bâkıllânî, bu durumu anlayarak pratik zekâsıyla hareket eder ve diplomatik kurallara aykırı

olan bu aşığlayıcı durumu bertaraf etmek amacıyla arkasını dönerek içeri adım atar. Bu manevra, kralın kurduğu tuzaktan kaçınmasını sağlar ve saygın bir diplomatik duruş sergiler (Bağdâdî, 2001, s. 3/364).

3. Bizans Sarayında Yaptığı Münazaralar

Saraydaki münazaralar, akşam yemeğinden sonra üç oturum gerçekleşmiş, ancak bu oturumlar bir tür kokteyl formatında düzenlenmiştir. Zira Bâkılânî'nin ifadelerinden bir oturumdan diğerine geçtiği anlaşılmaktadır. Aynı şekilde, imparator, Bâkılânî'nin ilmi birikimini fark edince her seferinde onu başka bir din adamıyla tartışmaya yönlendirmiştir (Karadaş Çağfer, 2009, ss. 7-9).

Bâkılânî, bu oturumlarda özellikle teolojik münazaralar gerçekleştirmiştir. Kaynaklarda, Bâkılânî'nin ayın yarılması ve Hz. İsa'nın ilah olma konularını tartıştığı belirtilmiştir. Dördüncü oturum ise farklı bir günde yapılmıştır. Çünkü kaynaklarda imparatorun farklı bir günde randevu verdiği ve Bâkılânî'nin oldukça ihtişamlı bir elbiseyle bu oturuma katıldığı belirtilir (Karadaş Çağfer, 2009, s. 10). Beşinci bir oturum olarak ise her ne kadar tüm kaynaklarda geçmese bile "ifk" hadisesi olarak bilinen Hz. Âişe'ye atılan iftira olayını içermektedir (Ebü'l-Kâsım İbn Asâkir, 1389, ss. 218-219).

3. 1. I. Oturum: Ayın Yarılması Hadisesi

Büveyhî hükümdarı mektubunda Bâkılânî için "Müslümanların sözcüsü ve münazaracısı" şeklinde bir ifade kullanmıştır (Kādî İyâz, 1983, s. 7/61). Muhtemelen Bâkılânî'nin bu özelliğini çok merak etmiş olacak ki; münazara için hemen hazırlıklara başlanmasını istemiştir. Nitekim daha önce de belirtildiği gibi hükümdarın huzurunda hem de özel olarak Sünnî çevrelerden Şiîlere, Mu'tezile âlimlerinden hatta münecimlere kadar geniş bir yelpazede gerçekleştirmiştir.

Yemek sonrasında, tespit edildiği kadarıyla üç oturum şeklinde münazaralar yapılmıştır. Bu münazaralardan biri, Hz. Peygamber'in ayın yarılması mucizesidir. İmparator, tüm insanların bu olayı görmemişken, böyle bir mucizenin gerçekliğini nasıl savunabildiğini sormuştur. Bâkılânî'nin cevabı şu şekildedir: "Sofranın etrafındaki insanlar görebilirken, burada bulunmayanlar bunu görmemektedir. Bu durum, sofranın varlığına zarar verir mi?" fakat imparator Bâkılânî'yi zor durumda bırakma derdinde idi. Bu yüzden Patrik'i çağırdı. Muhtemelen gelen din adamı coğrafya ve felsefe bilgisine sahip bir din adamıydı. Bu yüzden Bâkılânî coğrafi bilgilerle cevap vermiştir. Ona "Dünyanın küre şeklinde olduğu bilinmektedir.

Bir yerde Ay veya Güneş tutulması yaşanırken, diğer bazı yerlerde bu olay meydana gelmemektedir. Bu tutulmaların bazı yerlerde yaşanmaması, bu olayın meydana gelmediğini göstermez"(Ebû Ali Ömer es-Sekûnî, 1976, s. 247) diye cevap vermiştir.

Bâkılânî'nin ifade etmek istediği, bu olayın özel bir durum olduğudur. Ayrıca, dünyanın küresel bir şekle sahip olduğuna dair vurgu yaparak, bu açıklama ortaçağda yaşamış Müslüman bir bilginin entelektüel seviyesini yansıtmaktadır. İkinci cevap olarak Bâkılânî teolojik bir takım değerlendirmelerde bulunur. Ona göre Hz. İsa'ya gökyüzünden indirildiğine inanılan sofranın hakikati neyse ayın yarılması da öyledir. Çünkü sofranın indirilmesi hadisesi Müslümanlar dışında Yahudiler ve diğer din mensupları tarafından kabul edilmemesine rağmen bu Hristiyanlar açısından inanılması gereken bir olaydır (Kâdî İyâz, 1983, s. 7/64).

3. 2. II. Oturum Hz. İsa'nın Yaratılışı

Kaynaklardan anlaşıldığı kadarıyla imparator Bâkılânî'yi yanına alarak başka bir topluluğa götürdü ve ona Hz. İsa'nın yaratılışıyla ilgili soru sordu. Bâkılânî, cevabını Kur'an ayetiyle verir: "Şüphesiz, Allah Katında İsa'nın durumu, Âdem'in durumu gibidir. Onu topraktan yarattı, sonra ona 'ol' dedi, o da hemen oldu" (Kur'an Yolu, Âli İmrân, 3/59). Ancak bu cevap, Hz. İsa'yı ilah olarak gören imparatorun hoşuna gitmez. Onlardan gelen itirazlar üzerine Bâkılânî, "Allah ne çocuk edinir ne de eş; öyleyse İsa'nın kardeşi, dedesi, amcası, halası kimdir?" diye sorarak noktayı koyar. Hristiyan din adamları, Hz. İsa'nın gerçekleştirdiği mucizeleri anlatarak ölüleri dirilttiğini ve çeşitli hastalıkları iyileştirdiğini savunurlar. Bâkılânî ise bu olayların Allah'ın dilemesiyle gerçekleştiğini ve mucizelerin Allah'ın peygamberlerine bahşettiği bir armağan olduğunu vurgular. Ayrıca, eğer Hz. İsa'nın ölüleri dirilttiği iddia ediliyorsa, bu durumda Hz. Musa'nın Kızıldeniz'i kendi iradesiyle ikiye ayırdığı da gündeme gelir; bu da ona göre, mucizelerin Allah'ın peygamberlerini desteklemek ve muhalifleri aciz bırakmak için verilen bir armağan olduğunu ve Allah'ın iradesiyle gerçekleştiğini gösterir (Kâdî İyâz, 1983, s. 7/65-66).

3. 3. III. Oturum Hz. İsa'nın Beşer Olması

Bu oturumun ikinci oturumun devamı olduğu söylenebilir. Çünkü önceki oturumlarda imparator ve Patrik soru sorarken bu oturumda Bâkılânî'nin soru sormuştur.

Bâkılânî imparatora şöyle bir soru sorar: "ilahî olanla beşerî olanın birleşmesi ne demektir?" (Hz. İsa'yı kastediyor) İmparator " bununla yani tanrının insan şeklinde yeryüzüne inmesiyle insanları helak olmaktan kurtarmak içindi" dedi. Bunun üzerine Bâkılânî, ona şu soruyu sordu:

"Mesih, öldürüleceğini, çarmıha gerileceğini, kendisine bu tür şeylerin yapılacağını ve Yahudilerin ona inanmayacağını biliyor muydu? Eğer 'O, Yahudilerin kendisine yapmak istedikleri şeyi bilmiyordu' dersek, bu durumda onun ilahlığının geçerliliği ve gerçekliği söz konusu olamaz. İlah olması geçerli ve gerçek değilse, O'nun Tanrı'nın Oğlu olma iddiası da geçerli değil ve gerçek dışı olur. Eğer 'Anılan şeyleri biliyordu' dersek, bu durumda O'nun bilgeliği sorgulanmalıdır. Bu durumda O, hikmet sahibi değildi demektir, çünkü hikmet, kişiyi bela ve musibetlerden korur." Bu ifadeler karşısında İmparator, sessiz kalmak zorunda kaldı (Kādî İyâz, 1983, s. 7/65-66).

3. 4. IV. Oturum Hz. İsa'nın Allah'ın Oğlu Olması

İlk üç oturumdan sonra imparator Hristiyanların toplantı yaptıkları bir yerde münazara yaptırmak için randevu verdi. Oturum düzeni kuruldu. Bâkılânî oldukça şık bir elbiseyle geldi. İmparator onu oturduğu kürsünün yanında olan başka bir kürsüye oturttu. Hristiyan din adamı Patrik de toplantıya katıldı. Herkes yerini aldı. Patrik geldiğinde Bâkılânî, onu selamladıktan sonra ona " aile efradınız, çoluk-çocuğunuz nasıllar?" diye hitap etti. Bu sözler başta Patrik olmak üzere orada bulunanların ağırına gitti. Çünkü Hristiyan din adamlarına çocuk demek, onlara evlenmemeleri gerektiğini hatırlatan saygısız bir ifadedir. Bunu fark eden Bâkılânî, bu durumu değerlendirerek hemen şu sözleri sarf eder: "Siz Allah'a çocuk isnat ederken yüzünüz düşmez" (bu noktada Hz. İsa'nın Allah'ın oğlu olduğu inancını ima etmektedir), "ama Patrik'e çocuk isnat edilmesine karşı çıkıyorsunuz"(Ebü'l-Abbâs Şemsüddîn Ahmed b. Hallikân, 1978, s. 219). Buna cevap veremediler. Kaynaklarda bu münazaradan sonra imparatorun din adamına dönerek "bu şeytana nasıl bir muamelede bulunalım" diye danıştığı Patrik, imparatora şunları söyledi: "Gerekli adımları at, sultanlarına lütüfkâr davran, ona hediyeler gönder ve eğer mümkünse bu Iraklıyı hemen ülkenden çıkar. Aksi takdirde, Hristiyanlar arasında bir fitne çıkmasından endişe ederim." İmparator, patriğin önerilerini uygun buldu ve hızla Adudüddevle'ye nazik ve olumlu bir cevap mektubu yazdı. Ayrıca, birlikte gönderilmek üzere değerli hediyeleri hazırlattı. Yanlarında birçok Müslüman esir ve Kur'an Mushaf'ı bulunuyordu. Güvenli bir yere kadar, yanlarına bir asker müfrezesinin eşlik etmesini emretti (Kādî İyâz, 1983, s. 7/68)

3. 5. İfk Hadisesiyle İlgili Yaptığı Münazara

Bu konuyla münazaranın önceki oturumlarla beraber mi, yoksa başka bir oturum şeklinde gerçekleştiğiyle ilgili bilgi bulunmamaktadır. Bâkılânî'nin Bizans sarayında yaptığı münazaraları oturum şeklinde aktaran Kādî İyâz'ın eserinde bu konu yer almamaktadır. Fakat

(İbn Asâkir, 1389, ss. 218-219) aktardığı gibi bu konu da Bâkılânî'nin yapmış olduğu münazaralardan biri olarak zikredilebilir. Çünkü tarih boyunca Hristiyanların Müslümanlara sordukları sorulardan biri "ifk"¹ hadisesidir.

Hristiyan din adamlarından biri alaycı bir üslupla "Peygamberinizin (ifk hadisesini kast ederek) eşi Aişe'ye ne olmuştu?". Bu olaya karşı Bâkılânî, hem hazır cevap hem de sorularla karşılık verebilen yetenekli bir âlim olarak öne çıkar. Bâkılânî, hem Hz. Âişe'nin hem de Hz. Meryem'in suçsuz ve iffetli kadınlar olduğunu belirttikten sonra, Hz. Âişe'ye yöneltilen iftiranın gerçek olması durumunda bile, Hz. Âişe'nin çocuksuz öldüğü bilgisinin bulunduğunu ifade eder. Ayrıca, Hz. Meryem'in evlenmeden çocuk doğurduğu ve kendisine benzer bir iftiranın atıldığına dikkat çeker. Buna göre, Bâkılânî, Hz. Meryem'e yöneltilen iftiranın, Hz. Âişe'ye yapılan iftiradan daha büyük bir iftira olduğunu vurgular. İfadenin temelinde, Hristiyan din adamlarına hitaben, kendi peygamberlerine yönelik yapılan iftiranın, onların anladığı çerçevede daha büyük bir çelişki içerdiği düşüncesi yatar (İbn Kesîr, 1990, s. 11/350).

SONUÇ

Bâkılânî'nin Bizans sarayındaki münazara, IV/X. Yüzyılın siyasi, dini ve kültürel durumunu yansıtan önemli bir belge olarak değerlendirilebilir. Ancak, münazara hakkında eldeki bilgilerin tek taraflı olması ve Bizans kaynaklarında geçmemesi, sağlıklı bir değerlendirmeyi engellemektedir.

Ele alınan münazarada, elçinin uğurlanışı ve karşılanması gibi detaylara yer verilmesi, dönemin diplomasi protokolünü yansıtmaya açısından önemli bir katkı sunmaktadır. Elde edilen bilgiler, bu münazaranın sadece iki farklı inanç sistemini değil, aynı zamanda diplomatik ilişkilerin dinamiklerini de anlamak adına önemlidir. Ayrıca Bâkılânî'nin Bizans sarayını gözlemlemesi

¹ İfk olayının gelişimi şu şekildedir: Hz. Peygamber ve beraberindeki gaziler, 627 yılında Müreysî Gazvesinden dönerken bir mola yerinde durmuşlardı. Hz. Âişe, mola sırasında düşürdüğü gerdanlığını bulmak için deve üzerindeki tahtrevandan inip aramaya başladı. Ordu, onu fark etmeyip devam edince, geride bekleyerek kendisini alacaklarını umdu. Safvân b. Muattal, mola yerini kontrol etmek ve unutulmuş eşyaları toplamak için dönerken Hz. Âişe'yi orada gördü ve devesine bindirip yanlarına getirdi.

Bu olay, başlangıçta pek dikkat çekmedi, ancak münafıklardan Abdullah b. Ubey'in bu durumu büyütmesi ve saptırmasıyla Hz. Âişe aleyhine bir iftira kampanyasına dönüştü. Ortaya çıkan dedikodu ve fitne, Hz. Peygamber'i, Hz. Âişe'yi ve tüm Müslümanları bir ay boyunca derinden üzdü.

Yüce Allah'ın indirdiği Nur Suresi ayetleriyle bu kampanyanın bir iftira olduğu açıkça belirtildi: "İftira atanlar sizden küçük bir gruptur. Bunu bir şer olarak görmeyin, aksine o bir hayırdır. O iftira edenlerden her birine iftirası nispetinde bir günah vardır. Bu iftira işinde başrol oynayana, büyük bir azâb söz konusudur. Bu iftirayı duyduğunuzda, mümin erkekler ve kadınlar, 'Bu apaçık bir iftiradır.' deyip birbiriniz hakkında iyi duygular ve düşünceler içinde olmanız gerekmez miydi? Dört şahid getirseler ya! Eğer dört şahid getiremiyorlarsa Allah katında onlar yalancılardır." (Nûr 24/11-13)

Bu ayetlerle Hz. Âişe, Yüce Allah tarafından aklanmış oldu. Bk. (<https://islam-tr.org/konu/bizans-sarayinda-bir-islam-alimi-bakillani>). 59505.08/11/2023).

ve bu deneyimleri aktarması, o döneme ait devlet kurumlarını günümüze taşıma konusunda önemli bir kaynak sağlamaktadır.

Münazarada ele alınan konular İslam'ın ilk döneminde gerçekleşen münazara örnekleriyle paralellik göstermektedir. Bu münazaranın diğer münazaralardan farkı ilk defa İslam coğrafyasının dışında gerçekleşmiş olmasıdır. Bâkılânî'nin, İslam coğrafyası dışında böyle bir münazara gerçekleştirmesi, onun donanımlı bir ilim adamı ve münazara konusunda yetkin bir kişi olduğunu göstermektedir.

Münazara sırasında yaşanan gerilime rağmen, tartışmanın hoşgörü ortamında geçtiği söylenebilir. Münazara, günümüzde kamu diplomasinin bir parçası olan kültürel diplomasisinin erken örneklerinden biri olarak kabul edilebilir. Çünkü kültürel diplomaside ilişkilerin sertleştiği bir dönemde gerilimi azaltma amacı taşımaktadır. Münazaranın sonunda İmparatorun Bâkılânî ve heyette bulunan diğer kişilere hediyeler vermesi, Büveyhî hükümdarına bir mektup göndermesi ve ayrıca henüz hangi sebeple esir tuttuğunu bilmediğimiz Müslüman esirleri ve ele geçirdiği Kur'an Mushaflarını geri vermesi bunu göstermektedir.

Devlet düzeyinde gerçekleştirilen münazarayı günümüzde yürütülen "psikolojik savaşın" bir örneği olarak değerlendirmek mümkündür. Çünkü bu çalışmada anlatıldığı gibi, münazara, iki karşıt görüşün mücadelesi gibi bir müsabaka olarak ortaya çıkmıştır, adeta iki güçlü pehlivanın güreşmesi veya iki devletin savaşı gibi gerçekleşmiştir.

Bâkılânî'nin ilim adamı kimliğini koruyarak seyahat boyunca taviz vermemesi, saygı gösterilmesi gereken bir tutumu yansıtmaktadır. Bu durum, ilim adamının özgüvenini ve kültürel diplomasi alanındaki etkinliğini göstermektedir.

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BANKACILIK SEKTÖRÜNDE SATIŞ BASKISININ ÖRGÜTSEL SİNİZME ETKİSİNİN ANALİZİ: KIRŞEHİR İLİ ÖRNEĞİ

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Özet

Günümüzde giderek artan rekabet koşulları karşısında, piyasaların değişmesi ve hizmet sektörünün gelişmesiyle birlikte örgütlerin çalışanlarından beklentileri farklılaşmaya başlamıştır. Teknolojik gelişmeler ile birlikte, bankacılık sektörü de değişmekte, yaşanan sorunlar geçmişe oranla çeşitlenmekte ve çalışanların işyerlerindeki stres sorunu gün geçtikçe artmaktadır. Artan sorunların başında banka çalışanlarının hedef baskısı altında yoğun stres yaşaması ve bu stres davranışını yönetememesi, sorun çözme becerilerinden yoksun kalması, kendi haline sorunlarla baş etme kapasitesinin geliştirememesine istinaden ‘sinik davranışlar’ göstermesi durumu ortaya çıkmıştır. Banka çalışanlarının yaşamış olduğu ‘mesleki tükenmişlik’ onları sinizme itmiştir. Bu çalışma ile hedef baskısı ve örgütsel sinizm kavramları arasındaki ilişkileri tespit etmek amaçlanmıştır. Çalışmanın ana kütesini Kırşehir ili sınırları içindeki kamu ve özel sektör banka personeli oluşturmaktadır. Çalışmanın amacı, bankacılık sektöründe ki satış baskısının örgütsel sinizm üzerinde aracılık rolünün olup olmadığının tespit edilmesidir.

Anahtar Sözcükler: Bankacılık Sektörü, Hedef Baskısı (Satış Baskısı) , Örgütsel Sinizm.

ANALYSIS OF THE EFFECT OF SALES PRESSURE ON ORGANIZATIONAL CYNICISM IN THE BANKING SECTOR: THE CASE OF KIRŞEHİR PROVINCE

Abstract

Today, in the face of increasingly competitive conditions, with the change of markets and the development of the service sector, the expectations of organizations from their employees have begun to differ. Along with technological developments, the banking sector is also changing, the problems experienced are becoming more diverse compared to the past, and the stress problem of employees in the workplace is increasing day by day. One of the increasing problems is that bank employees experience intense stress under target pressure and cannot manage this stress behavior, lack problem-solving skills, and show "cynical behavior" due to their inability to develop the capacity to deal with problems on their own. The "professional burnout" experienced by bank employees has pushed them into cynicism. This study aimed to determine the relationships between the concepts of goal pressure and organizational cynicism. The main population of the study consists of public and private sector bank personnel within the borders of Kırşehir province. The aim of the study is to determine whether sales pressure in the banking sector has a mediating role on organizational cynicism.

Key Words: Banking Sector, Target Pressure (Sales Pressure), Organizational Cynicism.

Giriş

Bankacılık sektörü, finansal sektör içinde önemli bir alt sektör olarak yer almaktadır ve ekonomik faaliyetin kalbi durumundadır. Ekonomik büyümenin finansmanında önemli bir rol oynar. Tasarruf sahiplerinin, hane halkının, girişimcilerin, yatırımcının, üreticinin, özel ve kamu sektörünün çok önemli bir paydaşıdır (www.tbb.org.tr).

Bankacılık; finansal hizmetlerin gerçekleştirildiği sektör olup, bireylerin ve işletmelerin mali ihtiyaçlarını karşılamaktadır. Teknolojinin gelişmesi ile birlikte bankacılık sektörü de bu gelişmeye paralel olarak büyük değişim yaşamıştır. Böylelikle finansal işlemler daha hızlı erişilebilir hale gelmiştir. Bunun sonucu olarak bankalar sadece yerel pazarlarda değil, küresel pazarlarda da rekabete açık hale gelmiştir. Değişen pazar ortamında ayakta kalabilmek için yenilikçi ürünler ve hizmetler sunmaya başlayan sektördeki bankalar rekabetin gittikçe artmasına yol açmıştır. Bankalar arasındaki bu rekabet, bankaların kendi şubeleri arasında bile kendini göstermektedir. Karlılık ve en büyük olma yarışı, bankaların ürün yelpazesinin her geçen gün genişlemesine, bu da çalışan personelin iş yükünün giderek artmasına yol açmaktadır (Taşkın vd, 2010: 12). Rekabetin artması ile birlikte bankalar personellerinden daha yüksek performans bekleyebilmektedirler. Bu da personelin mevcut iş yükünü arttırmakta ve personelin daha fazla stres yaşamasına yol açmaktadır.

En basit tanımıyla hedef; varılmak istenen nokta olarak tanımlanabilir (Seferoğlu, 2012:1). Bir hayalin, bir fikrin, belirli bir tarih ve zaman çerçevesinde, eyleme dönüştürülerek, harekete geçirilmesi de hedef kavramının başka bir tanımıdır (Onaran 1981:205).Hedef baskısının en yaygın olarak görüldüğü sektörlerden biri bankacılık sektörüdür. Bankacılık sektöründe görülen hedef baskısı; banka çalışanın performansının düşmesine, verimsizliğe, ruhsal ve bedensel sağlığında bozulmaya yol açıp örgüt içinde de örgütsel sinizme ortam hazırlamaktadır.

Günümüzde örgütsel sinizm, örgütün dürüstlükten, adaletten ve doğruluktan yoksun olduğuna inanmaları sonucu çalışanların örgütüne karşı olumsuz duygu ve güvensiz tutum geliştirmesi ile ortaya çıkmaktadır (Abraham, 2000; Karacaoğlu ve İnce, 2012).Personelin işyerinde genellikle negatif bir tutum geliştirdiği durumu ifade etmektedir. Bu durum, işyerinde umutsuzluk, motivasyon kaybı, performansta düşüşe neden olabilmektedir.

YÖNTEM

Araştırmanın Amacı ve Önemi

Hedef baskısı ve örgütsel sinizm kavramları son yıllarda başta örgütsel davranış olmak üzere birçok disiplinin ilgi odağı olmuştur. Ancak ülkemizde gerek örgütsel sinizm ve gerekse hedef

baskısı konularında çok fazla teorik araştırma yapılmamıştır. Bu çalışma ile hedef baskısı ve örgütsel sinizm kavramları arasındaki ilişkileri tespit etmek amaçlanmıştır.

Tüm bu araştırmaları göz önüne alarak gerçekleştirilen bu araştırmanın amacı hedef baskısı ile örgütsel sinizm arasındaki ilişkileri ortaya koyacak bir model oluşturmak ve test etmektir.

Araştırmanın Kapsam ve Sınırlılıkları

Çalışmanın ana kütlesi Kırşehir ili sınırları içindeki kamu ve özel sektör banka personelidir. Çalışmada kartopu örnekleme yöntemi kullanılmıştır. Ankete katılan şube personelleri ilk olarak tesadüfi belirlenmiştir. Sonrasında kendileri gibi satış baskısına maruz kalan diğer bankacı personellere de anketi ulaştırmaları istenmiştir. Kırşehir ili içerisindeki kamu ve özel sektör bankalarının hepsi çalışma kapsamına dâhil edilmiştir.

Örneklem Kitle

Araştırmanın örneklem kitle Kırşehir’de faaliyet gösteren kamu ve özel bankalarıdır. Kırşehir’de ki mevcut bankalarda çalışan toplam 297 banka çalışanı ve yöneticileri arasından 100 kişi bu ankete katılmışlardır.

Verilerin Toplama Aracı

Bu çalışmada; katılanlara ait yaş, cinsiyet, statü, görev yapılan birim, sektördeki deneyim yılı ve bankanın türü olmak üzere 6 demografik soruya ankette yer verilmiştir.

Araştırmanın amacını gerçekleştirmek üzere, satış baskısı ve örgütsel sinizm kavramı üzerine literatür taraması yapılmıştır. Yapılan tarama sonucunda her iki kavram için en uygun ölçekler belirlenmiş ve anket çalışması hazırlanmıştır. Hazırlanan anket çalışması 2 aşamadan oluşmaktadır. Anket formunun ilk bölümü katılımcıların hedef baskısı algılarını belirlemek amacıyla Soygür ve Aydın tarafından geliştirilen tek boyutlu ve 8 ifadeden oluşan Hedef Baskısı ölçeğinden oluşmaktadır. Anket formunun ikinci bölümünü ise Brandes, Dharwadkar ve Dean (1999) tarafından geliştirilmiş olan 13 maddelik ve araştırmacı tarafından açıklayıcı ve doğrulayıcı faktör analizleriyle geçerlik ve güvenilirlik çalışmaları yapılmış “ Örgütsel Sinizm Ölçeği” oluşturmaktadır.

Araştırmada Hedef Baskısı Ölçeği ve Sinizm ölçeği kullanılmıştır. Elde edilen bulgular SPSS programı ile analiz edilmiştir. Katılımcıların demografik özelliklerine göre dağılımlarının belirlenmesinde frekans ve yüzde analizinin yanı sıra araştırmada kullanılan ölçeklere ait katılımcıların düzeylerinin belirlenmesinde ortalama ve standart sapma kullanılmıştır. Ölçeklerin güvenilirliklerinin incelenmesi için cronbach’s alpha güvenilirlik analizi yapılmış ve tüm ölçüm araçlarına ait güvenilirlik düzeylerinin 0.70’in üzerinde olduğu belirlenmiştir. Ölçeklerin faktör yapılarının bu çalışmanın örnekleme içinde doğrulanıp doğrulanmadığının test

edilmesi için LISREL 8.7 programı yardımı ile DFA analizi yapılmıştır. DFA’da modelin uygunluğunun tespit edilmesinde kullanılan çeşitli uyum indeksleri bulunmaktadır. Bu çalışmada Ki kare uyum iyiliği indeksi ile birlikte, CFI, RMSEA, SRMR, NFI, NNFI gibi uyum kriterleride dikkate alınmış olup uyum aralıkları tablo 1’de verilmiştir (Schermele-Engel ve Moosbrugger, 2003). Araştırmanın amacına uygun olarak kurulan hipotez ve alt problemlerin test edilmesinde istatistiksel olarak %95 güven düzeyinde test edilmiş olup bağımsız değişkenler ile bağımlı değişkenlerin arasındaki ilişkinin verilerin dağılımın normal olması nedeniyle Pearson Korelasyon analizi yapılmıştır. Aynı zamanda ölçümlere göre ikili gruplar arasındaki farkın belirlenmesinde bağımsız örneklem t-testi, ikiden fazla gruplar için tek yönlü Anova testi yapılmıştır.

Tablo 1: Araştırmada Kullanılan Uyum İndeksleri Aralıkları

Uyum Kriterleri	Mükemmel Uyum	Kabul Edilebilir Uyum
χ^2/df	≤ 3	≤ 5
RMSEA	$0 < RMSEA < 0.05$	$0.05 \leq RMSEA \leq 0.10$
SRMR	$0 \leq SRMR < 0.05$	$0.05 \leq SRMR \leq 0.10$
NFI	$0.95 \leq NFI \leq 1$	$0.90 \leq NFI \leq 0.95$
NNFI	$0.95 \leq NNFI \leq 1$	$0.90 \leq NNFI \leq 0.95$
CFI	$0.95 \leq CFI \leq 1$	$0.90 \leq CFI \leq 0.95$

BULGULAR ve YORUMLAR

Araştırmanın bu kısmında araştırmada ulaşılan bulgulara ait analiz sonuçlarına yer verilmiştir.

Geçerlilik ve Güvenirlilik

Ölçeklere Ait Güvenirlilik Düzeyleri ve DFA Sonuçları

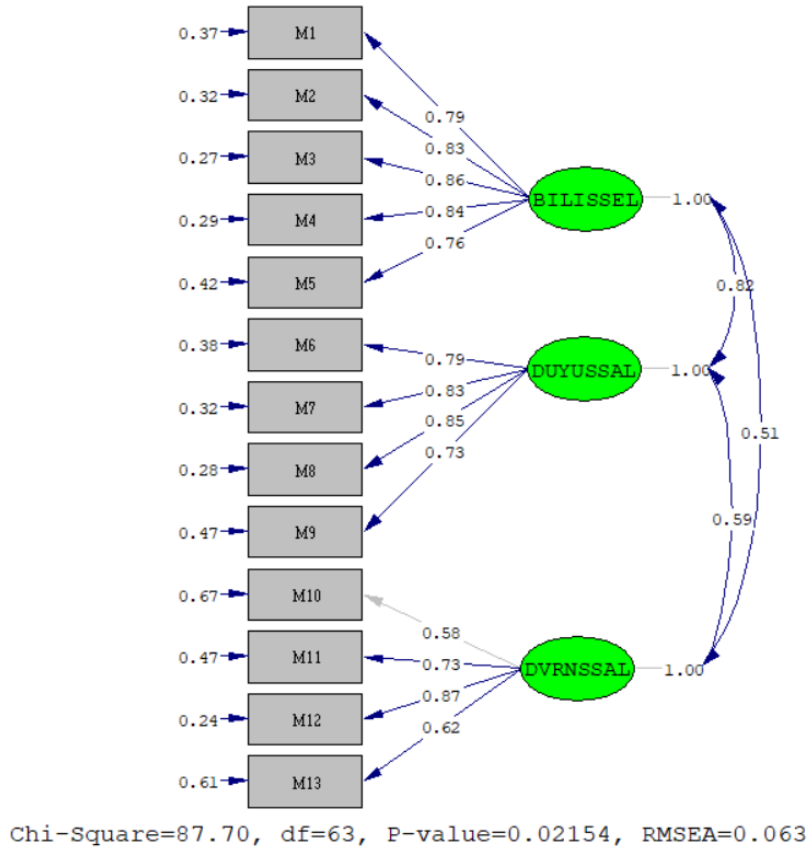
Tablo 2: Araştırmada Kullanılan Ölçme Araçlarının Bu Çalışmaya Ait Güvenirlilik Düzeyleri

Ölçümler	Cronbach’s Alpha
Bilişsel Boyut	0,906
Duyuşsal Boyut	0,868
Davranışsal Boyut	0,733
Sinizm Ölçeği	0,902
Hedef Baskısı Ölçeği	0,939

Araştırmada kullanılan ölçeklere ait güvenilirlik düzeylerinin incelenmesinde cronbach's alpha güvenilirlik analizi yapılmış olup, her bir ölçeğin ve alt boyutunun güvenilirlik düzeyinin yüksek düzeyde olduğu belirlenmiştir (Cronbach's alpha>0.70).

Örgütsel Sinizm Ölçeğine Ait DFA Sonuçları
Ölçeğin açıklanan faktör yapısının doğrulanıp doğrulanmadığının belirlenmesi için doğrulayıcı faktör analizi yapılmıştır. Ölçeğin DFA'sına ait path diyagramı şekil 1'de sunulmuştur.

Şekil 1 incelendiğinde örgütsel sinizm ölçeği aracının DFA bulgularına göre, maddelere ait faktör yük değerlerinin 0.58–0.86 arasında olduğu görülmektedir. Bu değerler faktör yükleri sınırları için kabul görülen değerlerdir. Maddeler ile örtük değişkenler arasındaki korelasyonların anlamlı olduğu belirlenmiştir ($t>2,58$). Path diyagramları incelendiğinde maddeler arasında modifikasyon yapılmasına gerek duyulmamış olup M10 maddesinin faktör yükü 0.50'nin üzerinde olması için fiksleme yapılmıştır. Ölçekteki tüm maddelere ait t değerinin 2.58'den büyük olduğu bu nedenle tüm maddelere ait faktör yüklerinin ölçek boyutları üzerindeki etkilerinin %99 güven düzeyinde anlamlı olduğu belirlenmiştir. DFA sonucu ulaşılan uyum indekslerine ait sonuçlar tablo 4'de gösterilmiştir.



Şekil 1: Örgütsel Sinizm Ölçeğine Ait DFA Path Diyagramı

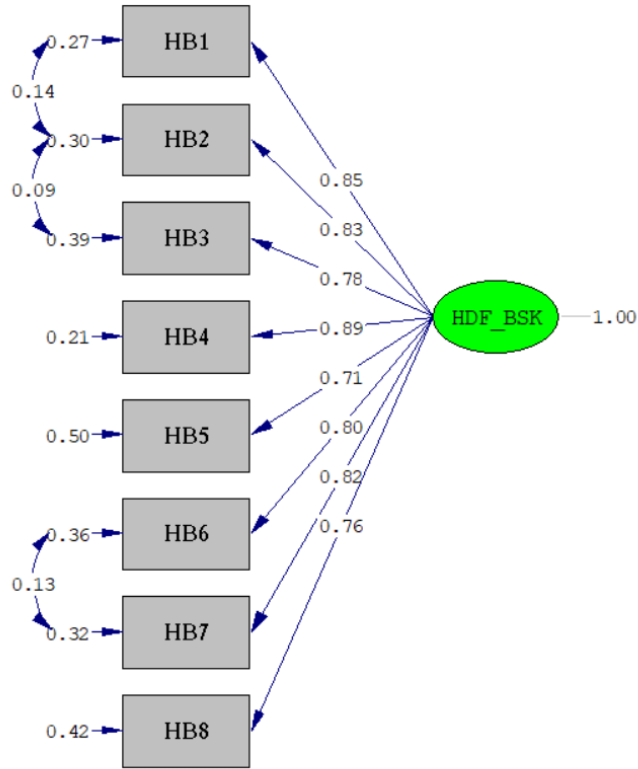
Tablo 3: Örgütsel Sinizm Ölçeği Uyum İyiliği Değerleri

X ² /df	RMSEA	CFI	NNFI	NFI	SRMR
1,392	0,063	0,98	0,98	0,94	0,092

Bir modelin bütün olarak kabul edilebilir olması için raporlanan uyum iyiliği değerlerinin kabul edilebilir veya mükemmel uyum sınırları içerisinde düşmesi gerekmektedir. DFA sonucu elde edilen uyum kriterleri değerleri incelendiğinde X² değerinin df değerine olan oranının 1,392 ile mükemmel uyum düzeyinde, RMSEA değerinin ise 0,063 ile kabul edilebilir uyum düzeyinde olduğu, diğer uyum değerlerinin de mükemmel ve kabul edilebilir uyum değerleri içerisinde yer aldığı belirlenmiştir. Bu sonuç açıklanan faktör yapısının doğrulandığını göstermektedir.

Hedef Baskısı Ölçeğine Ait DFA Sonuçları

Ölçeğin açıklanan faktör yapısının doğrulanıp doğrulanmadığının belirlenmesi için doğrulayıcı faktör analizi yapılmıştır. Ölçeğin DFA'ına ait path diyagramı şekil 2'de sunulmuştur.



Chi-Square=29.33, df=17, P-value=0.03157, RMSEA=0.086

Şekil 2: Hedef Baskısı Ölçeğine Ait DFA Path Diyagramı

Şekil 2 incelendiğinde örgütsel sinizm ölçme aracının DFA bulgularına göre, maddelere ait faktör yük değerlerinin 0.71–0.89 arasında olduğu görülmektedir. Bu değerler faktör yükleri sınırları için kabul görülen değerlerdir. Maddeler ile örtük değişkenler arasındaki korelasyonların anlamlı olduğu belirlenmiştir ($t > 2,58$). Path diyagramları incelendiğinde modelin kabul edilebilir uyum aralığına gelmesi için Madde 1- Madde 2, Madde 2-Madde3 ve Madde 6-Madde 7 arasında modifikasyon yapılmasına gerek duyulmuştur. Ölçekteki tüm maddelere ait t değerinin 2.58'den büyük olduğu bu nedenle tüm maddelere ait faktör yüklerinin ölçek boyutları üzerindeki etkilerinin %99 güven düzeyinde anlamlı olduğu belirlenmiştir. DFA sonucu ulaşılan uyum indekslerine ait sonuçlar tablo 5'de gösterilmiştir.

Tablo 4: Hedef Baskısı Ölçeği Uyum İyiliği Değerleri

Modifikasyon	X²/df	RMSEA	CFI	NNFI	NFI	SRMR
Öncesi	3,997	0,175	0,96	0,94	0,94	0,050
Sonrası	1,725	0,086	0,99	0,99	0,98	0,036

DFA sonucu elde edilen uyum kriterleri değerleri incelendiğinde X² değerinin df değerine olan oranının 1,725 ile mükemmel uyum düzeyinde, RMSEA değerinin ise 0,086 ile kabul edilebilir uyum düzeyinde olduğu, diğer uyum değerlerinin de mükemmel ve kabul edilebilir uyum değerleri içerisinde yer aldığı belirlenmiştir. Bu sonuç açıklanan faktör yapısının doğrulandığını göstermektedir.

Demografik Bulgular

Araştırmanın demografik özelliklerine ait bulgular Tablo 2'de verilmiştir.

Tablo 5: Katılımcıların Demografik Özelliklerine Ait Bulgular

Demografik	Grup	n	%
Çalıştığınız Banka	Özel	61	61,6
	Resmi	38	38,4
Göreviniz	Gişe görevlisi	35	35,4
	Müdür	8	8,1
	Uzman	17	17,2
	Yönetmen	16	16,2
	Diğer	23	23,2
Görev yaptığınız birim	Bireysel bankacılık	34	34,3
	Operasyon	22	22,2
	Ticari bankacılık	20	20,2
	Diğer	23	23,2
Cinsiyetiniz	Erkek	36	36,4
	Kadın	63	63,6
Yaşınız	21-30 yaş	17	17,2
	31-40 yaş	57	57,6
	41-50 yaş	23	23,2
	51 yaş ve üzeri	2	2,0
Kaç senedir Bankacılık sektöründesiniz?	1-5 sene	26	26,3
	6-10 sene	29	29,3
	11-15 sene	30	30,3
	16 sene ve üzeri	14	14,1
	Toplam	99	100,0

Araştırma kapsamında toplan 99 katılımcıya ulaşılmış olup katılımcıların %61,6'sının özel bankada çalıştığı, %38,4'ünün resmi bankada çalıştığı belirlenmiştir. Katılımcıların %35,4'ünün gişe görevlisi olduğu, %8,1'inin müdür olduğu, %17,2'sinin uzman olduğu, %16,2'sinin yönetmen olduğu, %23,2'sinin diğer görevlerde çalıştığı belirlenmiştir. Katılımcıların %34,3'ünün bireysel bankacılık bölümünde, %22,2'sinin operasyon bölümünde,

%20,2'sinin ticari bankacılık bölümünde ve %23,2'sinin diğer bölümlerde görev yaptığı belirlenmiştir. Katılımcıların %36,4'ünün erkek, %63,6'sının kadın olduğu belirlenmiştir. Katılımcıların %17,2'sinin 21-30 yaşlarında, %57,6'sının 31-40 yaşlarında, %23,2'sinin 41-50 yaşlarında olduğu ve %2,0'sinin 51 yaş ve üzeri olduğu belirlenmiştir. Katılımcıların %26,3'ünün 1-5 senedir bankacılık sektöründe olduğu, %29,3'ünün 6-10 senedir bankacılık sektöründe olduğu, %30,3'ünün 11-15 senedir bankacılık sektöründe olduğu ve %14,1'inin 16 sene ve üzerinde bankacılık sektöründe olduğu belirlenmiştir.

Verilerin Dağılımı ve Betimsel Bulgulara Ait Sonuçlar

Tablo 6: Verilerin Dağılımı

Ölçümler	Merkezi Eğilim		Basıklık-Çarpıklık	
	Ortalama	Medyan	Basıklık	Çarpıklık
İş Stresi Ölçeği	3,21	3,15	-0,53	0,12
Hedef Baskısı Ölçeği	3,60	3,63	-0,68	-0,33

Normal dağılım analizi sonucunda incelenen merkezi eğilim ölçümlerinden ortalama-medyanın birbirine yakınlığı ve basıklık ile çarpıklığın ± 2 arasında olması nedeniyle elde edilen verilerin normal dağılımdan geldiği belirlenmiştir (George ve Mallery 2010). Aynı zamanda araştırmaya dâhil olan katılımcı sayısı yeterli olduğu için ($n \geq 30$) merkezi limit teoreminden hareketle istatistiksel açıdan daha güçlü olan parametrik yöntemlere başvurulmuştur (Ghasemi ve Zahediasl, 2012).

Tablo 7: Ölçeklere Ait Betimsel Bulgular

Ölçümler	Ort.	S.s.
Bilişsel Boyut	3,08	0,89
Duyuşsal Boyut	3,18	0,92
Davranışsal Boyut	3,40	0,78
Sinizm Ölçeği	3,21	0,72
Hedef Baskısı Ölçeği	3,60	0,93

Likert formatında oluşturulan ölçeklerde elde edilen puanlar sonucu katılımcıların yanıtlarının düzeylerinin hesaplanmasında 0,8 puan aralığı ($4/5=0,80$) kullanılmıştır. Bu durumda Likert yapıdaki ölçeğin başlangıç puanı olan 1 puanın üzerine 0,8'lik puan aralığı eklenerek her ölçüm düzeyine denk gelen aralık hesaplanmaktadır. Bu durumda 1-1,80 aralığı "çok düşük", 1,81-2,6

aralığı “düşük”, 2,61-3,4 aralığı “orta”, 3,41-4,2 aralığı “yüksek” ve 4,21-5,0 aralığı “çok yüksek” düzeyi temsil etmektedir ve eğer ölçek toplam puan ile hesaplanıyorsa o zaman bu aralıklar madde sayısı ile çarpılması gerekir (Durmaz 2020). Katılımcıların sinizm düzeylerinin orta düzeyde olduğu belirlenmiş olup (Ort.=3,21), en yüksek düzeye ait faktörün 3,40'lık ortalama ile davranışsal boyutu olduğu belirlenmiştir.

Katılımcıların hedef baskısı düzeylerinin yüksek düzeyde olduğu belirlenmiştir (Ort.=3,60).

Araştırmanın Hipotezine Ait Sonuçlar

H₁: Sinizm boyutları ile hedef baskısı boyutları arasında anlamlı bir ilişki vardır.

H₂: Hedef baskısı düzeylerinin sinizm düzeyleri üzerinde anlamlı bir etkisi vardır.

H₃: Hedef baskısı düzeylerinin sinizm boyutları üzerinde anlamlı bir etkisi vardır.

Tablo 8: Değişkenler Arasındaki İlişkiye Ait Analiz Sonuçları

Değişkenler		Bilişsel Boyut	Duyuşsal Boyut	Davranışsal Boyut	Sinizm Ölçeği	Hedef Baskısı Ölçeği
Bilişsel Boyut	r	1	0,730*	0,358*	0,884*	0,567*
	p		0,000	0,000	0,000	0,000
Duyuşsal Boyut	r		1	0,444*	0,891*	0,604*
	p			0,000	0,000	0,000
Davranışsal Boyut	r			1	0,679*	0,361*
	p				0,000	0,000
Sinizm Ölçeği	r				1	0,629*
	p					0,000
Hedef Baskısı Ölçeği	r					1
	p					

*p<0,05

Korelasyon analizi incelendiğinde katılımcıların sinizm düzeyleri ile hedef baskısı düzeyleri arasında pozitif yönlü gizli düzeyde bir ilişki bulunmuştur (r=0.629; p<0.05). Sinizm boyutları ile hedef baskısı düzeyleri arasındaki ilişki incelendiğinde, en güçlü düzeyde ilişkinin duyuşsal boyut ile hedef baskısı düzeyleri arasında olduğu belirlenmiştir (r=0. 604; p<0.05). Araştırmanın 1.hipotezi kabul edilmiştir.

Araştırmanın ikinci ve üçüncü hipotezlerin test edilmesinde regresyon analizi yapılmıştır. Regresyon analizi yapılmadan önce regresyon analizlerinin varsayımları olan verilerin

dağılımının normal olması, değişkenler arasında ilişkinin olması ve değişkenler arasında oto korelasyon ve çoklu bağıntı problemlerinin olmaması durumları incelenmiştir. Araştırma kapsamında modele dâhil edilen verilerin dağılımının normal dağılım olduğu tablo 3’de verilmiştir. Modele dâhil edilen değişkenler arasındaki ilişkinin anlamlı olmadığı sonucu ise tablo 5’te verilmiştir. Modeldeki her yol katsayısına ait regresyon modeli için otokorelasyon olup olmadığının incelenmesinde Durbin Watson değerine bakılmış ve bu değerinin 1-3 arasında olması nedeniyle kurulan her regresyon katsayısı için oto korelasyon olmadığına karar verilmiştir (Field, 2005). Aynı zamanda araştırma modelinde bağımsız değişkenin faktörlerinin bağımlı değişken üzerindeki etkisinin incelenmesi için bağımsız değişkenlerin birden fazla olması nedeniyle çoklu doğrusal regresyon modeli yapılmış olup ilgili modelde çoklu bağıntı olup olmadığına karar verirken VIF değeri incelenmiş ve VIF değerinin 10’nun altında olması nedeniyle çoklu bağıntı probleminin olmadığı belirlenmiştir (Field, 2005). Tüm bu bilgiler ışığında kurulan regresyon analizlerine ait varsayımların karşıladığını belirlenmiştir.

Tablo 9: Hedef Baskısı Düzeylerinin Sinizm Düzeyleri Üzerindeki Etkisine Ait Regresyon Analizi

Değişkenler	β	s.h	t	p
Sabit	1,467	0,226	6,497	0,000*
Hedef Baskısı Ölçeği	0,484	0,061	7,972	0,000*

* $p < 0.05$; Doğrusal regresyon analizi yapılmıştır.

F:63,545; F(P):0.000; Durbin-Watson: 1,889; R²:0,390

Bağımsız: Hedef Baskısı Ölçeği

Bağımlı: Sinizm Ölçeği

Tablo 9’da yer alan değerler incelendiğinde, hedef baskısı düzeylerinin sinizm düzeyi üzerindeki etkisinin ($\beta = 0,484$; $t = 7,972$; $p < 0,05$) anlamlı olduğu belirlendiğinden araştırmanın ikinci hipotezinin kabul edilmiştir. Bu sonuç katılımcıların hedef baskısı düzeylerinde bir birimlik iyileştirme olduğunda sinizm düzeylerinde 0,484 birimlik iyileştirme olacağı anlamına gelmektedir. Hedef baskısı düzeylerinin tek başına sinizm düzeylerinin %39,0’unu açıkladığı belirlenmiştir (R²:0,390). Regresyon eşitliği aşağıda verilmiştir.

$$\text{Sinizm} = 1,467 + 0,484 * \text{Hedef Baskısı}$$

Tablo 10: Hedef Baskısı Düzeylerinin Bilişsel Boyut Üzerindeki Etkisine Ait Regresyon Analizi

Değişkenler	β	s.h	t	p
Sabit	1,137	0,297	3,833	0,000*
Hedef Baskısı Ölçeği	0,540	0,08	6,777	0,000*

* $p < 0.05$; Doğrusal regresyon analizi yapılmıştır.

F:45,932; F(P):0.000; Durbin-Watson: 2,104; R²:0,314

Bağımsız: Hedef Baskısı Ölçeği

Bağımlı: Bilişsel Boyut

Regresyon analizi incelendiğinde hedef baskısı düzeylerinin bilişsel boyut üzerindeki etkisinin ($\beta = 0,540$; $t = 6,777$; $p < 0,05$) anlamlı olduğu belirlendiğinden araştırmanın üçüncü hipotezi bilişsel boyut için kabul edilmiştir. Bu sonuç katılımcıların hedef baskısı düzeylerinde bir birimlik iyileştirme olduğunda bilişsel boyut düzeylerinde 0,540 birimlik iyileştirme olacağı anlamına gelmektedir. Hedef baskısı düzeylerinin tek başına bilişsel boyut düzeylerinin %31,4'ünü açıkladığı belirlenmiştir (R²: 0,314). Regresyon eşitliği aşağıda verilmiştir.

$$\text{Bilişsel Boyut} = 1,137 + 0,540 * \text{Hedef Baskısı}$$

Tablo 11: Hedef Baskısı Düzeylerinin Duyuşsal Boyut Üzerindeki Etkisine Ait Regresyon Analizi

Değişkenler	β	s.h	t	p
Sabit	1,035	0,297	3,486	0,001*
Hedef Baskısı Ölçeği	0,595	0,08	7,456	0,000*

* $p < 0.05$; Doğrusal regresyon analizi yapılmıştır.

F:55,588; F(P):0.000; Durbin-Watson: 1,494; R²:0,358

Bağımsız: Hedef Baskısı Ölçeği

Bağımlı: Duyuşsal Boyut

Regresyon analizi incelendiğinde hedef baskısı düzeylerinin duyuşsal boyut üzerindeki etkisinin ($\beta = 0,595$; $t = 7,456$; $p < 0,05$) anlamlı olduğu belirlendiğinden araştırmanın üçüncü hipotezi duyuşsal boyut için kabul edilmiştir. Bu sonuç katılımcıların hedef baskısı düzeylerinde bir birimlik iyileştirme olduğunda duyuşsal boyut düzeylerinde 0,595 birimlik iyileştirme olacağı anlamına gelmektedir. Hedef baskısı düzeylerinin tek başına duyuşsal boyut

düzeylerinin %35,8'ini açıkladığı belirlenmiştir ($R^2:0,358$). Regresyon eşitliği aşağıda verilmiştir.

Duyuşsal Boyut: $1,035+0,595*\text{Hedef Baskısı}$

Tablo 12: Hedef Baskısı Düzeylerinin Davranışsal Boyut Üzerindeki Etkisine Ait Regresyon Analizi

Değişkenler	β	s.h	t	p
Sabit	2,310	0,294	7,865	0,000*
Hedef Baskısı Ölçeği	0,301	0,079	3,818	0,000*

* $p<0.05$; Doğrusal regresyon analizi yapılmıştır.

F:14,577; F(P):0.000; Durbin-Watson: 1,907; $R^2:0,122$

Bağımsız: Hedef Baskısı Ölçeği

Bağımlı: Davranışsal Boyut

Regresyon analizi incelendiğinde hedef baskısı düzeylerinin davranışsal boyut üzerindeki etkisinin ($\beta= 0,301$; $t= 3,818$; $p<0,05$) anlamlı olduğu belirlendiğinden araştırmanın üçüncü hipotezi davranışsal boyut için kabul edilmiştir. Bu sonuç katılımcıların hedef baskısı düzeylerinde bir birimlik iyileştirme olduğunda davranışsal boyut düzeylerinde 0,301 birimlik iyileştirme olacağı anlamına gelmektedir. Hedef baskısı düzeylerinin tek başına davranışsal boyut düzeylerinin %12,2'sini açıkladığı belirlenmiştir ($R^2:0,122$). Regresyon eşitliği aşağıda verilmiştir.

Davranışsal Boyut: $2,310+0,301*\text{Hedef Baskısı}$

Alt Problemlere Ait Sonuçlar

Araştırmanın bu kısmında araştırmada kullanılan ölçüm araçları ile bazı değişkenler arasındaki farklılıklar incelenmiştir. Farklılıkların incelenmesinde, 2'li grupların karşılaştırılmasında bağımsız örneklem t-testi, 2'den fazla grupların karşılaştırılmasında tek yönlü Anova analizi yapılmıştır.

Araştırmaya katılım sağlayan bireylerin sinizm boyutları ve hedef baskısı düzeyleri ile cinsiyetleri arasında anlamlı bir fark bulunup bulunmadığını bulgulamak amacı ile bağımsız örneklem t-testi analizi yapılmıştır. Bu analiz sonucunda katılımcıların cinsiyetleri ile sinizm boyutları ve hedef baskısı düzeyleri ile cinsiyetleri arasında anlamlı bir fark bulunamamıştır ($p>0,05$).

Araştırmaya katılım sağlayan bireylerin sinizm boyutları ve hedef baskısı düzeyleri ile sektörde çalışma süreleri arasında anlamlı bir fark bulunup bulunmadığını bulgulamak amacı ile tek

yönlü Anova analizi yapılmıştır. Bu analiz sonucunda katılımcıların yaşları ile sinizm boyutları ve hedef baskısı düzeyleri ile yaşları arasında anlamlı bir fark bulunamamıştır ($p>0,05$).

Araştırmaya katılım sağlayan bireylerin sinizm boyutları ve hedef baskısı düzeyleri ile sektörde çalışma süreleri arasında anlamlı bir fark bulunup bulunmadığını bulgulamak amacı ile tek yönlü Anova analizi yapılmıştır. Bu analiz sonucunda katılımcıların sektörde çalışma süreleri ile sinizm boyutları ve hedef baskısı düzeyleri ile sektörde çalışma süreleri arasında anlamlı bir fark bulunamamıştır ($p>0,05$).

Tablo 13: Çalışılan Banka Türü ile Sinizm Boyutlarının ve Hedef Baskısı Düzeylerinin Karşılaştırılması

Değişkenler	Banka Türü	n	Ort.	s.s	t	p
Bilişsel Boyut	Özel	61	3,23	0,90	2,039	0,044*
	Resmi	38	2,86	0,83		
Duyuşsal Boyut	Özel	61	3,33	0,98	2,268	0,026*
	Resmi	38	2,93	0,75		
Davranışsal Boyut	Özel	61	3,50	0,81	1,696	0,093
	Resmi	38	3,23	0,71		
Sinizm Ölçeği	Özel	61	3,34	0,76	2,545	0,013*
	Resmi	38	3,00	0,59		
Hedef Baskısı Ölçeği	Özel	61	3,82	0,88	3,057	0,003*
	Resmi	38	3,26	0,92		

* $p<0.05$; t: Bağımsız Örneklem t-testi

Araştırmaya katılım sağlayan bireylerin sinizm boyutları ve hedef baskısı düzeyleri ile çalıştıkları banka türü arasında anlamlı bir fark bulunup bulunmadığını bulgulamak amacı ile bağımsız örneklem t-testi analizi yapılmıştır. Bu analiz sonucunda çalışılan banka türü ile sinizm ölçeğinin ‘bilişsel boyut’ alt faktörü arasında anlamlı bir farklılaşma bulunmuştur ($p=0,044<0,05$). Ortalamalar incelendiğinde özel bankada çalışanların bilişsel boyut düzeylerinin resmi bankada çalışanlara göre daha yüksek olduğu görülmüştür.

Çalışılan banka türü ile sinizm ölçeğinin ‘duyuşsal boyut’ alt faktörü arasında anlamlı bir farklılaşma bulunmuştur ($p=0,026<0,05$). Ortalamalar incelendiğinde özel bankada

çalışanların duyuşsal boyut düzeylerinin resmi bankada çalışanlara göre daha yüksek olduğu görülmüştür. Çalışılan banka türü ile sinizm ölçeği arasında anlamlı bir farklılaşma bulunmuştur ($p=0,013<0,05$). Ortalamalar incelendiğinde özel bankada çalışanların sinizm düzeylerinin resmi bankada çalışanlara göre daha yüksek olduğu görülmüştür. Araştırmaya katılım sağlayan bireylerin sinizm boyutları ve hedef baskısı düzeyleri ile bankada yaptıkları görevleri arasında anlamlı bir fark bulunup bulunmadığını bulgulamak amacı ile tek yönlü Anova analizi yapılmıştır. Bu analiz sonucunda katılımcıların bankada yaptıkları görevleri ile sinizm boyutları ve hedef baskısı düzeyleri arasında anlamlı bir fark bulunamamıştır ($p>0,05$).

Tablo 14: Görev Yapılan Birim ile Sinizm Boyutlarının ve Hedef Baskısı Düzeylerinin Karşılaştırılması

Değişkenler	Birim	n	Ort.	s.s	F	p	Scheffe
Bilişsel Boyut	Bireysel bankacılık	34	3,05	0,92	1,624	0,189	
	Operasyon	22	3,29	0,94			
	Ticari bankacılık	20	3,27	0,68			
	Diğer	23	2,78	0,91			
Duyuşsal Boyut	Bireysel bankacılık	34	3,13	0,93	0,933	0,428	
	Operasyon	22	3,40	0,92			
	Ticari bankacılık	20	3,28	0,86			
	Diğer	23	2,97	0,96			
Davranışsal Boyut	Bireysel bankacılık	34	3,61	0,74	1,433	0,238	
	Operasyon	22	3,30	0,88			
	Ticari bankacılık	20	3,35	0,51			
	Diğer	23	3,22	0,89			
Sinizm Ölçeği	Bireysel bankacılık	34	3,24	0,76	1,156	0,331	
	Operasyon	22	3,33	0,71			
	Ticari bankacılık	20	3,30	0,60			
	Diğer	23	2,97	0,74			
Hedef Baskısı Ölçeği	Bireysel bankacılık ^a	34	3,53	0,85	3,881	0,012*	b>d
	Operasyon ^b	22	3,96	0,87			
	Ticari bankacılık ^c	20	3,87	0,72			
	Diğer ^d	23	3,14	1,09			

* $p<0,05$; F: Tek Yönlü Anova Testi

Araştırmaya katılım sağlayan bireylerin sinizm boyutları ve hedef baskısı düzeyleri ile bankada buldukları birim arasında anlamlı bir fark bulunup bulunmadığını bulgulamak amacı ile tek yönlü anova analizi yapılmıştır. Bu analiz sonucunda birim ile hedef baskısı arasında anlamlı bir farklılaşma bulunmuştur ($p=0.012<0,05$). Farklılaşmanın hangi gruptan kaynaklandığının incelenmesi için yapılan scheffe testi sonucu ortalamalar incelendiğinde farklılığın operasyon biriminde görev alanlar ile diğer birimlerde görev alanlar arasında kaynaklandığı ve operasyon biriminde görev alanların hedef baskısı düzeylerinin daha yüksek olduğu belirlenmiştir. Araştırmaya katılım sağlayan bireylerin sinizm boyutları ve hedef baskısı düzeyleri ile eğitim düzeyleri arasında anlamlı bir fark bulunup bulunmadığını bulgulamak amacı ile tek yönlü Anova analizi yapılmıştır. Bu analiz sonucunda katılımcıların eğitim düzeyleri ile sinizm boyutları ve hedef baskısı düzeyleri arasında anlamlı bir fark bulunamamıştır ($p>0,05$).

SONUÇ

Çalışmanın amacı, bankacılık sektöründe ki satış baskısının örgütsel sinizm üzerinde aracılık rolünün olup olmadığının tespit edilmesidir. Elde edilen bulgular değerlendirildiğinde, bahse konu değişkenler arası anlamlı bir ilişkinin varlığı ve satış baskısı sonucu ortaya çıkan örgütsel sinizmin, banka personelinin üzerinde olumsuz etki yarattığı tespit edilmiştir.

Çalışanlar üzerinde satış baskısı arttığı zaman örgütsel sinizmin de buna paralel olarak arttığı ve satış baskısı ile örgütsel sinizm arasında pozitif yönlü ilişki olduğu tespit edilmiştir. Bu bağlamda, temelde çalışan personelin örgütüne karşı güven duymaması ve olumsuz hisler beslemesi gibi negatif/olumsuz duygu durumlara atıfta bulunan örgütsel sinizm algısı çalışanda arttıkça örgütüne karşı duyduğu bağlılık hissinde bir azalma meydana geleceği muhtemel bir sonuç olarak karşımıza çıkmaktadır.

Çalışmada, banka personelinin kurumuna(örgüte) yönelik geliştirdiği olumsuz duygu durumların sonucunda kurumun(örgütün) kendisine karşı dürüst olmadığına/davranmadığına kanaat getirmesi sonucu oluşan ve örgütsel sinizmin boyutlarına bakıldığında yani ölçeklere ait betimsel bulgular incelendiğinde; katılımcıların hedef baskısı düzeylerinin yüksek düzeyde olduğu belirlenmiş olup; en yüksek düzeye ait faktörün davranışsal boyut olduğu belirlenmiştir. Korelasyon analizi incelendiğinde sinizm boyutları ile hedef baskısı düzeyleri arasındaki ilişki incelendiğinde, en güçlü düzeyde ilişkinin duyuşsal boyut ile hedef baskısı düzeyleri arasında olduğu belirlenmiştir. Araştırmanın 1.hipotezi kabul edilmiştir. Hedef baskısı düzeylerinin sinizm düzeyleri üzerindeki etkisine ait regresyon analizi incelendiğinde katılımcıların hedef baskısı düzeylerinde bir birimlik iyileştirme olduğunda davranışsal boyut düzeylerinde de

iyileştirme olacağı belirlenmiştir. Araştırmanın 2.hipotezi de kabul edilmiştir. Katılım sağlayan bireylerin sinizm boyutları incelendiğinde özel bankada çalışanların bilişsel boyut düzeylerinin resmi bankada çalışanlara göre daha yüksek olduğu görülmüştür. Özel bankada çalışanların duyuşsal boyut düzeylerinin resmi bankada çalışanlara göre daha yüksek olduğu görülmüştür. Böylelikle araştırmanın 3.hipotezi de kabul edilmiştir. Bankacılık sektöründe; banka personelinin üzerindeki satış baskısının örgütsel sinizm üzerindeki etkisine ilişkin olarak gerçekleştirilen bu çalışmanın analizleri neticesinde satış baskısının örgütsel sinizm üzerinde aracılık rolü oynadığı tespit edilmiş olup çalışma kapsamında elde edilen bulgular da yazında konuyla ilgili yapılan çalışmaları destekler nitelikte olduğu ifade edilebilecektir.

ÖNERİLER

- ✓ Bankada çalışanların motivasyon düzeylerinin artırılması için yönetim kadrosunun ve insan kaynakları birimlerinin koordineli bir şekilde aktivite planlaması gerekmektedir.
- ✓ Kurum kültürünün benimsenmesi, yaygınlaşması ve çalışanlarda kuruma aidiyet oluşması için eğitimler yapılmalıdır.
- ✓ Hedef baskısını ortadan kaldıracak durumlardan biri de yüksek hedeflerin azaltılması ve hedef tutturana personele motive olması açısından hedef primlerinin yüksek ödenmesidir.
- ✓ Örgütsel sinizmin olumluya çevrilmesi için düzenli yapılacak personel görüşmeleriyle, çalışanların sorunlarının dinlenmesi, sinik davranışları olumluya çevirecektir.
- ✓ Sinizm ortamlarına kurum idarecilerinin girmesi, sorunu yerinde teşhis edip çözmesi, sinizmin kurum kültürü olmasına en başından engel olmasıyla sonuçlanacaktır. Çalışanların sadece hedefleri değil psikolojik sağlamlıkları da takip edilmelidir.
- ✓ Bankacılık sektöründeki aktörler sadece karlılık anlayışından uzaklaşarak, evrensel gelişimleri takip etmeli ve çalışanın da "biricik" ve "değerli" olduğunu hissettirecek uygulamaları devreye sokmalıdır.
- ✓ Aynı zamanda piyasayı düzenleyen devlet organlarının, banka çalışanlarının ve ailelerinin daha insani şartlarda çalışması ve yaşaması için, yasal düzenlemelerin bir kısmını çalışanlar lehine iyileştirmelidir.
- ✓ Mesai saatleri konusunda düzenlemeler yine çalışanların lehine yapılmalı, "zoraki gönüllü" mesailerin önüne geçilmelidir.
- ✓ Ödüllendirme ve terfilerde çalışanların olumlu çaba ve katkıları asla gözden kaçmamalı, ödüllendirme davranışlarının adil olması, işini iyi yapan personellerin sayısının

artmasına, bu da aslında ilk hedeflenen bankanın karlılık oranlarına olumlu katkı sağlamasına vesile olacaktır.

- ✓ Son olarak; Sürekli artarak devam eden hedeflerin olması, yetersizlik ve mesleki tükenmişlik nedeniyle çalışanın motivasyonunun düşmesi durumu değiştirilerek, her sorunda önlerine getirilen ‘iş akdi fes’ seçeneğinin koz olarak kullanılmaması gerekmektedir.

Kaynakça

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**CATEGORY-BASED MACHINE LEARNING METHOD FOR $J/\psi \rightarrow e^+e^-$
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Abstract

In the landscape of particle physics, the precise identification of meson decays is a cornerstone for exploring fundamental forces and validating theoretical models. The decay of J/ψ mesons to electron-positron pairs ($J/\psi \rightarrow e^+e^-$) offers a window into the dynamics of the strong force, mediated by Quantum Chromodynamics (QCD). The presented study introduces a category-based machine learning method, specifically the CatBoost algorithm, to discriminate $J/\psi \rightarrow e^+e^-$ events from the dataset collected at the Large Hadron Collider (LHC). The use of CatBoost harnesses the power of gradient boosting frameworks alongside categorical feature support to enhance the identification of J/ψ decays from the large dataset obtained from high-energy collision experiments. The implementation of CatBoost, outlining the preprocessing of input data, feature engineering, and the optimization of hyperparameters tailored to the characteristics of the decay channel under study. Performance of the model is quantified by machine learning metrics such as precision, recall, F1-score and area under receiver operating characteristic curve (AUC ROC).

Keywords: J/ψ , dielectron, CatBoost, machine learning, particle physics.

Introduction

The discovery of the J/ψ meson, called also charmonium, in 1974 [1, 2] marked a watershed moment in particle physics, fundamentally transforming understanding of the subatomic world. This meson, a bound state consisting of a charm quark and its corresponding antiquark ($c\bar{c}$), has a mass of about $3096.9 \pm 0.006 \text{ MeV}/c^2$ [3] and played a significant role in confirming the existence of a fourth quark type, the charm quark, thus supporting the quark model of hadronic structure [4, 5].

The importance of the J/ψ meson lies in its unique properties. It is relatively long-lived for a meson, with a lifetime of about $\sim 10^{-21}$ seconds [3], and it predominantly decays into hadrons due to strong interaction. However, its decay into lepton pairs such as electron-positron (e^+e^-) pairs provides a clean signature for experimental detection and allows precise measurements of its properties, crucial for testing various aspects of the Standard Model [6] of particle physics [7, 8, 9, 10]. Studying the J/ψ meson provides investigation of the strong force, one of the four fundamental forces, which is described by Quantum Chromodynamics (QCD) [11]. The J/ψ meson's decays are sensitive to the QCD dynamics at various energy scales, offering insights into the behavior of quarks and gluons, partonic state of the matter, under extreme conditions reached at the high energy collisions.

The Large Hadron Collider (LHC) [12] provides an opportunity to study the production of J/ψ mesons at high energy collisions. Analysis of the charmonium state formed in high energy collisions in a massive amount of data has a complex procedure since it requires computational and physics knowledge. In addition, this process is more challenging for the analysis of specific decay channels, like $J/\psi \rightarrow e^+e^-$, due to the presence of background in which cut based computational analysis is used leading loosing some of the J/ψ information [13].

The intricacy of these analyses necessitates advanced data processing and analysis methods. Traditional techniques, while effective, often require extensive computation time and resources. The advent of machine learning (ML) and artificial intelligence (AI) offers a potential alternative with their ability to learn from data and make predictions or decisions, are particularly suited to handling the complex, high-dimensional data produced by the LHC. Studies have presented the effectiveness of ML methods [14-18] in various fields demonstrating their potential to revolutionize data

analysis in high-energy. Additionally, the integration of ML in high-energy physics not only enhances the efficiency of data analysis but also opens new avenues for discoveries, allowing for more nuanced and rapid interpretation of experimental results. This integration signifies a paradigm shift in how data from large-scale physics experiments are processed and understood, marking a new era in the exploration of the fundamental particles and forces that constitute the universe. Therefore, in this study performance of CatBoost [19] algorithm, one of the improved version of Gradient Boosting Decision Tree (GBDT) [20], to reconstruct the $J/\psi \rightarrow e^+e^-$ at the LHC was investigated.

CatBoost Algorithm: A Gradient Boosting Framework

CatBoost (Categorical Boosting) [19] is a high-performance gradient boosting library, particularly renowned for its efficiency in handling categorical data. Compared to the other machine learning algorithms, it has ability to process categorical features directly. This capability eliminates the need for the extensive data preprocessing typically required by algorithms that cannot inherently handle non-numeric data. This feature is particularly useful in complex data environments like those encountered in particle physics, where datasets often contain a heterogeneous mix of data types [19].

Unlike traditional boosting methods, CatBoost employs a symmetric tree structure that reduces overfitting and improves model performance. The algorithm also features an innovative ordering principle called 'ordered boosting', which helps in combating the prediction shift caused by a naïve treatment of categorical variables. This method enhances the accuracy and robustness of the model, making it highly reliable for critical analyses [20]. In addition, the algorithm optimizes binary decision trees using oblivious trees, where all decisions at the same tree level are based on the same feature and threshold. This approach not only simplifies the model but also speeds up the learning process, allowing for faster analysis of large datasets, a common characteristic of particle physics experiments [20]. The model is improved to be accessible to both novice and experienced machine learning practitioners, with a range of parameters that can be tuned for specific needs. Since it is compatible with multiple programming languages and can be deployed in a variety of computing environments, it is a flexible ML tool for applications in different fields [19].

ANALYSIS

Dataset

In the study, proton–proton collision data collected by the Compact Muon Solenoid (CMS) [21] experiment at $\sqrt{s} = 7$ TeV in 2010 were used to reconstruct of J/ψ production from its dielectron decay channel [22–24]. A total of 10015 events including e^+e^+ , e^-e^- , and dielectron pairs from 2 to 5 GeV having characteristic and kinematic features of the particles were studied with Python implementation of the CatBoost algorithm.

The dataset contains various characteristics for each pair of particles, including their momentum components (p_x , p_y , p_z), transverse momentum (p_t), energy (E), pseudorapidity (η), and azimuthal angle (ϕ). Additionally, information about the charges of each pair partner (q_1 , q_2) and the mass of the reconstructed J/ψ particle (M) is available. In the process of identifying the J/ψ signal distribution using the CatBoost algorithm, the particle and kinematic features, were used except for η and ϕ . The opening angle (α) [25] between the particle pairs and the transverse momentum of the mother particle (P_t) were computed to be used as features for classification of the meson signal class. As in standard particle physics analysis, $\Delta\eta$ and $\Delta\phi$ values of each pairs, which represent the absolute differences in η and ϕ between two particles in the same event [26, 27], were then included as additional features in the algorithm to assess the correlation between the particles.

Implementation of CatBoost Algorithm

This study aims to evaluate the performance of the CatBoost model in detecting J/ψ production through its decay into dielectrons. For this purpose, electrons and positrons are classified based on their track properties, requiring each to have a momentum (p_t) above 1.3 GeV/c and opposite charges, which are standard criteria to enhance particle measurement accuracy. Additionally, a precise mass cut is necessary to create significant sidebands and minimize background interference. The selection of the signal class is based on particles whose mass (M) is within ± 0.3 GeV/ c^2 of the official J/ψ mass. Unlike traditional methods that lose signal information due to cuts on alpha (α), delta eta ($\Delta\eta$), and delta phi ($\Delta\phi$) features, this technique uses these parameters as key indicators to identify the charmonium state. By using these selection criteria, out of 10015 events 2438 of them includes J/ψ particle. The rest of the events were considered

as background. The features used in the analysis is listed in Table 1.

Table 1. List of the features used in the CatBoost algorithm.

Parameter	Definition
p_t	Transverse momentum of each particle.
P_t	Transverse momentum of mother particle.
$\Delta\eta$	Difference of pseudorapidity between pairs.
$\Delta\phi$	Difference of azimuthal angle between pairs.
Q	Charge of each particle.
α	Opening angle between pair partners.
M	Mass of the mother particle.

For the model application, 75% of the data were separated for training and rest were for the test. The hyperparameters of the model was also tuned before its application. In CatBoost algorithm number of decision trees which is also called number of iterations was selected 100. In addition, the depth of each tree was preferred as 10. Lastly, learning rate of the model which controls how much the model is adjusted during each step of the learning process was optimized to 0.1.

RESULTS

Model Performance Metrics

In ML, the sensitivity, precision, and F1 score values are used for evaluation of the model performances which are determined from confusion matrix [28]. The matrix is a table representation of the actual class information in the dataset and the predictions of the machine learning model. An example of an error matrix is given in Figure 1. In the figure, the actual values represent the class information of the dataset, while the predicted values represent the class information obtained as a result of the model application. In the matrix, the positive class represents the J/ψ meson, while the negative class represents the background. The confusion matrix determines how the applied model categorizes the data. In Figure 1, (i) true positive (TP) indicates that the data belonging to the J/ψ meson signal class was correctly identified by the method; (ii) true negative (TN) shows that the data belonging to the background class was correctly identified by the model; (iii) false negative (FN) shows that the J/ψ meson signal in the data was detected as background by the algorithm; and (iv) false positive (FP) shows that the data belonging to the background class was identified as a J/ψ meson signal by the model. In the most ideal situation, the values of FP and FN are expected to be 0.

True	Negative	Positive
	Negative	Positive
Negative	True Negative (TN)	False Positive (FP)
Positive	False Negative (FN)	True Positive (TP)
	Negative	Positive
	Predicted	

Figure 1. An example of confusion matrix.

Sensitivity will be the ratio of the J/ψ meson class correctly identified by the model in the dataset to the entire correct signal class. It will be calculated using the parameters in the matrix as shown in Equation 1 [29]. Precision will indicate the performance of the ML model in signal determination and will be determined by Equation 2 [29]. The F1 score, which evaluates the model's performance by considering both sensitivity and precision, will be calculated as a harmonic mean as shown in Equation 3 [29].

$$\text{Sensitivity} = \frac{TP}{TP + FN} \tag{1}$$

$$\text{Precision} = \frac{TP}{TP + FP} \tag{2}$$

$$\text{F1 score} = \frac{2 \times \text{Sensitivity} \times \text{Precision}}{\text{Sensitivity} + \text{Precision}} \tag{3}$$

For measuring the performance of the ML model, the "Receiver Operating Characteristic Curve (ROC)" method is also used. It is based on (i) determining the sensitivity and (ii) the "false positive rate ($FPR = FP / (FP + TN)$)" criteria, (iii) creating two-dimensional graphs of these, and (iv) calculating the area under the curve (AUC ROC). AUC ROC is a measure of how well two classes can be distinguished by the model [30]. A high AUC ROC value indicates the model's power in differentiating classes. An area greater than 0.9 can be interpreted as excellent classification [30].

Evaluation of CatBoost Performance:

To understand J/ψ meson signal identification performance of the CatBoost algorithm confusion matrix was derived represented in Figure 2. From the figure it is summarized that the model only classifies 7 background events as the meson signal. In addition, the model predicts 1 signal event as background.

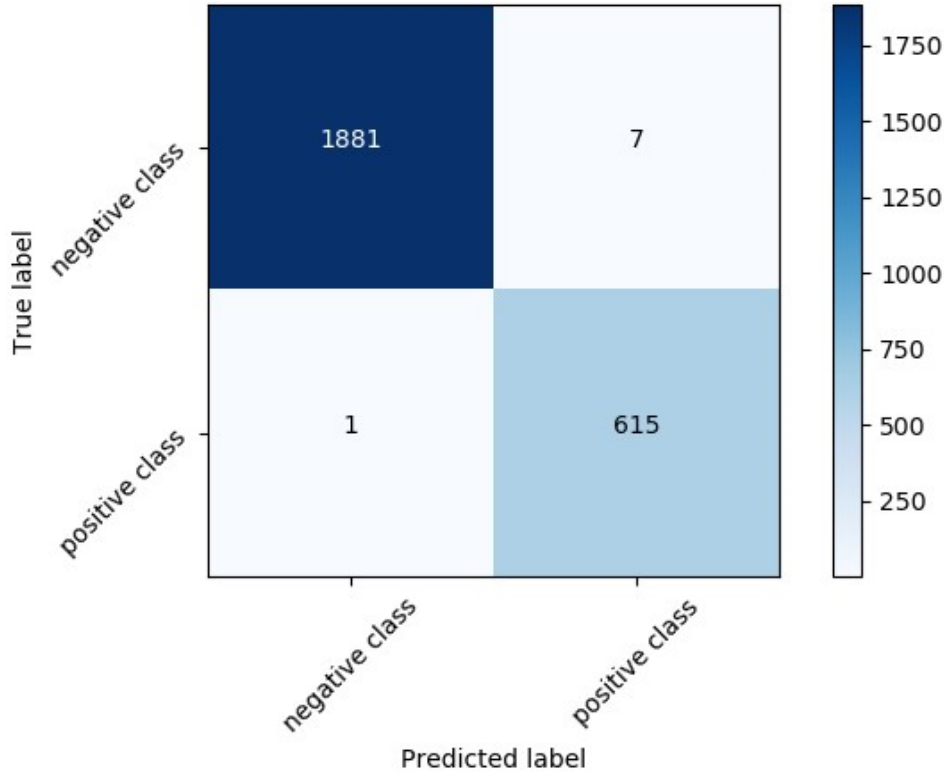


Figure 2. Confusion matrix of CatBoost model implementation to the dataset.

Table 2 presents the average sensitivity, precision, and F1-score of CatBoost algorithm derived from the confusion matrix represented in Figure 2. The associated AUC-ROC values is also given in Table 2. From the table it is concluded that Cat Boost algorithm achieves a 99.986% success in predicting the ground state of charmonium, with a sensitivity of 99.771% and a precision of 99.433%. Predicted J/ψ invariant mass spectrum by CatBoost is demonstrated in Figure 3. As it is understood from the figure the algorithm performed well even if the signal is quite low.

Table 2. Performance of CatBoost algorithm along with the associated AUC-ROC values.

Sensitivity	Precision	F-1 Score	AUC ROC
0.99711	0.99433	0.99571	0.99986

CONCLUSION

This paper has successfully demonstrated the remarkable efficacy of the CatBoost algorithm in identifying $J/\psi \rightarrow e^+e^-$ decay events in high-energy physics experiments, specifically within the context of data collected at the LHC. The key performance metrics, as detailed in Table 2 and Figure 2, underscore the exceptional capabilities of CatBoost in handling complex, large-scale datasets. The algorithm has shown extraordinary accuracy, with a 99.986% success rate in predicting the ground state of charmonium, along with a high sensitivity of 99.771% and a precision of 99.433%. These results highlight model's potential as a transformative tool in particle physics research.

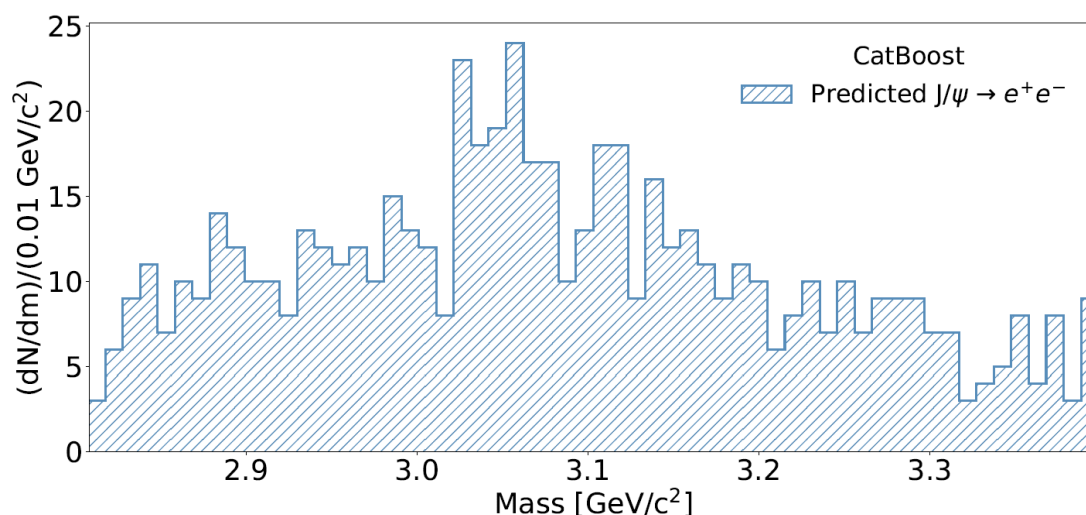


Figure 3. Predicted J/ψ invariant mass spectrum by CatBoost.

The impressive AUC-ROC values associated with the CatBoost model reinforce its reliability and predictive power. This research lays the groundwork for broader applications of machine learning algorithms in particle physics. The success of CatBoost in this study encourages further exploration into other sophisticated data-driven approaches that could potentially uncover deeper insights and accelerate scientific discoveries.

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**ORTA ÇOCUKLUKTA ANNELERE VE BABALARA GÜVENLİ BAĞLANMA
DÜZEYLERİ ARASINDAKİ İLİŞKİNİN VE BU DÜZEYLERİ ETKİLEYEN
FAKTÖRLERİN İNCELENMESİ**

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Özet

Bu araştırmada orta çocukluk döneminde anne ve babalara güvenli bağlanma düzeyleri arasındaki ilişkinin ve bu düzeyleri etkileyen faktörlerin incelenmesi amaçlanmaktadır. Bu amaçla orta çocukluk dönemindeki 204 çocuk araştırmaya dahil edilmiştir. Araştırmada veri toplama aracı olarak Kerns Güvenli Bağlanma Ölçeği Anne ve Baba Formları ve Kişisel Bilgi Formu kullanılmıştır. Gerçekleştirilen analizler sonucunda, çocukların anne ve babalarına güvenli bağlanma düzeyleri arasında orta düzeyde anlamlı pozitif bir ilişki olduğu belirlenmiştir. Çocukların anne ve babalarına güvenli bağlanma düzeyleri cinsiyete, anne ve baba öğrenim düzeyine, annelerin sosyal aktivitelere götürme sıklıklarına göre farklılaşmamıştır. Babaların çocuklarını sosyal aktivitelere götürme sıklıkları ile hem anneye hem de babaya güvenli bağlanma düzeyleri arasında anlamlı pozitif yönde bir ilişki tespit edilmiştir. Anneler tarafından istenen gebelik sonucu dünyaya gelme durumlarına göre çocukların annelerine güvenli bağlanma düzeyleri anlamlı farklılık gösterirken, babalarına güvenli bağlanma düzeyleri anlamlı farklılık göstermemiştir. Babalar tarafından istenen gebelik sonucu dünyaya gelme durumlarına, annelerin doğumdan sonra bebek bakımında eşlerinden destek alma durumlarına, babaların doğumdan sonra bebeklerinin bakımını üstlenme durumlarına göre ise çocukların babalarına güvenli bağlanma düzeyleri anlamlı düzeyde farklılaşırken, annelerine güvenli bağlanma düzeyleri anlamlı olarak farklılaşmamıştır.

Anahtar Kelimeler: Anne, baba, güvenli bağlanma, orta çocukluk.

**AN EXAMINING THE RELATIONSHIP BETWEEN SECURE ATTACHMENT
LEVELS TO MOTHERS AND FATHERS IN MIDDLE CHILDHOOD AND THE
FACTORS INFLUENCING THESE LEVELS**

Abstract

This research aims to examine the relationship between secure attachment levels to mothers and fathers in middle childhood, along with the factors influencing these levels. For this purpose, a total of 204 children in middle childhood were included in the study. The data collection tools used in the research were Kerns Secure Attachment Scale for Mothers and Fathers, along with a Personal Information Form. The analyses conducted revealed a moderately significant positive relationship between children's secure attachment levels to mothers and fathers. The secure attachment levels of children to their mothers and fathers did not vary based on gender, parental educational levels, or the frequency of mothers' involvement in social activities. However, a significant positive relationship was found between fathers' frequency of taking their children to social activities and the secure attachment levels to both mothers and fathers. The secure attachment levels of children to their mothers showed significant differences based on the circumstances of being desired by mothers during pregnancy, while the secure attachment levels to fathers did not exhibit significant differences. The secure attachment levels of children to their fathers significantly varied based on whether the pregnancy was desired by fathers, the extent of support mothers received from their partners in infant care after birth, and the extent to which fathers took on the responsibility of caring for their infants after birth. However, the secure attachment levels of children to their mothers did not show significant differences in relation to these factors.

Keywords: Secure Attachment, Middle Childhood, Mother, Father.

Giriş

Bağlanma Kuramı'nı geliştiren Bowlby (1969)'e göre bağlanma, yaşamın ilk yıllarında bebek ve bakım veren arasında gelişen duygusal ilişkidir. Bebek ve bakım veren arasında kurulan bağlanma ilişkisi yaşam boyu özellikle duygusal yaşantılarında insanları yönlendiren önemli bir kaynak oluşturmaktadır (Bowlby, 1973; 1988). Bağlanma ilişkisi bebek ve bakım veren arasındaki etkileşimin kalitesine göre şekillenmektedir. Bebekler doğuştan bakım verenleriyle yakınlığı sağlayacak ve koruyacak bir dizi davranışa sahiptir. Bu davranışlar "bağlanma davranışı" olarak adlandırılmaktadır. Ağlama, gülme, gülümseme, seslenme, çığlık atma gibi davranışlar bebeklerin sevgi, ilgi, yakınlık, bakım ve fizyolojik ihtiyaçlarının karşılanması için bakım verenlerine yönelttikleri bağlanma davranışlarıdır. Bakım verenlerin bu davranışlara verdikleri yanıtlar bağlanma ilişkisinin niteliğini belirlemektedir (Bowlby, 1982; 1988). Bakım verenlerin bağlanma davranışlarına verdikleri uygun yanıtlar ve bu davranışları yanıtlamada gecikmemeleri, ilgi, sevgi ve duyarlılıkla bebeklerine yaklaşmaları güvenli bağlanma ilişkisinin gelişmesini sağlamaktadır. Bakım verenlerin, bağlanma davranışlarına yanıt vermedeki tutarsızlıkları, ilgi, sevgi ve duyarlılıktaki eksiklikleri ise güvensiz bağlanma ilişkisi ile sonuçlanmaktadır (Cassidy, 1994; Diehl, Elnick, Bourbeau ve Labouvie-Vief, 1998).

Bağlanma ilişkisi içerisinde bahsi geçen bakım verenler genellikle annelerdir; fakat anne yokluğunda bebekler kendilerine bakım veren yetişkinleri de bağlanma figürü olarak seçebilmektedir. Bebeklerin ilk bağlanma ilişkisini kurdukları yetişkinler Bağlanma Kuramı'nda birinci/birincil bağlanma figürleri olarak adlandırılmaktadır. Bebekler bakım ihtiyaçları azaldıkça ve bağımsız hareket yetenekleri geliştikçe yakınlık duydukları farklı figürleri de bağlanma figürleri olarak belirlemektedir. İkincil bağlanma figürleri adı verilen bu figürler öncelik aile içerisinde seçilmektedir. Babalar, kardeşler bağlanma kuramında ikincil bağlanma kuramları olarak adlandırılmaktadır (Ainsworth ve ark.1978; Hazan ve Shaver, 1994). Bowlby (1969) ikincil bağlanma figürlerinden özellikle babaların, bebeklerin/çocukların yaşam boyu duygusal yaşantılarının belirleyicisi olarak önemli bir yere sahip olduklarını bildirmektedir. Bowlby (1982)'ye göre çocukların birincil bağlanma figürleriyle kurdukları bağlanma ilişkisi ikincil bağlanma figürlerinden olan babalarla kurulan bağlanma ilişkisini etkileyebilmektedir. Anneleriyle güven temelli ilişkiler kuran bebeklerin, babalarıyla da güven temelli ilişkiler kurmaya yatkın oldukları, güvensiz anne-bebek ilişkisinin babalarla kurulacak bağlanma ilişkisini de zedeleyebileceği bildirilmektedir.

Çocukların, bağlanma figürleriyle kurdukları bağlanma ilişkisi gelişimlerini çok yönlü etkilemektedir. Anneleriyle güvenli bağlanma ilişkisi kuran çocuklar bakım verenleriyle kurdukları güven temelli ilişkileri akran ilişkilerine ve sosyal ilişkilerine taşımaktadır (Collins Clark ve Shaver, 1996). Bu çocukların sosyal ortamlara daha kolay uyum sağladıkları ve akran ilişkilerinin daha iyi olduğu, öz güvenlerinin yüksek olduğu, insanlarla iyi düzeyde iletişim kurabildikleri bildirilmektedir. (Waters, Hamilton ve Weinfield, 2000). Birincil bakım verenleriyle güvensiz bağlanma geliştiren çocukların bağlanma ilişkisi yoluyla kazanamadıkları temel güven duygusu eksikliğinin kurdukları diğer ilişkileri de olumsuz etkilediği bildirilmektedir. Güvensiz bağlanma stiline sahip çocukların sosyal ortamlara kolay uyum sağlayamadıkları, akran ilişkilerinde güçlükler yaşadıkları, öz güvenlerinin beklenen düzeyde olmadığı, diğer insanlarla iletişim kurmada sınırlılık yaşayabildikleri bildirilmektedir. (Bowlby, 1977; Belsky, 2005). Damar (2019) araştırmasında, orta çocukluk döneminde, çocukların prososyal davranışlarıyla bağlanma güvenlikleri arasında anlamlı ve pozitif yönde bir ilişki olduğunu belirlemiştir. Sumbaş ve Sezer (2017) orta okul öğrencilerinde, güvenli bağlanmanın çocukların umut düzeyini ve kendilerine yönelik pozitif algılarını olumlu yönde etkilediğini saptamıştır. Birincil bağlanma figürleri olan annelerle kurulan bağlanma ilişkisi gibi ikincil bağlanma figürlerinden olan babalarla kurulan bağlanma ilişkisi de çocukların gelişimleri üzerinde etkilidir. (Grossmann ve ark., 2002; Rosenberg ve Wilcox, 2006). Deneault ve arkadaşları (2021) gerçekleştirdikleri metanaliz çalışmasında çocukların babalarıyla bağlanma düzeyleri ile içselleştirilmiş ve dışsallaştırılmış davranış problemleri arasında negatif yönde bir ilişki olduğunu belirlemişlerdir. Dumont ve Paquette (2013) araştırmalarında baba-çocuk bağlanma güvenliğinin çocukların sosyal-duygusal gelişimlerini olumlu yönde etkilediğini belirlemişlerdir. Bureau ve arkadaşları (2017) okul öncesi dönemde çocukların problem davranışlarıyla babalarına bağlanma güvenlikleri arasında güçlü bir ilişki olduğunu, babalarıyla bağlanma düzeyleri düştükçe, problem davranışların arttığını tespit etmişlerdir.

Bu araştırmada çocukların gelişimlerinde oldukça önemli bir yere sahip olan anne ve babalarına güvenli bağlanma düzeyleri arasındaki ilişki ve bu düzeyleri etkileyen faktörlerin incelenmesi amaçlanmaktadır. Araştırma bulgularının kuramsal alt yapıya, literatüre ve bağlanma araştırmalarına katkı sağlayacağı, araştırmacılara yol gösterici olacağı düşünülmektedir.

Materyal ve Yöntem

Araştırma Modeli

Bu araştırma, tarama modelinde betimsel bir araştırmadır. Bu araştırma ile orta çocukluk döneminde annelere ve babalara bağlanma düzeyi arasındaki ilişki ve bu düzeyi etkileyen faktörlerin incelenmesi amaçlandığı için betimsel tarama modeli kullanılmıştır. Tarama modelleri; geçmişte veya halen var olan bir durumu, var olduğu şekli ile betimlemeyi amaçlayan araştırma yaklaşımıdır (Karasar, 2006).

Katılımcılar

Araştırmanın evrenini Tekirdağ ili Süleymanpaşa İlçesi' nde Milli Eğitim Bakanlığına bağlı ortaokullarda 2021-2022 eğitim öğretim yılında, 5. ve 6. Sınıflarda öğrenim gören 10 ve 11 yaş arası çocuklar oluşturmaktadır. Araştırmanın örneklemini, belirtilen okullar arasından basit tesadüfi örnekleme yöntemi ile belirlenen dört okuldaki, tam ailelerden gelen, normal gelişim gösteren 204 çocuk ve ebeveynleri oluşturmaktadır.

Araştırmaya dahil edilen çocuklar ve ailelere ilişkin demografik dağılımlar Çizelge 1.'de verilmiştir.

Çizelge 1. Araştırmaya Dahil Edilen Çocuklar ve Ailelerin Sosyo-Demografik Özelliklerine Göre Frekans ve Yüzde Değerleri

Sosyo-Demografik Özellikler	Gruplar	f	%
Cinsiyet	Kız	100	49,0
	Erkek	104	51,0
Anne öğrenim düzeyi	Okur-Yazar veya İlköğretim	71	34,8
	Ortaokul	34	16,7
	Lise	52	25,5
	Lisans ve Üzeri	47	23,0
Baba öğrenim düzeyi	Okur-Yazar veya İlköğretim	46	22,5
	Ortaokul	29	14,2
	Lise	63	30,9
Anne istenen/beklenen gebelik	Lisans ve Üzeri	66	32,4
	Evet	182	89,2
Baba istenen/beklenen gebelik	Hayır	22	10,8
	Evet	176	86,3
Anne bebek bakıma eş desteği	Hayır	28	13,7
	Hiçbir zaman	22	10,8
	Ara sıra	107	52,5
Baba bebek bakımını üstlenme	Her zaman	75	36,7
	Hiçbir zaman	14	6,9
	Ara sıra	103	50,5
Anne sosyal aktivitelere götürme	Her zaman	87	42,6
	Evet	168	82,4
	Hayır	20	9,8
Baba sosyal aktivitelere götürme	Ara Sıra	16	7,8
	Evet	146	71,6
	Hayır	44	21,5
	Ara Sıra	14	6,9

Çizelge 1. incelendiğinde araştırmaya katılan çocukların %49,0'ının (n=100) kız, %51,0 'ının (n=104) erkek olduğu görülmektedir. Ebeveynlerin eğitim düzeyine bakıldığında annelerinin %34,8 'inin (n=71) okur-yazar veya ilköğretim, %16,7' sinin (n=34) ortaokul, %25,5' inin (n=52) lise, %23,0' ının (n=47) lisans ve üzeri, babalarının %22,5' inin (n=46) okur-yazar veya ilköğretim, %14,2' sinin (n=29) ortaokul, %30,9'unun (n=63) lise, %32,4 'ünün (n=66) lisans ve üzeri mezunu olduğu görülmektedir. Çocukların ebeveynleri tarafından istenen/beklenen gebelik sonucu dünyaya gelme durumları incelendiğinde anneleri tarafından %89,2' sinin (n=182) istenen, %10,8' inin (n=22) istenmeyen, babaları tarafından %86,3'ünün (n=176) istenen %13,7'sinin (n=28) istenmeyen bir gebelik sonucu dünyaya geldiği ortaya çıkmaktadır. Bebeklik döneminde annelerin bebek bakımında eşlerinden aldıkları desteğe göre değerlendirildiğinde %10'8'inin (n=22) hiçbir zaman destek almadığı, %52,5'inin (n=107) ara sıra, %36,7'sinin (n=75) her zaman destek aldığı, babaların bebeklik dönemlerinde bakımlarını üstlenme durumlarına göre ise %6,9'unun (n=14) hiçbir zaman üstlenmediği, %50,5' inin (n=103) ara sıra, %42,6' sının (n=87) her zaman üstlendiği tespit edilmiştir. Çocukların ebeveynlerinin sosyal aktivitelere götürme durumları incelendiğinde annelerinin %82,4' ünün (n=168) götürdüğü, %9,82inin (n= 20) götürmediği, %7,8' inin (n=16) ara sıra götürdüğü, babalarının %71,6' sının (n=146) götürdüğü, %21,5'inin (n=44) götürmediği, %6,9'unun ise ara sıra götürdüğü görülmektedir.

Veri Toplama Araçları

Anne ve Baba Bilgi Formları

Araştırmacı tarafından anne ve babalara yönelik ayrı iki form hazırlanmıştır. Anne bilgi formunda çocuğun yaşı, cinsiyeti, annenin öğrenim düzeyi, doğumdan sonra bebek bakımında eşinden destek alma ve çocuğuyla sosyal aktivitelere gitme durumu; baba bilgi formunda baba öğrenim düzeyi, bebeklik döneminde çocuğunun bakımını üstlenme ve çocuğuyla sosyal aktivitelere gitme durumuyla ilgili sorulara yer verilmiştir.

Kerns Güvenli Bağlanma Ölçeği (KGBÖ)

Kerns, Klepac ve Cole (1996) tarafından geliştirilen Kerns Güvenli Bağlanma Ölçeği (KGBÖ) on beş maddeden oluşmaktadır. Orta çocukluk ve ergenlik öncesi dönemdeki çocuklara uygun olarak geliştirilen on beş maddeli ölçek çocukların bağlanma figürlerinin (a) duyarlı ve ulaşılabilir olacaklarına ne oranda güvendiklerini, (b) stres altında iken bağlanma figürlerine güvenme eğilimlerini ve (c) bağlanma figürleri ile iletişim kurma kolaylığını ve isteklilik

düzeylerini ölçmeyi amaçlamaktadır. Çocuklar ölçeği hem anne hem de babaları için ayrı olarak doldurmaktadırlar. Ölçekten en az 15 puan, en fazla 60 puan alınabilmektedir. 1, 3, 4, 9, 10, 13, 15. Maddeler ters kodlanmaktadır. Yüksek puanlar ebeveynlere karşı güvenli bağlanmaya karşılık gelmektedir (Sümer ve Anafarta-Şendağ, 2009).

Ölçeğin Türkçe'ye çevrilmesi ve uyarlanması Sümer ve Anafarta-Şendağ (2009) tarafından yapılmıştır. Ölçeğin Cronbach alfa iç tutarlık katsayıları anne formu için .84 ve baba formu için .88 olarak bulunmuştur. Ölçeğin geçerlik çalışmaları kapsamında anne ve baba formları için ayrı ayrı ana bileşenler (faktör) analizi yapılmıştır. Yapılan çalışmada hem anne hem de baba formu için KGBÖ'nün tek boyut üzerinden ebeveynlere güvenli bağlanma düzeyini ölçtüğü görülmüştür. Bu çalışmada anne formu için Cronbach alfa iç tutarlık katsayısı .82, baba formu için Cronbach alfa iç tutarlık katsayıları .80 olarak bulunmuştur.

Verilerin Analizi

Araştırmadan elde edilen verilerin analizi için Statistical Package for Social Sciences (SPSS) 22 bilgisayar programı kullanılmıştır. Sosyo-demografik verilerin değerlendirilmesinde sayı ve yüzdeler hesaplanmıştır. Araştırmadan elde edilen verilerin analizinde öncelikle parametrik test koşullarının sağlanıp sağlanmadığına ilişkin normallik testi yapılmıştır. Kolmogorov- Smirnov Testi ile Basıklık-Çarpıklık Katsayısı ölçek verilerinin normal dağılmadığını göstermiştir. Parametrik olmayan testlerin kullanıldığı çalışmada iki grubun karşılaştırılmasında Mann Whitney U testi, üç ve daha fazla grubun karşılaştırılmasında Kruskal Wallis-H Testi kullanılmıştır. Ölçekler arasındaki korelasyon ise Spearman Korelasyon Analizi ile hesaplanmıştır. Araştırmada anlamlılık düzeyi .05 olarak kabul edilmiştir.

Çizelge 2. Kerns Anne ve Baba Güvenli Bağlanma Ölçeklerine İlişkin Kolmogorov - Smirnov ve Basıklık -Çarpıklık Testi Sonuçları

	Kolmogorov-Smirnov Testi		Basıklık Çarpıklık Katsayısı		
	Z	Sd	p	Skewness	Kurtosis
Kerns Güvenli Bağlanma Ölçeği					
Anne	.133	204	.00	-,974	-,210
Baba	.141	204	.00	-,564	-,210

Çizelge 2.'de ölçekler ve alt boyutlarına ilişkin normallik testleri sonuçları incelendiğinde, Kolmogorov-Smirnov testi sonucunda; Kerns Anne ve Baba Güvenli Bağlanma Ölçeklerinin dağılımının normal olmadığı belirlenmiştir ($p > 0,01$). Bunun için ek olarak Basıklık-Çarpıklık Katsayısı ve Grafik dağılım testlerine bakılmıştır. Büyüköztürk ve arkadaşları (2010)'na göre; bir değişkenin normal dağılıp dağılmadığı mantıksal bir karardır. Bir dağılımın tam normal

olması ihtimali çok düşük olmakla birlikte, normallik incelemesi yaparken aslında normallikten önemli ölçüde sapma gösterip göstermediğine bakılmalıdır. Bunun için de incelenen üç temel nokta vardır. Bu sayıların -1 ile +1 aralığında yer alması gereklidir. İkinci nokta Shapiro-Wilk ve Kolmogorov-Simirnov testidir. Grup büyüklüğünün 50'den küçük olması durumunda Shapiro-Wilk, 50'den büyük olması durumunda ise Kolmogorov-Simirnov Testi puanlarının normal dağılıp dağılmadığını incelemek için kullanılmaktadır. Araştırma grubunda çocukların sayısının 50'den fazla olması nedeniyle Kolmogorov-Simirnov testi uygun bulunmuştur. Üçüncü kriterde dağılım grafiklerinin normal dağılıma benzemesidir. Histogram grafiği dağılımın normallikten saptığını göstermiştir. Bu bakımdan tüm bu kriterler göz önünde bulundurularak; Kerns Anne ve Baba Güvenli Bağlanma Ölçekleri puan dağılımının normal dağılım göstermemesi nedeniyle parametrik olmayan testler kullanılmıştır. Niceliksel verilerin karşılaştırılmasında ikiden fazla grup durumunda, normal dağılım göstermeyen parametrelerin gruplar arası karşılaştırmalarında Kruskal Wallis H Testi kullanılmıştır ve farklılığın anlamlı çıkması durumuna ikili grupların karşılaştırılmasında Mann Whitney U testinden yararlanılmıştır (Büyüköztürk 2006).

Ölçekler normal dağılıma sahip olmadıkları için kolerasyon analizi olarak Pearson Kolerasyonu katsayısına bakılmıştır. İki değişken arasında Pearson Kolerasyon katsayısının yorumunda $r=0.00 - 0,25$ çok zayıf, $0,26 - 0,49$ zayıf, $0,50-0,69$ orta, $0,70-0,89$ yüksek, $0,90 -1,00$ çok yüksek düzeyde ilişki kabul edilmektedir (Kalaycı, 2010).

Bulgular

Bu bölümde araştırma bulguları Çizelge 3. İle Çizelge 12. Arasında sunulmaktadır.

Çizelge 3. Kerns Anne ve Baba Güvenli Bağlanma Ölçeklerine İlişkin Pearson Kolerasyonu Sonuçları

		1	2
1-Kerns Anne Güvenli Bağlanma Ölçeği	r	-	,607**
2-Kerns Baba Güvenli Bağlanma Ölçeği	r	,607**	-

**p < 0.01

Çizelge 3.'de Kerns Anne Güvenli Bağlanma Ölçeği ile Kerns Baba Güvenli Bağlanma Ölçeği toplam puan ortalamaları arasında orta düzeyde anlamlı ve pozitif ($r=,607$; $p<,01$) bir ilişki olduğu ortaya çıkmaktadır.

Çizelge 4. Cinsiyete Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Mann Whitney-U Testi Sonuçları

	n	Sıra Ort.	Sıra Top.	U	p	z	Ss
Anne							
Kız Çocuk	100	108,12	10812,00	4638,000	.182	-1,335	7,88399
Erkek Çocuk	104	97,10	10098,00				
Baba							
Kız Çocuk	100	110,21	11020,50	4429,500	.067	-1,830	7,98682
Erkek Çocuk	104	95,09	9889,50				

p<0.05

Çizelge 4. incelendiğinde cinsiyete göre çocukların Kerns Anne (U= 4638,000; p=,182; z=-1,335) ve Baba (U= 4429,500; p=.067; z=-1,830) Güvenli Bağlanma Ölçeği puan ortalamalarının anlamlı düzeyde farklılaşmadığı ortaya çıkmaktadır.

Çizelge 5. Anne Öğrenim Düzeyine Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Kruskal Wallis-H Testi Sonuçları

	n	so	x ²	sd	p	Ss
ANNE						
Okur-Yazar ve İlköğretim	71	91,18	6,742	3	,081	7,98682
Ortaokul	34	97,04				
Lise	52	106,88				
Lisans ve Üzeri	47	118,69				
BABA						
Okur-Yazar ve İlköğretim	71	92,59	4,564	3	,207	7,88399
Ortaokul	34	101,71				
Lise	52	104,24				
Lisans ve Üzeri	47	116,12				

p<0.05

Çizelge 5. incelendiğinde anne öğrenim düzeyine göre çocukların Kerns Anne (x² =6,742; p>.05) ve Baba (x² =4,564; p>.05) Güvenli Bağlanma Ölçeği puan ortalamalarının anlamlı düzeyde farklılaşmadığı ortaya çıkmaktadır.

Çizelge 6. Baba Öğrenim Düzeyine Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Kruskal Wallis-H Testi Sonuçları

	n	so	x ²	sd	p	Ss
ANNE						
Okur Yazar ve İlköğretim	71	100,41	5,087	3	,166	7,88399
Ortaokul	34	81,72				
Lise	52	104,83				
Lisans ve Üzeri	47	110,86				
BABA						
Okur-Yazar ve İlköğretim	71	99,12	4,309	3	,230	7,98682
Ortaokul	34	88,97				
Lise	52	99,31				
Lisans ve Üzeri	47	113,85				

p<0.05

Çizelge 6. incelendiğinde baba öğrenim düzeyine göre çocukların Kerns Anne ($\chi^2 = 5,087$; $p > .05$) ve Baba ($\chi^2 = 4,309$; $p > .05$) Güvenli Bağlanma Ölçeklerinden puan ortalamalarının anlamlı düzeyde farklılaşmadığı ortaya çıkmaktadır.

Çizelge 7. Anneler Tarafından İstenen Gebelik Sonucu Dünyaya Gelme Durumlarına Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Mann Whitney-U Testi Sonuçları

		n	Sıra Ort.	Sıra Top.	U	P	z	Ss
Anne	Evet	100	105,43	19189,00	19189,00	,041	-2,045	7,88399
	Hayır	104	78,23	1721,00				
Baba	Evet	100	104,97	19104,00	19189,00	,086	-1,719	7,98682
	Hayır	104	82,09	1806,00				

$p < 0.05$

Çizelge 7. incelendiğinde anneler tarafından istenen gebelik sonucu dünyaya gelme durumlarına göre çocukların Kerns Anne Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaştığı ortaya çıkmaktadır ($U = 19189,00$; $p = ,041$; $z = -2,045$). Ortalama puanlar incelendiğinde anneler tarafından istenen gebelik sonucu dünyaya gelen çocukların ($n = 105,43$), istenmeyen bir gebelik sonucu dünyaya gelen çocuklara göre ($n = 78,23$) annelerine daha yüksek düzeyde güvenli bağlanma sergiledikleri görülmektedir. Anneler tarafından istenen gebelik sonucu dünyaya gelme durumlarına göre ise çocukların Kerns Baba Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaşmadığı saptanmıştır ($U = 19189,00$; $p = ,086$; $z = -1,719$)

Çizelge 8. Babalar Tarafından İstenen Gebelik Sonucu Dünyaya Gelme Durumlarına Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Mann Whitney-U Testi Sonuçları

		n	Sıra Ort.	Sıra Top.	U	p	z	Ss
Anne	Evet	176	105,66	18595,50	1908,500	,055	-1,917	7,88399
	Hayır	28	82,66	2314,50				
Baba	Evet	176	105,97	18651,00	1853,000	,035	-2,109	7,98682
	Hayır	28	80,68	2259,00				

$p < 0.05$

Çizelge 8. incelendiğinde babalar tarafından istenen gebelik sonucu dünyaya gelme durumlarına göre çocukların Kerns Baba Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaştığı ortaya çıkmaktadır ($U = 1853,000$; $p = ,035$; $z = -2,109$). Ortalama puanlar incelendiğinde babalar tarafından istenen bir gebelik sonucu dünyaya gelen çocukların ($n = 105,97$), istenmeyen bir gebelik sonucu dünyaya gelen çocuklara göre ($n = 80,68$) babalarına daha yüksek düzeyde güvenli bağlanma sergiledikleri ortaya çıkmaktadır. Babalar tarafından istenen gebelik sonucu dünyaya gelme durumlarına göre ise çocukların Kerns Anne Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaşmadığı görülmektedir ($U = 1908,500$; $p = ,055$; $z = -1,917$).

Çizelge 9. Annelerin Doğumdan Sonra Bebek Bakımında Eşlerinden Destek Alma Durumlarına Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Kruskal Wallis-H Testi Sonuçları

	n	so	x ²	sd	p	ss
ANNE						
Her zaman	75	109,79	1,927	2	,382	7,88399
Ara Sıra	107	99,06				
Hiçbir zaman	22	94,39				
BABA						
Her zaman	75	120,87	13,309	2	,001	7,98682
Ara Sıra	107	94,97				
Hiçbir zaman	22	76,50				

p<0.05

Çizelge 9. incelendiğinde annelerin doğumdan sonra bebek bakımında eşlerinden aldıkları göre çocukların Kerns Baba Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaştığı ortaya çıkmaktadır ($x^2 = 13,309$; $p < ,05$). Gruplar arası farkın belirlenebilmesi için yapılan One Withney U testi sonuçlarına göre bebek bakımında eşlerinden her zaman destek alan annelere sahip çocukların ara sıra destek alan ve hiçbir zaman hiçbir zaman destek almayan; ara sıra destek alanların ise hiçbir zaman destek almayan annelere sahip olanlara göre babalarına güvenli bağlanma düzeylerinin daha yüksek olduğu tespit edilmiştir. Annelerin doğumdan sonra bebek bakımında eşlerinden aldıkları desteğe göre Kerns Anne Güvenli Bağlanma Ölçeği puan ortalaması ise anlamlı düzeyde farklılaşmamıştır ($x^2 = 1,927$; $p > ,05$).

Çizelge 10. Babaların Doğumdan Sonra Bebeklerinin Bakımını Üstlenme Durumlarına Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Ortalamaları Standart Sapmaları ve Kruskal Wallis-H Testi Sonuçları

	n	so	x ²	sd	p	ss
ANNE						
Her zaman	86	107,97	1,322	2	,516	7,88399
Ara Sıra	104	98,11				
Hiçbir zaman	14	101,54				
BABA						
Her zaman	86	114,49	6,470	2	,039	7,98682
Ara Sıra	104	94,89				
Hiçbir zaman	14	85,36				

p<0.05

Çizelge 10. incelendiğinde babaların doğumdan sonra bebeklerinin bakımını üstlenme durumlarına göre çocukların Kerns Baba Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaştığı ortaya çıkmaktadır ($x^2 = 6,470$; $p < ,05$). Gruplar arası farkın belirlenebilmesi için yapılan One Withney U testi sonuçlarına göre doğumdan sonra bebeklerinin bakımını her zaman üstlenen babalara sahip çocukların ara sıra üstlenen ve hiçbir zaman üstlenmeyenlere göre babalarına güvenli bağlanma düzeylerinin daha yüksek olduğu tespit edilmiştir. Babaların doğumdan sonra bebeklerinin bakımını üstlenme durumlarına göre ise Kerns Anne Güvenli Bağlanma Ölçeği puan ortalaması anlamlı düzeyde farklılaşmamıştır ($x^2 = 1,322$; $p > ,05$).

Çizelge 11. Annelerin Sosyal Aktivitelere Götürme Durumlarına Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Kruskal Wallis-H Testi Sonuçları

	n	so	x ²	sd	p	ss
ANNE						
Evet	168	103,92	1,011	2	,603	7,88399
Hayır	20	89,93				
Vakit Buldukça	16	103,31				
BABA						
Evet	168	103,29	,285	2	,867	7,98682
Hayır	20	95,85				
Vakit Buldukça	16	102,50				

p<0.05

Çizelge 11. incelendiğinde annelerin sosyal aktivitelere götürme durumlarına göre çocukların Kerns Anne ($x^2 = 1,011$; $p > ,05$) ve Baba ($x^2 = ,285$; $p > ,05$) Güvenli Bağlanma Ölçeklerinden aldığı puan ortalamalarının anlamlı düzeyde farklılaşmadığı belirlenmiştir.

Çizelge 12. Babaların Sosyal Aktivitelere Götürme Durumlarına Göre Çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği Puan Ortalamaları Standart Sapmaları ve Kruskal Wallis-H Testi Sonuçları

	n	so	x ²	sd	p	Ss
ANNE						
Evet	146	110,18	8,793	2	,012	7,88399
Hayır	44	81,93				
Vakit Buldukça	14	87,07				
BABA						
Evet	146	114,94	22,914	2	,000	7,98682
Hayır	44	72,24				
Vakit Buldukça	14	67,89				

p<0.05

Çizelge 12. incelendiğinde babaların sosyal aktivitelere götürme durumlarına göre çocukların Kerns Anne ($x^2 = 8,793$; $p < ,05$) ve Baba ($x^2 = 22,914$; $p < ,01$) Güvenli Bağlanma Ölçekleri puan ortalamalarının anlamlı düzeyde farklılaştığı ortaya çıkmaktadır. Gruplar arası farkın belirlenebilmesi için yapılan One Withney U testi sonuçlarına göre babalarının sosyal aktivitelere götürdüğü çocukların babaları vakit buldukça götüren ve götürmeyenlere göre babalarına, götüren babalara sahip çocukların götürmeyenlere göre annelerine daha yüksek düzeyde güvenli bağlanma sergiledikleri ortaya çıkmaktadır.

Tartışma

Bu araştırmada orta çocukluk döneminde anne ve babalara güvenli bağlanma düzeyini etkileyen faktörlerin incelenmesi amaçlanmaktadır. Araştırmada ilk önce parametrik koşulların sağlanıp sağlanmadığını belirlemek amacıyla normallik testleri yapılmıştır. Daha sonra annelere ve babalara güvenli bağlanma düzeyi arasındaki kolerasyon değerlendirilip, anne ve babalara güvenli bağlanma düzeyi çeşitli değişkenler açısından incelenmiştir.

Anne ve Babaya Bağlanma Korelasyonu;

Bowlby (1969) çocukların genellikle birincil bağlanma figürlerinin anneler olduğunu; fakat bebeklerin ilk birkaç ay içerisinde babalarına da bağlanma sergilediklerini, anneye olan bağlanma ilişkisinin babayla olan bağlanma ilişkisinin güçlü bir yordayıcısı olduğunu bildirmektedir. Bağlanma davranışlarının en belirgin olduğu yedi ve sekizinci aylardan başlayarak bebekler anne ve babalarını gördüklerinde gülümseyerek yakınlaşmayı istemektedir. Anneye güvenli bağlanan bebekler bu bağlanma davranışını diğer bağlanma figürlerine de sergileme eğilimindedir. Çocukların bağlanma güvenlikleri anne-babaların şefkati ve duyarlılığı ile beslenmektedir (Bee ve Boyd, 2009). Fox, Kimmerly ve Schafer (1991) çocukların anne ve babalarına bağlanmaları arasındaki uyumu değerlendirmek amacıyla gerçekleştirdikleri meta analiz çalışmalarında anne ve babaya bağlanmanın birbirinin belirleyicisi olduğunu saptamışlardır. Literatür değerlendirildiğinde de anne ve babaya bağlanmanın birbirinden bağımsız olmadığı ortaya çıkmaktadır.

Cinsiyet

Araştırmada, cinsiyete göre çocukların Kerns Anne ve Baba Güvenli Bağlanma ölçeklerinden aldıkları puan ortalamalarının anlamlı düzeyde farklılaşmadığı saptanmıştır ($p>0.05$). Bağlanmanın cinsiyetle ilişkisiyle ilgili literatürde iki yaygın görüş bulunmaktadır. Birincisi ebeveynlere bağlanmanın cinsiyete göre farklılaşmaması, ikincisi ise kız çocuklarının erkek çocuklara göre ebeveynlerine daha güvenli bağlanmasıdır. Bağlanmanın cinsiyete göre farklılaşmaması genellikle anneliğin içgüdüsel bir davranış olması ve anne davranışlarının çocukların cinsiyetlerine göre farklılaşmamasıyla, kız çocuklarının lehine sonuçlanması ise onların duygusal farklılıkları nedeniyle ebeveynlerinden sevgi ve sıcaklığı almaya daha açık olmaları, bu farklılıktan kaynaklanan davranış biçimleri ve ebeveyn tutumlarıyla açıklanmaktadır (İlhan-Ildız ve Ahmetoğlu, 2016). Kerns, Tomich, Aspelmeier ve Contreras (2000), Lecompte ve arkadaşları (2014) araştırmalarında bulgularla tutarlı bir şekilde bağlanma güvenliğinin cinsiyete göre farklılaşmadığını saptamışlardır. Cohn (1990) ise bağlanmanın cinsiyete göre anlamlı düzeyde farklılaşmamasına rağmen kız çocuklarının ortalama puanlarının, erkek çocuklarından daha yüksek olduğunu vurgulanmaktadır. Pierrehumbert ve arkadaşları (2009) ise araştırmalarında projektif hikâye temelli bağlanma ölçüm yöntemini kullanarak kız çocuklarının erkeklere göre hikayelerinde bağlanma figürleriyle daha yakın ve sıcak bir ilişkiden bahsettiklerini bildirmektedir. Bulgulara göre kız çocuklarının, erkek çocuklara göre ortalama puanları daha yüksektir. Literatürden yola çıkarak bağlanma

figürlerinin erken dönemlerden başlayarak bağlanmanın kurulması için gerekli olan sarılma, sıcaklık, duyarlılık ve tutarlılık gibi davranışları cinsiyet ayrımı yapmadan çocuklarına gösterdiklerini; fakat kız çocuklarının duygusal yapılarındaki farklılıktan dolayı bu davranışlardan daha fazla sıcaklık ve şefkat algıladıkları düşünülebilir.

Anne ve Baba Öğrenim Düzeyi

Araştırmada anne öğrenim düzeyine göre çocukların Kerns Anne ve Baba Güvenli Bağlanma ölçeklerinden aldıkları puan ortalamalarının anlamlı düzeyde farklılaşmadığı tespit edilmiştir ($p>0.05$). Literatürde bulgularla tutarlılık gösteren araştırma sonuçları yer almaktadır. İlhan-Ildız ve Ahmetoğlu (2016) annelerin öğrenim düzeylerine göre çocukların bağlanma stilleri arasında anlamlı farklılık olmadığını belirlemiş, bu durumu bağlanmanın kurulması sırasında önemli olan, dokunma, temel ihtiyaçların karşılanması, hassasiyet, sevgiyi verebilme gibi davranışların farklı öğrenim düzeyindeki anne ve babalar tarafından da rahatlıkla yerine getirilebilir davranışlar olmasıyla açıklamışlardır. Carlson (1995) çalışmasında annenin öğrenim düzeyinin annelik davranışını etkilemediğini bunun nedeninin de anneliğin kadının doğasında var olan bir duygu olmasıyla açıklamaktadır. Çocukların anne-babalarına güvenli bağlanma düzeylerinin anne öğrenim durumuna göre farklılaşmamasının nedeninin evrensel olarak anne-çocuk ilişkisinin doğum öncesi dönemde gelişmeye başlaması ve annelik davranışlarının içgüdüsel olarak gelişmesi, aynı zamanda gelişen teknoloji ile tüm sosyo-kültürel düzeydeki annelerin anne-çocuk ilişkisiyle ilgili bilgilere kolay erişebilme imkanı olması, bu durumunda düşük öğrenim düzeyine sahip annelerin de farkındalıklarını arttırmasına neden olduğu düşünülebilir. Araştırmada babaların öğrenim düzeyine göre çocukların Kerns Anne ve Baba Güvenli Bağlanma ölçekleri puan ortalamalarının anlamlı düzeyde farklılaşmadığı ortaya konulmuştur ($p>0.05$). Benzer şekilde Karaboğa (2011), Nwoke (2013), İlhan-Ildız ve Ahmetoğlu (2016) babaların öğrenim durumları ile çocukların bağlanma güvenlikleri arasında anlamlı bir farklılık olmadığını belirlemişlerdir. Bağlanmanın gelişiminde bakım yoluyla çocuğun beslenme gibi fizyolojik ihtiyaçlarının giderilmesinin önemi vurgulanmaktadır (Bowlby, 1969; 1982). Hewlett (2000) çalışmasında çoğu kültürde babaların çocuklarının bakımında oldukça az yer aldığından bahsetmektedir. Özellikle kültürümüzde geleneksel aile yapısının etkilerinin devam etmesi babaların çocukların bakımından uzak kalmalarıyla sonuçlanmaktadır. Bu durum babaların öğrenim düzeyine göre ölçeklerden alınan puanların anlamlı düzeyde farklılaşmamasının nedeni olarak düşünülebilir. Literatürde babaların eğitim düzeyi ile çocuklarda bağlanma arasında anlamlı ilişkilerin tespit

edildiği arařtırmalarda bulunmaktadır. Crittenden ve Claussen (2003), Seven (2006), bu alıřmalara rnek gsterilebilir.

Anne ve Baba Tarafından İstenen Gebelik Sonucu Dnyaya Gelme

Anneler tarafından istenen gebelik sonucu dnyaya gelme durumlarına gre ocukların Kerns Baba Gvenli Baėlanma leėi puan ortalaması anlamlı dzeyde farklılařmazken ($p>0.05$), Kerns Anne Gvenli Baėlanma leėi puan ortalaması anlamlı dzeyde farklılařmaktadır ($p<0.05$). Anneleri tarafından istenen/beklenen bir gebelik sonucu dnyaya gelen ocuklar istenmeyen gebelik sonucu dnyaya gelenlere gre annelerine daha yksek dzeyde gvenli baėlanma gstermiřlerdir. Anneleri tarafından istenen/beklenen bir gebelik sonucu dnyaya gelen ocuklar istenmeyen gebelik sonucu dnyaya gelenlere gre annelerine daha yksek dzeyde gvenli baėlanma gstermiřlerdir. Yavuzer (2000) annelerin istenmeyen bir gebelik sonucunda dnyaya gelen bebeklerine karřı fke duyabileceėini, bakım ve ihtiyalarıyla ilgilenme konusunda isteksizlik yařayabileceėini, istenen gebelik sonucunda dnyaya gelen bebeklerine ise sevgi, ilgi ve duyarlılıkla yaklařacaėını bildirmektedir. zkan ve arkadařları (2013) arařtırmasında doėumdan sonra annelik rolnn bařarıyla gerekleřtirilmesinde gebelik ncesi ve sırasında hazır bulunuřluėun nemini tespit etmiřtir. Baėlanmanın kurulmasında ilk ayların nemi dřnldėnde istenen/beklenen gebelik sonucunda dnyaya gelmeyen bebeklere, annelerinin en ok bakım, ilgi ve sevgiye ihtiya duydukları ilk dnemlerde beklenen řekilde karřılık vermemesinin ocuklarda gvenli baėlanma dzeyinin dřmesine neden olduėu dřnlebilir.

Arařtırmada babalar tarafından istenen gebelik sonucu dnyaya gelme durumlarına gre ocukların Kerns Anne Gvenli Baėlanma leėi puan ortalaması anlamlı dzeyde farklılařmazken ($p>0.05$), Kerns Baba Gvenli Baėlanma leėi puan ortalaması anlamlı dzeyde farklılařmaktadır ($p<0.05$). Babaları tarafından istenen/beklenen bir gebelik sonucu dnyaya gelen ocuklar istenmeyen gebelik sonucu dnyaya gelenlere gre babalarına daha yksek dzeyde gvenli baėlanma gstermiřlerdir. Babalık duygusunun doėumdan sonraki dnemlerde kazanıldıėı bilinmektedir. Babalık duygusunun oluřumundaki nemli bir faktr ise babalıėa hazırbulunuřluktur. Babalıėa hazırbulunuřluėu olan babalar babalık roln abuk kabullenirken, hazırbulunuřluėu olmayan babaların babalıėı kabullenmesinin zaman aldıėı ve ilk zamanlar bebeklerine karřı ilgisiz olabilecekleri bildirilmektedir (Axinn, Barber ve Thornton, 1998). İstenen-beklenen gebelik sonucunda dnyaya gelmeyen ocukların babalarının, babalık roln benimsemede ve bebeklerini kabullenmede glk yařamasının

bağlanmanın kurulması için gerekli olan fiziksel temas, ilgi ve duyarlılık gibi davranışları sergilemede sınırlılığa yol açtığı, bu durumda çocukların güvenli bağlanma düzeylerini olumsuz etkilediği düşünülebilir.

Doğum Sonrası Bebek Bakımı

Araştırmada annelerin doğumdan sonra bebek bakımında eşlerinden aldıkları desteğe göre Kerns Anne Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaşmadığı ($p>0.05$), Kerns Baba Güvenli Bağlanma Ölçeği puan ortalamasının ise anlamlı düzeyde farklılaştığı tespit edilmiştir ($p<0.05$). Bebek bakımında eşlerinden her zaman destek alan annelere sahip çocukların ara sıra destek alanlara ve hiçbir zaman destek almayanlara; ara sıra destek alanların ise hiçbir zaman destek almayan annelere sahip olanlara göre babalarına güvenli bağlanma düzeylerinin daha yüksek olduğu ortaya çıkmıştır. Araştırmada babaların doğumdan sonra bebeklerinin bakımını üstlenme durumlarına göre çocukların Kerns Anne Güvenli Bağlanma Ölçeği puan ortalamasının anlamlı düzeyde farklılaşmadığı ($p>0.05$), Kerns Baba Güvenli Bağlanma Ölçeği puan ortalamasının ise anlamlı düzeyde farklılaştığı belirlenmiştir ($p<0.05$). Doğumdan sonra çocuklarının bakımını her zaman üstlenen babalara sahip çocukların ara sıra üstlenen ve hiçbir zaman üstlenmeyenlere göre babalarına güvenli bağlanma düzeylerinin daha yüksek olduğu tespit edilmiştir. Literatür incelendiğinde konuyla ilgili önemli bulgulara rastlanmaktadır. Babalar çocuklar için önemli bir duygusal güven kaynağıdır. Çocukların temel bakımına babaların erken dönemlerdeki katılımı, bebeklik dönemindeki sevecen davranışları ve duygusal tepkileri kabul edişleri, üzgün veya korkulu durumlarda bebeklerini fiziksel temasla rahatlatmaları yüksek düzeyde güvenli bağlanma ilişkisinin kurulmasında önemlidir (Scott ve Hunt, 2011; Rosenberg ve Wilcox, 2006). Cox ve arkadaşları (1992) 3 aylık bebekler üzerinde yaptığı araştırmasında, bebeklerin annelerin yanı sıra babalarıyla da etkileşim içerisinde olduklarını gözlemlemiştir ve “pozitif” ebeveyn-bebek etkileşiminin annelerde olduğu gibi babalarla da kurulan güvenli bağlanma ilişkisi üzerinde belirleyici olduğunu tespit etmiştir. Lundy (2002) ise ilk zamanlardaki bebek-baba etkileşiminin bağlanma güvenliğinin önemli bir yordayıcısı olduğunu ortaya koymaktadır. Annenin çocukla ilişkisinin en önemli evresi doğumdan hemen önce başlayan ve doğumdan sonraki birkaç ayı içerisine alan evredir. Bu dönemde annelerin özellikle eş desteğine ihtiyaçları bulunmaktadır (Yavuzer, 2000). Annelerin doğum sonrasında eşlerinden bebek bakımı konusunda aldıkları destek hem annelik rolünü benimsemelerinde hem de kaygı, depresyon gibi doğum sonrası oluşabilecek olumsuz duygu durumlarına karşı korunmalarında oldukça

önemlidir (Van der Akker, 2012). Bulgulardan yola çıkarak babalık rolünün erken dönemlerde benimsenmesinin ilerleyen dönemlerde de babalık davranışları üzerinde olumlu etkileri olduğu düşünülebilir. Rohner (1998) babaların çocuklarına karşı sıcaklık, sevgi, ilgi ve yakınlığının çocuklar üzerinde anneler kadar hatta bazı durumlarda annelerden daha etkili olduğunu bildirmektedir. Bulgular ve literatürdeki araştırmalar değerlendirildiğinde bağlanmanın kurulmasından kritik dönemler olan ilk aylarda babaların bebek bakımında eşlerine destek olmaları ve bebek bakımını üstlenmeleri çocukların güvenli bağlanma düzeylerini artırdığı söylenebilir.

Çocukları Sosyal Aktivitelere Götürme

Araştırmada annelerin sosyal aktivitelere götürme durumlarına göre çocukların Kerns Anne ve Baba Güvenli Bağlanma Ölçeği puan ortalamalarının anlamlı düzeyde farklılaşmadığı ortaya konmuştur ($p>0.05$). Araştırmada babaların sosyal aktivitelere götürme durumlarına göre Çocukların Kerns Anne ($p<0.05$) ve Baba ($p<0.01$) Güvenli Bağlanma Ölçeği puan ortalamalarının anlamlı düzeyde farklılaştığı ortaya konulmuştur. Babalarının sosyal aktivitelere götürdüğü çocukların babaları vakit buldukça götüren ve götürmeyenlere göre babalarına daha yüksek düzeyde güvenli bağlandıkları, götüren babalara sahip çocukların götürmeyenlere göre annelerine daha yüksek düzeyde güvenli bağlanma sergiledikleri ortaya çıkmaktadır. Babalarının sosyal aktivitelere götürdüğü çocuklar hem annelerine hem de babalarına daha yüksek düzeyde güvenli bağlanma sergilemiştir. Anne ve babaların çocuklarıyla etkileşim biçimleri farklılık göstermektedir. Özellikle 90'lı yıllardan itibaren, babaların bebeklikten başlayarak çocuklarıyla etkileşim biçimlerinin annelerinkinden çok daha farklı olduğuna dair görüşler dile getirilmeye başlanmıştır (Sroufe, Cooper ve DeHart, 1992). Babaların çocukların yaşamlarına katılımları annelere göre sınırlılık göstermektedir Babalar çocuklarla etkinliklere katılan, oyun oynayan, derslerine yardımcı olan ve anneye bu yönleriyle destek olan yetişkinler olarak görülmektedir (Shannon, Tamis-LeMonda, London ve Cabrera, 2002). Cox ve arkadaşları (1992) bağlanma ilişkisinde babanın çocuklarla arkadaşlığının, baba duyarlılığından daha etkili olduğu sonucuna ulaşmıştır. Bulgulara göre çocukların sosyal aktivitelere katılımında annelere göre değil, babalara göre ölçeklerden alınan puanların farklılaşması annelik rolünün daha çok çocuk bakımı ve ev düzeniyle, babalık rolünün ise bebeklik döneminden başlayarak oyun oynama, birlikte aktivitelere katılma ve etkinlikler yapma ile ilişkilendirilmesiyle, çocukların babalarıyla bu tür aktiviteler yoluyla etkileşim kurmalarıyla bunun sonucu olarak da babalarının sosyal aktivitelere her zaman götüren

çocukların babalarına daha güvenli bağlanmaları ve daha olumlu ebeveynlik davranışları algılamalarıyla açıklanabilir.

Sonuç ve Öneriler

Orta çocukluk döneminde anne ve babalara güvenli bağlanma düzeyi ile bu düzeyleri etkileyen faktörlerin incelenmesi amacıyla gerçekleştirilen bu araştırmada, anne ve babalara güvenli bağlanma düzeyi arasında orta düzeyde anlamlı ve pozitif bir ilişki olduğu ortaya çıkmıştır. Çocukların annelerine ve babalarına güvenli bağlanma düzeyini etkileyen faktörlerle ilgili ise bağlanma kuramı alt yapısıyla desteklenen önemli bulgular elde edilmiştir. Betimsel bir çalışma olan bu araştırma tarama modeliyle gerçekleştirilmiştir ve değerlendirme aracı olarak ölçek kullanılmıştır. Araştırmaya orta çocukluk dönemindeki çocuklar dahil edilmiştir. Konuyla ilgili bundan sonraki araştırmalarda nitel araştırma yöntemlerinden gözlem ve görüşme yöntemleri kullanılabilir, boylamsal araştırmalar tasarlanabilir. Çalışma grubu olarak orta çocukluk dönemine ilave olarak okul öncesi dönemdeki çocuklar ve ergenlerle araştırmalar gerçekleştirilebilir.

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**THE ROLE OF SOCIO ECONOMIC DEMOGRAPHIC, POLITICAL AND
CULTURAL FACTORS IN IMMIGRATION DECISION: CASE OF AFGANISTAN**

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Abstract

As it is obvious from Afghanistan's past and figures show, Afghan migration has a long history. Here we are going to start the discussion from 1978 until now. However, after Haft Saur's 1978 coup d'état, a large wave of migration to Iran and Pakistan took place, and the Soviet government's actions led to revolutions and resistance against the government in various provinces across the country. During the war, basic infrastructures of the country were destroyed, and a big number of people immigrated to Iran and Pakistan, which was estimated more than six million by 1992 year. For those people who spoke Pashtu language and were Sunni, they preferred to live in Pakistan, and Shia Muslim preferred living in Iran. After falling the government of doctor Najibullah most of those people, who had been immigrants came back to the country but internal war inside the country made people to be displaced and leave the country, and this was the second round of immigration. During the 1996 and 2001 that was the ruling time of Taliban in Afghanistan, where around 33% of Afghans lived in the absolute poverty and couldn't meet the basic needs of their life that in term couldn't help the decline in the migration .

Keywords: Afghan migration, Economi, 1996

Introduction

Since 40 years Afghanistan has been in the external and internal conflicts. due to security, corruption, poverty, lack of employment, and some other political, cultural and economical factors people of afghanistan have been being made to decide for the external immigration. As per the suvey of Asia Foundation more than 35% of Afghans answered yes to the question “ whether an opportunity given to you would like to leave the country?” (The Asia Foundation, 2019).

People who spoke Pashtu language and were Sunni , they preferred to live in Pakistan, and Shia Muslim preferred living in Iran (Noor, 2006). After falling the government of doctor Najibullah most of those people, who had been immigrants came back to the country but internal war inside the country made people to be displaced and leave the country, and this was the second round of immigration (Erfani, 2016). During the 1996 and 2001 that was the ruling time of Taliban in Afghanistan, where around 33% of Afghans lived in the absolute poverty and couldn't meet the basic needs of their life that in term couldn't help the decline in the migration. Moreover during the regime of Taliban due to the systematic persecution most of Hazara tribe moved to Iran (Dimitriadi, 2013). Overall, Afghanistan's two main migration periods led nearly a third of the population in Pakistan , Iran and other nations to seek relief (Koepke, 2011). Following 2001 both Iran and Pakistan were changing their policies for Afghan migrants, and with the course of time due to foreign aid, per capita income got increased which caused Afghans to seek new routes and destination countries like Australia and European countries. According to President of Afghan migrant and refugees as mentioned in Dimitriadi (2013), three category people want to settle in the European countries, those who are in risk due to their political belief, those who look for the safe place, and those who want to go there in order to seek better economic conditions. In Pakistan and Iran, Afghan refugees could be divided into three categories, those who migrated before 1980, those who went to these countries after 9/11, and those who are economic migrants (Noor, 2006). If it is talked about the Afghan refugees in Pakistan, issue is divided into two parts, which are before 9/11 and after 9/11. During the 1980s Pakistan government adopted open door policy for the Afghan refugees, which caused to come big number of refugees to the country in order to achieve their goals in the war against Soviet union and Afghan government (Noor, 2006). In 1990s specially in 1995 Pakistan government faced shortage of resources from donors to assist the refugees, which caused to announce those refugees who came to Pakistan after 1995 as illegal refugees, likewise the discontinuation of aids by the international communities made Pakistan to close the border.

After 9/11 in 2001 with air strike of American and coalition forces Pakistan used against Afghan refugees closed door policy in order to decrease the security problem and to prevent the refugees from entrance to Pakistan. In 1960s and 1970s there were thousands Afghan migrants in Iran, during refugee crisis Iran was unwilling for international assistance, refugees were not required to live in the camps (Noor, 2006). In Post 9/11 like Pakistan, Iran also closed the border with Afghanistan.

According to Bansak, Simpson and Zavodny (2015), Factors, which has impact on immigration, could be divided into two groups, which are consisting of push and pull factors, both of them can be divided into economic and non-economic factors. In push economic factors poverty, High taxes, High unemployment and over population are included, whereas in pull economic factors demand for labor, high wages, generous welfare, strong economic growth, technology, and low cost of living (Bansak, Simpson, and Zavodny, 2015). In the push non economic factors discrimination, poor health care, corruption, war, compulsory military services, natural disaster and famine are included, and these factors plus non economic pull factors that are consisting of family network, rights and freedom, property rights, law and order and amenities helps the migration.

In the push factors one of the basic causes of migration is poverty, according to Murrugarra, Larrison, and Sasin, (2011) Now, high income gaps between locations-especially countries-continue to inspire people to move away poverty through migration they argue that those people who are migrated to developed societies or destinations could help their societies by remittances, which could be used in the different kinds of investment. Since 2001 Afghans are suffering from conflicts, which in term create problems for the economic growth that causes a decline in the employment, and make people to migrate to other countries. As per the report issued by cited in Center for Research and Regional Studies (February 10, 2018) due to low employment rate and worse economic conditions most of the youth like to immigrate , and in the report WorldBank (2018), it was mentioned that during 1990 war induced migrants were 95% of all migrants but in 2015 economic migrants were 50%, which is equal with 2.25 million migrants and due to adding 400000 Afghans to work force will help the number of migrants to increase. In the pull economic factors remittances play important role in Afghan immigration to other countries. These remittances could influence different aspects of life, and cause relative welfare (Adams, 2011). Remittances and contributions from the Afghan emigrants play a significant role in Afghanistan's stability and rehabilitation, even though the precise amount is difficult to determine (Agah, 2013). According to IFAD (2013), In 2012, the International Fund for

Agriculture and Development (IFAD) reported the money transfer flow to Afghanistan to be US\$ 3.2bn. It therefore, accounted for more than 16 percent of Afghanistan gross Domestic product in that fiscal year.

In the push non-economic factors one of the basic factors that Afghans want to leave their country is insecurity. According to The Asia Foundation (2019), more than 17% of migrants leave Afghanistan due to insecurity. More than 100000 civilians have been killed in the last ten years in Afghanistan (“Afghanistan: Civilian casualties”, 2020).

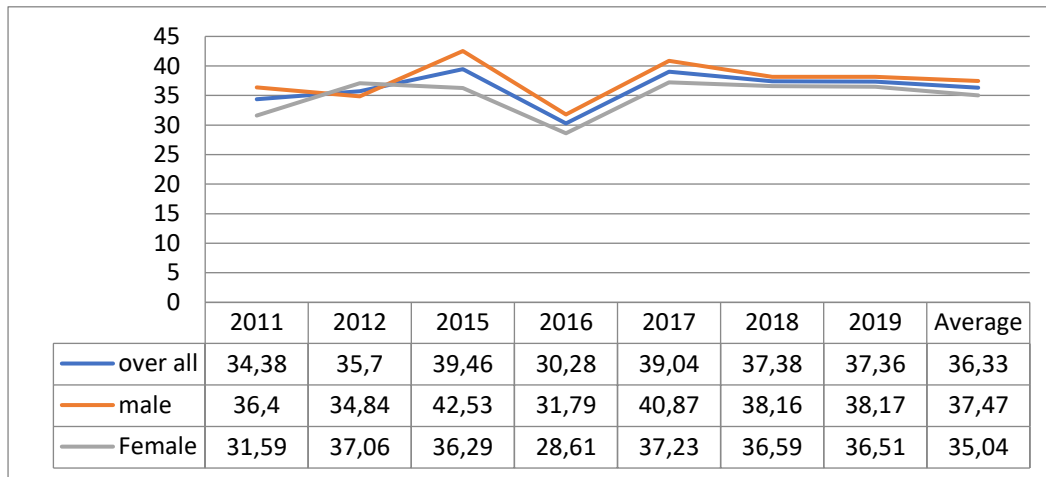
If it is talked about the impact of demographic factors on the immigration, young generation mostly like to immigrates to other countries, as the 67% of Aghan generation have less than 26 years of age (Schmeidl, 2014). In the case of gender according to Tyler & Schmeidl, in the large cities of Afghanistan women are more vulnerable, and have hardship to access to education, health and employment. Overall women more are displaced internally relative to men and Their external migration is marginalized (Schmeidl, 2014).

One of the factors, which plays secondary not primary role in migration is education, except of those in which young people want to go abroad for higher education or for better place (Browne, 2017). In the survey of Asia foundation more than 43% of educated people want to leave their country (The Asia Foundation, 2019). People may give reason education for their migration or give reason their children education for their migration. Some of the few specific points of consensus is that well-educated individuals in low-income contexts are more likely to relocate in higher-income places, due to a mix of higher financial opportunities, higher expectations and lack of sufficient jobs in their home environment (Browne, 2017).

PROBLEMS INFLUENCES AFGHANS’ EXTERNAL IMMIGRATION DECISIONS IN THE LAST EIGHT YEARS: AN OVERVIEW

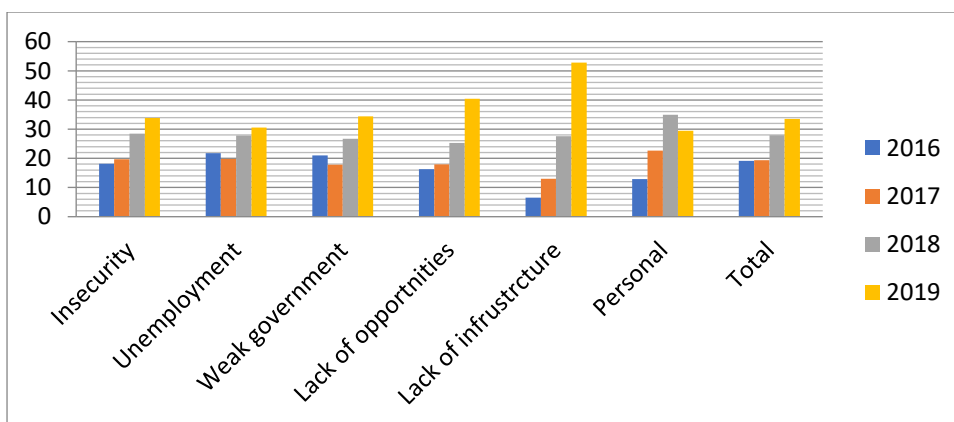
In the above paragraphs, we divided the Afghan immigration into four Phases. First started in the 1979 due to Soviet Invasion, second started with the beginning of internal war, third started with Taliban regime and the fourth one took place during the US invasion, where Afghans seek new route for the immigration due to changing policy of Iran and Pakistan toward the Afghan refugees. After US invasion, international communities put their effort to help Afghans and provide them a better welfare, but still Afghans facing problems in their social, economic, political, and educational life, which made them to immigrate some other countries. The following graph shows the percentage of those Afghans, who want to leave the country as per the survey of Asia Foundation.

Figure 1. Percentage of Those Afghans Who Want To Leave The Afghanistan During The Last Eight Years



As per the figure 1, more than 37% of male correspondents says yes to the question “ whether you are given a chance would you like to leave the Afghanistan?” , less than 35.5% of female want to leave the country, and overall more than 36.5% of Afghan want to leave the country. As the figure shows males slightly want to emigrate more than females, and one of the reasons is male’s economic immigration. According to Echavez, Mosawi and Leah (2016) Afghanistan is a country where traditional rules are more dominant, and male is considered breadwinner. so, the reason could be males’ employment seeking that causes their willing to immigrate relative to female. In 2016, less people want to live abroad because in this year complaints are less than next three years.

Figure 2. Percentage of Complaints Based on Years

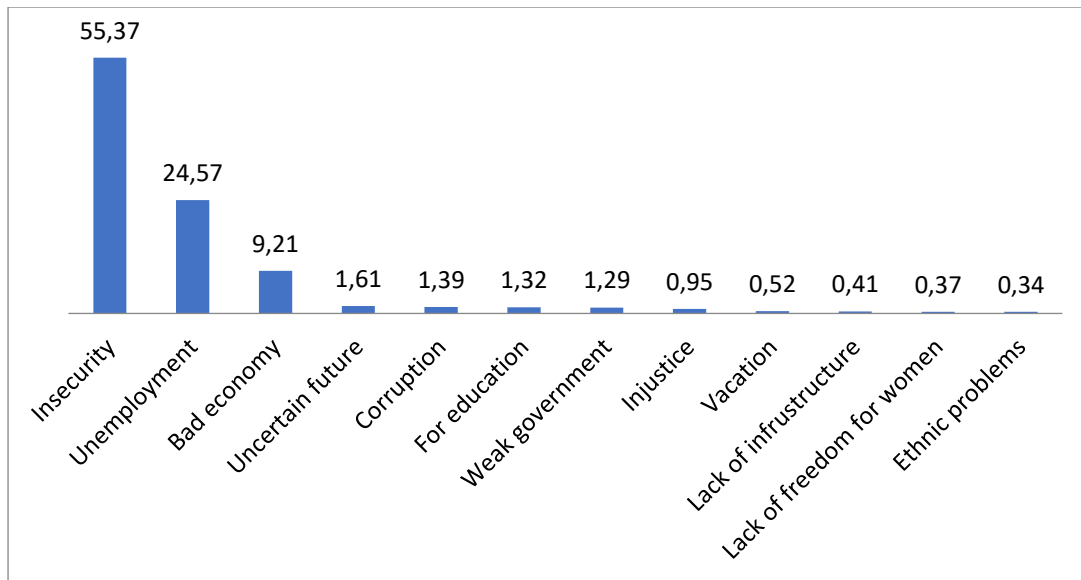


(The Asia Foundation, 2019)

As per the figure 2 problem faced by Afghans are seen less in 2016 relative 2017, 2018, and 2019.

The basic problems that Afghans give as reasons for immigration are as under in the following graph. Respondents asked to give two reasons that why they want to leave Afghanistan in Graph 2 and 3 we have those reasons due to what Afghans want to leave their country. The reasons explained in two separate figures, in figure one we have first mentioned reason and in figure 2 second mentioned reasons are provided.

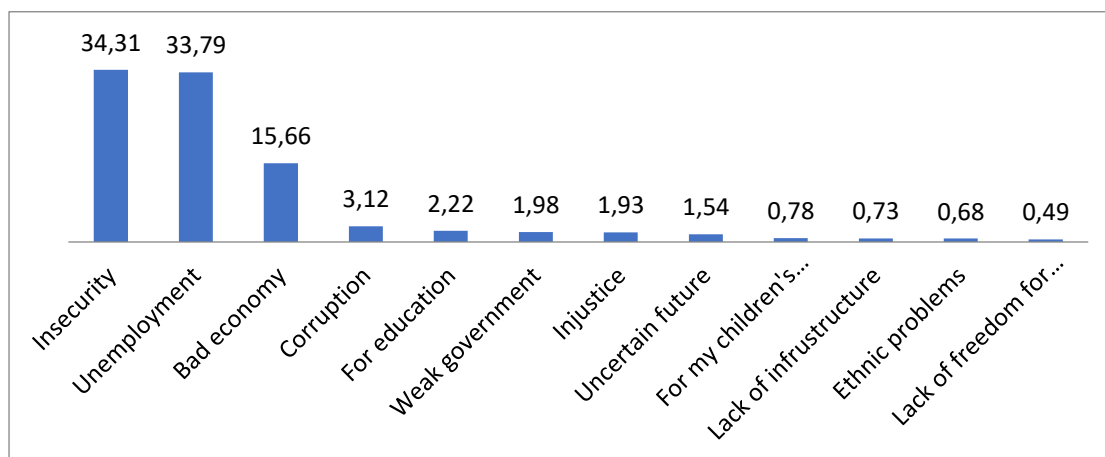
Figure 3. Why would you leave Afghanistan? (First Mention average of 2011-2019)



(The Asia Foundation, 2019)

As per the figure 3 most of the Afghans, who want to leave Afghanistan give insecurity, unemployment, bad economy, corruption, being of not fair education and uncertainty as reasons.

Figure 4. Why would you leave Afghanistan? (Second Mention average of 2011-2019)



(The Asia Foundation, 2019)

Figure 4 explains the second reason due to which Afghans are made to leave their country. Here are so major problems insecurity, unemployment, corruption, low education, uncertainty, and weak government. One of the basic problems is insecurity and economic problem according to the report of the ministry of Refugee and Repatriations (2020), more than 50% immigrated to Iran, and Pakistan due to insecurity and less than 50% emigration took place due to economic problems. Another reason that Afghans give, as reason for their immigration is corruption, as it is seen from the figure 2 more than 3% of the people say they want to leave their country because of corruption. According to Merkle, Reinold, and Seigel (2018), corruption in home country could lead migration aspiration, could facilitate migration, and could directly and indirectly shapes aspiration for migration. According to Shaheed (2019), from 2005 till 2018 Afghanistan averaged score is less than 15 where 0 score is used for highly corrupt and 100 for clean and as per the report in the 2018 Afghanistan has been amongst the top 10 most corrupt countries. Another reasons of Afghans for immigration is education. In the developing countries people with high education and rising income cause of their education when they are at low end of income distribution. In neoclassical models, more education in the origin country facilitate way for people to leave their countries temporarily or permanently. In the last 40 years, Afghanistan has been in the different kinds of conflicts, which causes to create uncertainty about future that in term has positive effect on the deciding about external migration from country. Since almost 19 years there has been conflict between Afghan government and Taliban, and according to the survey of Asia Foundation, in 2019 more than 30% of Afghans are saying that reconciliation between Taliban and Afghan government is impossible The Asia Foundation (2019) , this itself create uncertainty that in term causes of migration to abroad. Weak government also play crucial role in the immigration decision, which is one of the push factors. According to World Migration (2003), Weak working rates, poor pay or pensions, misplacement of talent, violation of human rights, underemployment, political unrest, lack of testing facilities, inefficient agencies, disrespect for local talent, prejudice in recruitment and promotion, inequality, inadequate access to quality education, and the demand for a better urban life are among the factors listed which causes of immigration to abroad country. Ethnic problem is also in one of the reasons for Afghans those want to leave their country, as per the report of Pajhwak Afghan News 25% of Afghans are victims of racial, linguistic and religious oppression, while 14 percent suffer adverse results from the action (Ahmadzai, and Salehai, 2019).

As per the report of the Pajhwak Afghan News, discrimination problems are divided into three categories from which ethnicity is the problem that is faced by more Afghans than the other two. Less than one percent of the respondents in the second mention say that they want to leave the country due to the absence of freedom of women in the country. Since 2003 progress seen in the gender equality in Afghanistan but still women in Afghanistan face widespread insecurity, lack of housing standards, economic inequality, sexual harassment challenges and health problems and well-being (Women for Women International, 2018). According to Ray (2019) nearly half (47%) of Afghan women want to immigrate to abroad, and the surveys of GALLUP shows that Afghan women in the world were the least satisfied women.

The mentioned survey conducted in the 34 provinces of Afghanistan in which the age of respondents is bigger than 18 years for the period 2016-2019.

3. CONCLUSION

In this study we examined the role of socio-economic, political and demographic factors in the external migration decision in case of Afghanistan. Immigration waves could be divided into three phases, first started with the invasion of Soviet Union, second started with internal conflict, third with Taliban regime and the fourth one, started during the invasion of US and coalition armies.

In the 1990s, 95% of immigrants were induced, and in the last decades economic migrants have been close to 50%. Problems due to which Afghans want to leave their country mainly are; insecurity, lack of employment, lack of infrastructures, lack of opportunities, and weak government.

As per the survey of Asia Foundation, the top six countries, where most of the Afghans want to live are; Iran, Turkey, Germany, Saudi Arabia, USA, and Pakistan.

Most of the remittances sent to Afghanistan come from Iran, Pakistan, Saudi Arabia, Germany, USA and UK, the real amount of remittances is many-time bigger than the official amount. There was strong correlation between remittances and household consumption of Afghanistan. As per the results of our estimation those people are more likely to leave the country, who are young, educated, have access to information (through TV and Internet), non-Pashtun (due to ethnopolitics), male, singles, non-believer in reconciliation with Taliban, and those who have more relatives and friends in abroad.

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EKONOMİ POLİTİKASINDA POLİTİKA TASARIMI: PARA POLİTİKASININ ETKİNLİĞİ ÜZERİNE BİR DEĞERLENDİRME

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Özet

Dünya ekonomisindeki değişim dinamiğinin etkilendiği en önemli politik araçlardan biri para politikasıdır. Bunun önemli bir sebebi günümüzde hızla değişen ve gelişen piyasalar finansal piyasalardır. Bu gelişmeler finansal sistemin düzenli işlemlerini sağlamak adına Merkez bankalarına ve para politikası uygulamalarına önemli görevler yüklemiştir. Hükümetin para arzını kontrol etmek için izlediği politikalar bütünü para politikasıdır (Ünsal,2000: 399). Ülkelerin para politikasını yürüten kurum merkez bankasıdır. Her ülkenin merkez bankası bir tür özel kamu iktisadi kuruluşudur. Merkez bankaları para politikaları uygularken ve para arzlarını belirlerken paranın dolaşım hızını dikkate almaktadır. Özellikle teknolojik gelişme ve finansal yenilikle kendini gösteren son dönem paranın dolaşım hızı açısından merkez bankalarına yeni sorumluluklar yüklemiştir. Bu sorumluluk öğrenme, bilgi ve yeni değişime uyum içinde gerekli olan sorumluluktur. Merkez bankasına yenilik ve değişim ortamında düşen sorumluluk, etkinliği, güvenliği ve etkin parasal kontrolü aynı anda sağlamaktır. Merkez bankaları bu sorumluluklarını piyasaları gözetim altında tutarak uyguladıkları para politikası ile gerçekleştireceklerdir (Kaplan, 1999: 12). Fakat, yenilik ve değişim merkez bankalarının finansal sistemin sağlıklı bir şekilde işlemlerini ve enflasyonsuz bir ortamda sürdürülebilir bir büyüme oranının gerçekleşmesini giderek zorlaştırmaktadır. Çünkü finansal yeniliklerdeki değişim ve gelişmeler paranın tanımını değiştirmeye başlamıştır. Yapısal değişiklikler ve finansal yeniliklere paralel olarak önceden bir politika belirlenmeye temel olabilecek bir parasal ilişkiyi tahmin edebilmek zorlaşmıştır (Günel,2006:73). Bu durum bütünselleşmiş ekonomi politikalarını da başarısız kılmış, bütünleşmiş politikaların başarısızlığı da para politikalarını etkilemiştir. Çünkü para birimlerinin amaç fonksiyonunu gerçekleştirmede en çok öğrenip bilgi bilgi akışını gerçekleştirdikleri ve birebir etkilendikleri para ve paraya dair konulardır. Onun için değişimin baş döndürücü hızla olduğu finansal piyasalarda para politikasının ve merkez bankasının dinamik yapıda olması gerekmektedir.

**POLICY DESIGN IN ECONOMIC POLICY: AN EVALUATION ON THE
EFFECTIVENESS OF MONETARY POLICY**

Abstract

One of the most important political tools that affects the dynamics of change in the world economy is monetary policy. An important reason for this is the rapidly changing and developing financial markets today. These developments have imposed important duties on central banks and monetary policy practices in order to ensure the regular functioning of the financial system. Monetary policy is the set of policies followed by the government to control the money supply (Ünsal, 2000: 399). The institution that carries out the monetary policy of the countries is the central bank. The central bank of every country is a type of private public economic institution. Central banks take into account the speed of circulation of money when implementing monetary policies and determining money supplies. The recent period, especially with technological development and financial innovation, has imposed new responsibilities on central banks in terms of the speed of circulation of money. This responsibility is the responsibility required for learning, knowledge and adaptation to new change. The responsibility of the central bank in an environment of innovation and change is to ensure efficiency, security and effective monetary control at the same time. Central banks will fulfill these responsibilities through the monetary policy they implement by keeping the markets under surveillance (Kaplan, 1999: 12). However, innovation and change make it increasingly difficult for central banks to ensure the healthy functioning of the financial system and to achieve a sustainable growth rate in an inflation-free environment. Because changes and developments in financial innovations have begun to change the definition of money. In parallel with structural changes and financial innovations, it has become difficult to predict a monetary relationship that could be the basis for determining a policy in advance (Günel, 2006:73). This situation also made integrated economic policies unsuccessful, and the failure of integrated policies also affected monetary policies. Because it is money and money-related issues that land units learn the most and flow information from, and are directly affected by, in achieving their objective function. Therefore, in financial markets where change occurs at a dizzying pace, monetary policy and the central bank must have a dynamic structure.

Giriş

Ekonomi politikasının amacı makro ekonomide kalıcı ve sürdürülebilir istikrarı sağlamak ve geleceği öngörülebilir kılmaktır. Karar birimlerini amaç fonksiyonunu gerçekleştirebileceği, kurumsal değişimin sağlandığı çevresel koşulları oluşturmaktır. Bunun için ekonomi politikası mali ve parasal kurallar bütünüdür (Karaçor, 2012:13).

Para politikası en geniş anlamıyla var olan koşullara göre, ekonominin likiditesini (harcama potansiyelini) artırmak ya da azaltmak demektir. Para politikası parasal araçlarla ulaşılmak istenen ekonomik amaçlar arasında ilişki kurmaktır. Önceden para politikası ekonomik büyümeden enflasyonla mücadeleyle, işsizliği önlemekten dış ticareti geliştirmeye kadar bütün amaçları gerçekleştirmeyi hedefliyordu. Oysa günümüzde para politikası yalnızca iç pazarın istikrarını (fiyat istikrarı) hedeflemeye yönelmiştir. Böylelikle modern para politikasının tanımlanmış parasal araçların ülke parasının değerini ve istikrarını korumak amacıyla kullanılması şeklinde yapılmaya başlanmıştır (Eğilmez, 2010:229). Fiyat istikrarını sağlamak, yani enflasyonu önlemek amacıyla merkez bankasının para arzını kontrol etmek için takip ettiği politikalar bütünü para politikasını oluşturur. Para politikası merkez bankaları tarafından yürütülmektedir ve amacı para arzını kontrol etmektir. Belirli amaçlara ulaşmak için para arzını artırıp, azaltılması para arzı kontrolünü oluşturur. Merkez bankası para arzını kontrol ederken, bir başka ifade ile para politikası uygularken başlıca üç enstrümanı kullanır: Açık piyasa işlemleri, reeskont oranı, kanuni karşılık oranıdır. Para arzı, parasal taban ile para çarpanının çarpımına eşittir. Merkez Bankası açık piyasa işlemleri ve reeskont oranı ile parasal tabanı, kanuni karşılık oranı ile de para çarpanı büyüklüğünü belirler.

Para arzını artırmak ya da azaltmak için kullanılan araçlardan biri Açık Piyasa İşlemleri (APİ)'dir. APİ finansal varlıkların merkez bankası tarafından ya birincil piyasada ya da ikincil piyasada alınıp satılmasıdır. APİ bankacılık sisteminin toplam rezervlerini daraltmak veya genişletmek suretiyle ülke para arzını etkilemeye yönelik işlemlerdir. Kısaca APİ para arzını, faiz hadlerini ve kredi hacmini etkilemek amacıyla merkez bankalarınca piyasalarda finansal araçların doğrudan doğruya alınıp satılmasıdır. Alım ve satıma konu olan finansal araçlar hazine bonusu, devlet tahvili, merkez bankası senetleri, birinci derece özel sektör senetleri ve yabancı paralar olarak sayılabilir. Merkez Bankası bazen kasasındaki devlet tahvilini satarak piyasadan para çeker, kredi nakit miktarını artırır; bazen de devlet tahvil miktarını alarak piyasaya para sürer, kendi nakit miktarını azaltır. Merkez Bankası APİ yolu ile devlet tahvili sattığı zaman para arzı azalır, devlet tahvili satın aldığı zaman parasını peşin ödediği için para

arzı artar. Merkez Bankası para arzını artırmak istediği zaman devlet tahvili satın alarak, para arzını azaltmak istediği zaman devlet tahvili satacaktır.

Para arzını etkileyen bir diğer araç reeskont oranıdır. Nakit para rezervleri geçici olarak belirli düzeyin altına inen bankalar, Merkez Bankasından borçlanarak kaynak yaratırlar. Merkez Bankasının bankalara sağladığı bu kaynağa uyguladığı faize reeskont denir. Reeskont oranının artması ve azalması para arzını etkiler. Merkez Bankası reeskont faiz oranını artırdığında, bankaların borçlanma maliyetleri artacağı için borç almak istemeyecekler ve para arzı kısıllacaktır. Merkez Bankası reeskont faizini düşürdüğünde ise bankalar borç talebinde bulunacak ve para arzı artacaktır. Buna göre, Merkez Bankası para arzını artırmak istediğinde reeskont oranını düşürecek; para arzını azaltmak istediğinde reeskont oranını artıracaktır.

Kanuni (zorunlu) karşılık oranı da para arzını etkileyen bir başka para politikası aracıdır. Bankalara yatırılan mevduatın belirli bir oranı kanuni karşılık olarak Merkez Bankasına yatırılması zorunludur. Amaç tasarruf sahiplerini korumaktır. Banka mevduatının, Merkez Bankasına yatırılması zorunlu olan payına kanuni karşılık oranı denir. Bu oran arttırıldığı zaman, bankaların piyasaya verecekleri kredi miktarı azalacak, dolayısıyla para arzı azalacaktır. Merkez Bankası tarafından bu oran azaltıldığı zaman, bankaların piyasaya verecekleri kredi miktarı artarak para arzını artırıcı etki oluşturacaktır.

Merkez Bankası, açık piyasa işlemleri, reeskont oranı ve kanuni karşılık oranı gibi para politikası araçlarını kullanarak, sıkı ve genişletici para politikalarını uygular. Merkez Bankasının bu araçları para arzını azaltma yönünde kullanması sıkı para politikasını oluşturur. Para arzının azalması, faiz oranını yükseltir. Aynı zamanda, para arzının azalması devlet tahvil fiyatlarını düşüreceği için, devlet tahvilinin faizi yükselir. Merkez Bankasının para politikası araçlarını para arzını artırıcı yönde kullanılması genişletici para politikasını oluşturur. Genişletici para politikası para arzını artırdığı için faiz oranını düşürür. Merkez Bankası tahvil satın alınca, piyasada tahvil arzı azalacak, tahvil arzının azalması tahvil fiyatını yükseltecek ve tahvil faizi düşecektir. Görüldüğü gibi, Merkez Bankası uyguladığı sıkı ve genişletici para politikalarıyla ekonomiyi etkilemektedir. Bu etki para politikasından para arzına, faiz oranına, toplam talebe ve en son olarak üretim ve istihdama doğru kanalize olmaktadır.

Merkez Bankasının uyguladığı para politikası ilk olarak para arzını etkiler. Para arzı sırasıyla faiz oranını, faiz oranı toplam talebi, toplam talep de üretim ve istihdamı etkiler. Demek ki para politikası, Merkez Bankasının para politikası araçları yardımıyla ekonomideki toplam talebi kontrol etme politikasıdır (Bocutoğlu, 2011:169).

Bu çerçevede Merkez Bankalarının;

i-Alacağı para politikası kararlarının ekonomiyi hangi yolla etkileyerek temel amaçlara ulaşılmasını sağlayacağını bilmesi,

ii-Uyguladığı para politikası stratejisi doğrultusunda paranın miktarını/maliyetini nasıl belirleyeceğine karar vermesi gerekmektedir.

Bu karar, uygulanan politikaların başarısı için temel şarttır. Ancak, verilmesi oldukça zor bir karardır. Çünkü para otoritesi tarafından alınan kararların ve uygulanan politikaların ekonomiyi ne şekilde etkileyeceğinin tam olarak formüle edilmemesi bu durumun “kara kutu” (black box) olarak adlandırılmasına neden olmuştur. Bu durum özellikle küreselleşme süreciyle daha da belirgin hal almıştır (Önder, 2005).

Küreselleşme süreci, rekabeti ve dolayısıyla finansal kuruluşlar ile piyasaların etkinliğini artırmak ve finansal hizmetleri sunanlar ile talep edenlerin risklerini dağıtmalarına ve riskten korunmalarına (hedging) imkân sağlamak gibi yararlarının yanı sıra, merkez bankaları ve para politikası uygulamaları için pek de hoş olmayan sonuçları da beraberinde getirmiştir. Günümüzde merkez bankalarının finansal sistemin sağlıklı bir şekilde işlemesi ve enflasyonsuz bir ortamda sürdürülebilir bir büyüme oranına ulaşması giderek zorlaşmaktadır. Kısaca, küreselleşme sağladığı faydaların yanı sıra, uluslararası entegrasyonu ve karşılıklı bağımlılığı artırmış, merkez bankalarının denetimini zorlaştırmış ve ulusal piyasaların birbirine bağımlılığını artırarak riskin daha hızlı yayılmasına neden olmuştur. Bu nedenle finansal sistemin içinde en önemli kurumlar merkez bankalarıdır. Merkez bankalarının temel amacı, ülkede fiyat istikrarını sağlayarak, sürdürülebilir büyümeye katkıda bulunmak ve finans sisteminin sağlıklı işlemini sağlamaktır (Günel, 2006). Merkez bankaları para politikaları uygularken ve para arzlarını belirlerken paranın dolaşım hızını dikkate almaktadır. Özellikle teknolojik gelişme ve finansal yenilikle kendini gösteren son dönem paranın dolaşım hızı açısından merkez bankalarına yeni sorumluluklar yüklemiştir. Bu sorumluluk öğrenme, bilgi ve yeni değişime uyum için gerekli olan sorumluluktur. Merkez Bankasına yenilik ve değişim ortamında düşen sorumluluk, etkinliği, güvenliği ve etkin parasal kontrolü aynı anda sağlamaktır. Merkez bankaları bu sorumluluklarını piyasaları gözetim altında tutarak uyguladıkları para politikası ile gerçekleştireceklerdir (Kaplan, 1999). Bunun için değişimin baş döndürücü hızla olduğu finansal piyasalarda para politikasının ve Merkez Bankasının dinamik yapıda olması gerekmektedir. Çünkü Merkez Bankası beşinci karar birimi olarak değerlendirilen ekonomi politikası yapıcılarında biridir. Dolayısıyla bir karar birimi olarak öğrenme ve bilgi sürecini etkin bir şekilde alıp bunu piyasalara yansıtmalıdır. Yani Merkez

Bankası hem bilgi arz eden hem de bilgi talep eden bir karar birimidir. Uyguladığı para politikasının başarısı bilgi boşluğu maliyetini minimum düzeye indirerek bilgi arzı ile bilgi talebi arasındaki dengeyi oluşturmaya bağlıdır (Ünsal, 2000). Merkez bankalarının bu fonksiyonu yerine getirebilmesi için bağımsız olması gerekmektedir. Çünkü Merkez Bankası amaç fonksiyonu hedefine bağımsızlık süreci ile ulaşabilecektir. Çünkü bağımsızlık politikaları şeffaf kılacaktır. Son dönemlerde Merkez Bankası bağımsızlığı “birinci en iyi” değil “ikinci en iyi” olarak tanımlansa da yine Merkez Bankasının bilgi akışının amaç fonksiyonu doğrultusunda gerçekleşmesi için bağımsızlık önemli bir kriter olarak bulunmaktadır (Serin, 1987:93).

Finansal sistemin sağlıklı işlemesi için para politikası hedeflerinin mikro politika olarak da adlandırılan bankacılık politikaları ile bütünleştirilmesi gerekmektedir. Çünkü bankacılık yapısında ortaya çıkacak sorunlar finansal sisteme yayılarak güveni sarsacak, politikaların etkinliğini zayıflatacaktır. Onun için merkez bankalarının birinci görevi fiyat istikrarını sağlamaktan çıkmış, finansal sistemin istikrarı olmuştur. Bu oluşum merkez bankalarının son başvuru mercii olma (lender of last resort) fonksiyonunu ön plana çıkarmıştır (Günel, 2001: 72).

Sağlıklı işleyen finansal piyasalar ekonomileri kurumsal değişime taşıyacak, tersi durum ise küreselleşme sürecinde birtakım riskleri beraberinde getirecektir. Bu riskleri en aza indirmek için bankacılık sisteminin yapısı ve denetiminin etkin olduğu (ekonomik birlikler tarafından kontrol, üst kurullar vb.) iyi işleyen bir bankacılık yapısının finansal sistem ile bütünleşmesi gerekmektedir. Hem merkez bankalarının görevlerini yerine getirebilmesi hem de para politikasının amacına ulaşılabilmesi için finansal sistemin istikrarlı olması gerekmektedir. Finansal istikrarı sağlamada bankacılık sisteminin yapısıyla birlikte merkez bankalarının kurumsal yapısı da önemlidir. Bu açıdan da bakıldığında merkez bankalarının siyasi iktidarların (hükümet) etkisinde olmaması, yani özerk veya bağımsız olması önemlidir. Bağımsızlık, merkez bankalarına uygulayacakları para politikaları ile piyasalarda etkinliği, güvenliği ve etkin parasal kontrolü aynı anda sağlama imkanı verecektir. Beşinci karar birimi olarak kendisinin ve diğer karar birimlerinin (birey, firma, devlet, örgüt ve birlikler) amaç fonksiyonununun gerçekleşmesini sağlayacak, politikaları başarılı kılacaktır.

2. MERKEZ BANKASININ BAĞIMSIZLIĞI

Küreselleşme süreci, Merkez bankacılığı ve para politikası uygulamalarında birçok değişimi beraberinde getirmiştir. Politika uygulamalarında başarı, bu değişimin gerçekleştirilip gerçekleştirilemediğine bağlı olmuştur.

1980'lerden başlayarak, parasal programlamaya (monetary targeting) dayalı politikaların etkileri azalmaya başlamış ve mali ve teknik yeniliklere paralel olarak, döviz kuru ve kısa vadeli faiz politikaları ön plana çıkmıştır. Çünkü, para arzının dışsal olduğu varsayımına dayanan monetarist yaklaşımın bir sonucu olan parasal programlama, teknolojik ve finansal yenilikler sonucu paranın içselliği ön plana çıkınca önemini yitirmiştir. Dolayısıyla, para arzını hedeflemeden ziyade enflasyon hedeflemesi ön plana çıkmıştır. 1980'lerin ortalarından itibaren aşamalı olarak merkez bankaları, paranın miktarından ziyade fiyatının, faiz oranlarının kontrolüne yönelmeye başlamışlar, parasal büyüklükler daha çok izlenen öncü gösterge niteliğine dönüşmüştür.

1990'lı yıllara gelindiğinde ise tartışmalar, operasyonel tekniklerden (faiz oranı-para tabanı kontrolü) Merkez Bankası bağımsızlığı, sorumluluğu ve güvenilirliği gibi yapısal sorunlara doğru kaymıştır. 1980'li yıllar Merkez Bankası bağımsızlığının artık "olmazsa olmaz" olarak görülen, para politikası stratejisi açısından ise "enflasyon hedeflemesi"ne geçişin yaygınlaştığı bir dönemdir.

Burada sözü edilen Merkez Bankasının para politikası hedeflerini belirlemede bağımsız olması anlamına gelen amaç bağımsızlığı değil, hedeflenen enflasyon oranına ulaşılabilme için kullanacağı para politikası araçlarını serbestçe belirleyebilmesi ve kullanılması anlamına gelen araç bağımsızlığıdır (Johnson, 1999: 81). Araç bağımsızlığı mali baskınlığın olmamasını istikrarlı ve güçlü mali sektörün varlığını gerektirmektedir. Hükümetin finansman ihtiyacına göre para politikasının belirlendiği mali baskınlık durumunda, Merkez Bankasının öncelikle hedefi, fiyat istikrarı olmaktan çıkmakta ve enflasyon hedeflemesi gerçekleşmemektedir. Bu durumda, kamu sektörü gelirleri büyük ölçüde senyoraj gelirlerinden veya devlet tahvili ihraçlarından sağlanmaktadır.

Kamu finansmanının senyoraj gelirlerinden sağlandığı ülkelerde, mali krizin önlenmesi amacıyla mali desteğe ihtiyaç duyulacağı beklentisi oluşmakta ve Merkez Bankasının itibarı zedelenmektedir. Mali kriz oluştuğunda ise, söz konusu mali destek uygulanmakta olan para politikasına ek bir yük getirmektedir (Khon, 2003). Fisher (1996), bu durumu Merkez Bankası bağımsızlığı açısından aslında bir "first best" dünyası kavramı değil "second best" dünyası kavramı olduğunu söylemektedir. Çünkü "first best" ortamında para ve maliye politikaları tam bir koordinasyon ve uyum içinde olacak ve Merkez Bankasının bağımsızlığına gerek kalmayacaktır. Fisher bu noktada ilginç bir tespitte bulunmaktadır: Merkez bankacıların çoğunun kendi pazarladığı, politik sistemlerin dar görünüşlü olmaya başladığı ve kısa vadeli politik faydalar için enflasyonist politikalara göz yumduğu mükemmel olmayan (second best)

bir dünyada ancak bağımsız bir Merkez Bankası enflasyon sorununu çözebilecektir. Bu bağlamda, özellikle mali otoritenin disipline olmadığı ülkelerde Merkez Bankası bağımsızlığı daha da önemli hale gelmektedir (Fisher, 1996). Aslında merkez bankalarının başarısızlığının asıl nedeni finansal gelişmeler nedeniyle, para tanımı, para arzı süreci ve para talebi fonksiyonunun değişikliğe uğramasıdır. Kısacası, Otmor Issing (1996)'in de belirttiği gibi, paranın değerini korumak için Merkez Bankasının bağımsızlığı gerekli olmakla birlikte yeterli değildir (Günel, 2001).

3. HESAP VEREBİLİRLİK ve ŞEFFAFLIK

Merkez Bankalarının para politikası uygulamalarında başarıya ulaşması, herhangi bir sorunla karşı karşıya kalmamaları hesap verebilir konumda olmalarını gerekli kılmaktadır.

Para politikası uygulamalarında politikaların etkilerini göstermede yaşanan gecikmeler, kamuoyunun para politikasının performansını takip edebilmesini ve ölçebilmesini zorlaştırması, Merkez Bankalarının hesap verebilir yapıya sahip olmalarını gerekli kılmaktadır. Beklenen politika etkilerinden sapma olması durumunda, Merkez Bankasından bu durumun nedeni ile ilgili açıklama beklenmektedir. Ayrıca, hesap verebilirlik, para politikasının siyasi baskılardan uzak kalmasını sağlayacaktır (Debelle, 1997: 77).

Etkin düzenleyici, denetleyici ve para politikası performansı aldıkları kararların hesabını verebilecek sorumlu otoritelerin varlığını gerektirmektedir. Hesap verebilirlik;

- a) Kısa süreli politik kaygılardan politikaların ayrılması,
- b) Ayrı kurumların potansiyel olarak çatışan amaçlarının uyumlaştırılması,
- c) Amaçlarda ve politikalarda açıklık,
- d) Politika kararlarının ve kararların altındaki kriterlerin şeffaflığı ile gerçekleştirilebilir.

Hesap verebilir bir Merkez Bankasının, uygulanan para politikası hakkında kamuoyunu bilgilendirirken yeterli derecede şeffaflığa sahip olması gerekmektedir. Şeffaflık, hem para otoritesinin kamuoyu ile iletişim kurmasını hem de güveni sağlayacaktır. Şeffaflık, özellikle bilgi çağı olarak adlandırdığımız içinde bulunduğumuz dönemde uygulanan politikaların başarısı için “olmazsa olmaz” bir şartı oluşturmaktadır. Para politikası uygulanmasında gizlilik ile politika uygulamalarında ve yönetiminde etkinlik ve tarafsızlığın daha iyi gözetileceği zannedebilecek ters etki yaratacaktır. Karar birimlerinin bilgi edinmesi engellendiği zaman “bilgi boşluğu” oluşacak ve politikalar başarısız olacaktır. Merkez Bankasının öncelendiği fiyat istikrarı amacına ulaşmasında “bilgi edinme hakkını” karar birimlerine sunması politika

etkinliğini beraberinde getirerek istikrarın oluşmasını sağlayacaktır. Ayrıca bu durum ekonomilerin gelişmişliğinin bir göstergesi olacaktır. Çünkü şeffaflık, yenilik ve değişim sürecine uyumu, kalkınma ve rekabeti gerçekleştirecektir. Ekonomiler gelişecektir, Aksi halde ise ekonomiler kurumsal değişimi sağlamayacak, istikrarsız bir ekonomik yapı içinde olacaklardır. Bu durum da uygulanan politikaların beklenen etkiyi gerçekleştirmesini engelleyecektir.

4. İSTİKRARLI MALİ SİSTEM

İstikrar ekonomik, politik ve sosyal göstergeler ve gözlemlenebilir kriterler bazında içinde bulunulan durumu göreceli olarak ifade eden bir kavramdır. Mutlak anlamda istikrar ekonomik, politik ve sosyal gelişmenin bir türevidir veya yansımasıdır. Ekonomide meydana gelen ekonomik ve politik dalgalanmalar piyasa ekonomisinin işlerliğini olumsuz yönde etkilediği için ekonomik ve politik istikrar gereklidir. Özellikle değişimin hızlı olduğu ve ekonomilerde kırılganlığın arttığı günümüzde bu gereklilik kendini daha da çok hissettirmektedir. Çünkü ekonomik faaliyetlerin istenilen sonuçları vermesi ve toplumun refah düzeyinin istenilen düzeye gelmesi mali sistemin istikrarına bağlıdır. İstikrarlı mali sistem para politikasının kredibilitesini artıracaktır. Mali krizlere karşı kırılgan olan gelişmekte olan ülkelerde mali istikrar Merkez Bankaları açısından büyük önem taşımaktadır. Etkin mali sistemde finansal yenilikler, bilgi etkileşim sürecini sağlayarak, bilgi boşluğunun, minimum olmasına katkı sağlayacaktır. Böylece karar birimleri öngörü hatalarına düşmeyecek ve para politikası etkin olacaktır. Etkinlik sonucu oluşan ekonomik başarı finansal serbestleşme süreciyle birlikte yabancı sermaye akımlarını artıracaktır. Özellikle gelişmekte olan ülkelerde yerli birikimin ülke ihtiyaç ve hedefleri için yetersiz kalması sebebiyle, yabancı sermaye bir ülkenin finansman kullanabilme kapasitesini artıracaktır. Bu sayede projelerin geleceğinin güven altına alınması sağlanmış olacaktır. Böylece rekabet içine giren gelişmekte olan ekonomiler kaynakların daha iyi dağılımını sağlayacaktır. Bir başka ifadeyle ekonomide likiditenin yükselmesiyle daha verimli yatırımlara bir yönelme olacaktır (Akdiş, 2000: 56).

Mali istikrarın sağlanamadığı durumda ise Merkez Bankası iki önemli sorun ile karşı karşıya kalacaktır; ilk olarak, finansal kuruluşların yükümlülüklerini yerine getirmek için Merkez Bankası fonlarını kullanması, Merkez Bankasının uyguladığı para politikası üzerindeki etkilerini sterilize etmesini güçleştirerek enflasyonist baskılara yol açacaktır. İkinci olarak, sıkı para politikası uygulanması durumunda faiz oranlarında meydana gelen artış yüksek borç

miktarı içinde bulunan finansal kuruluşların mali yapıları tehdit etmesi Merkez Bankasının para politikası uygulamadaki etkinliğini sınırlandıracaktır.

5. GELİŞMİŞ MALİ PİYASALAR

Mali istikrarın olmadığı, bankacılık sektörü ile mali sistemin zayıf olduğu ekonomilerde, para politikası etkin olamamaktadır. Çünkü bu koşullar, sistemi kırılğan hale getirerek Merkez Bankasının fiyat istikrarı hedefine odaklanmasını zorlaştırmaktadır. Bu durum, Merkez Bankasının açık piyasa işlemlerini yürütme yeteneğini sınırlamaktadır. Ayrıca gelişmiş mali piyasalar denge faiz oranları hakkında güvenilir bilgi verememekte ve kamu sektörü açıklarının finansmanında yetersiz hale gelmektedirler (Çolakoğlu, 2002).

Merkez bankaları açısından gelişmiş mali piyasalar para politikasının uygulanmasını kolaylaştıracaktır. Derin ve likit mali piyasalar piyasalarda işlem gören finansal enstrümanların fiyatlarındaki hareketlerin Merkez Bankasına ekonominin hedefleri ve piyasalardaki beklentilere ilişkin bilgi aktarım mekanizması sağlayacaktır. Ayrıca gelişmiş mali piyasalar yerli ve yabancı para cinsinden işlemlerin etkin bir şekilde yürütülmesini sağlayacaktır. Merkez bankalarının para politikalarını etkin bir şekilde uygulayabilmeleri bilançolarındaki hareketleri izleyebilmeleri, döviz rezervini yönetebilmeleri ve son borç veren merci olarak finansal kuruluşlara kredi verebilmeleri için yerli ve yabancı para cinsinden yüklü miktarda işlemi piyasalardaki fiyatları olumsuz yönde etkilemeden gerçekleştirebilmeleri gerekmektedir. Ayrıca mali piyasaların dolarizasyona izin vermeyecek kadar gelişmiş olduğu ekonomilerde para politikası daha etkin olarak uygulanmaktadır. Çünkü dolarizasyon para politikasının etkinliğini sınırlamakta, para politikasının değişen dünya dinamiklerine uyumunu zorlaştırmakta, sorunlara neden olmaktadır.

SONUÇ

Merkez bankaları bu sorumluluklarını piyasaları gözetim altında tutarak uyguladıkları para politikası ile gerçekleştireceklerdir (Kaplan, 1999: 12). Fakat, yenilik ve değişim merkez bankalarının finansal sistemin sağlıklı bir şekilde işlemlerini ve enflasyonsuz bir ortamda sürdürülebilir bir büyüme oranının gerçekleşmesini giderek zorlaştırmaktadır. Çünkü finansal yeniliklerdeki değişim ve gelişmeler paranın tanımını değiştirmeye başlamıştır. Yapısal değişiklikler ve finansal yeniliklere paralel olarak önceden bir politika belirlenmeye temel olabilecek bir parasal ilişkiyi tahmin edebilmek zorlaşmıştır (Günel,2006:73). bu durum bütünselleşmiş ekonomi politikalarını da başarısız kılmış, bütünleşmiş politikaların

başarısızlığı da para politikalarını etkilemiştir. Çünkü kara birimlerinin amaç fonksiyonunu gerçekleştirmede en çok öğrenip bilgi bilgi akışını gerçekleştirdikleri ve birebir etkilendikleri para ve paraya dair konulardır. Onun için değişimin baş döndürücü hızla olduğu finansal piyasalarda para politikasının ve merkez bankasının dinamik yapıda olması gerekmektedir. Çünkü merkez bankası öğrenen ekonomi sürecinde beşinci karar birimi olarak değerlendirdiğimiz ekonomi politikası yapımcılarından biridir. Dolayısıyla bir karar birimi olarak öğrenme ve bilgi sürecini etkin bir şekilde alıp bunu piyasalara yansıtmalıdır. Yani merkez bankası hem bilgi arz eden hem de bilgi talep eden bir karar birimidir. Uyguladığı para politikasının başarısı bilgi boşluğu maliyetini minimum düzeye indirerek bilgi arzı ile bilgi talebi arasındaki dengeyi oluşturmaya bağlıdır. Merkez bankalarının bu fonksiyonu yerine getirebilmesi için bağımsız olması gerekmektedir. Çünkü merkez bankası amaç fonksiyonu hedefine bağımsızlık süreci ile ulaşabilecektir. Çünkü bağımsız politikaları şeffaf kılacaktır. Son dönemde merkez bankası bağımsızlığı ‘birinci en iyi’ değil ‘ikinci en iyi’ olarak tanımlansa da yine de merkez bankasının bilgi akışını amaç fonksiyonu doğrultusunda gerçekleşmesi için bağımsızlık önemli bir kriter olarak bulunmaktadır (Serin, 1987:162). Finansal sistemin sağlıklı işlemesi için para politikası hedeflerinin mikro politika olarak da adlandırılan bankacılık politikaları ile bütünleştirilmesi bir yapının oluşturulması gerekmektedir. Çünkü bankacılık yapısında ortaya çıkacak sorunlar finansal sisteme yayılarak güveni sarsacak, politikaların etkinliğini zayıflatacaktır. Onun için merkez bankalarının birinci görevi fiyat istikrarını sağlamaktan çıkmış, finansal sistemin istikrarı olmuştur. Bu oluşum merkez bankalarının son başvuru merci olma (lender of last resort) fonksiyonunu ön plana çıkarmıştır. Sağlıklı işleyen finansal piyasalar ekonomileri kurumsal değişime taşıyacak, tersi durum ise küreselleşme sürecinde birtakım riskleri en aza indirmek için bankacılık sisteminin yapısı ve denetiminin etkin olduğu (ekonomik birlikler tarafından kontrol, üst kurular vb.) iyi işleyen bir bankacılık yapısının finansal sistem ile bütünleşmesi gerekmektedir. Hem merkez bankalarının görevlerini yerine getirebilmesi hem de para politikasının amacına ulaşabilmesi için finansal sistemin istikrarlı olması gerekmektedir. Finansal istikrarı sağlamada bankacılık sisteminin yapısıyla birlikte merkez bankalarının kurumsal yapısı da önemlidir. Bu açıdan da bakıldığında merkez bankalarının siyasi iktidarların (hükümet) etkisinde olmaması, yani özerk veya bağımsız olması önemlidir. Bağımsızlık, merkez bankalarına uygulayacakları para politikaları ile piyasa etkinliği güvenliği ve etkin parasal kontrolü aynı anda sağlama imkanı verecektir. Beşinci karar birimi olarak kendisinin ve diğer karar birimlerinin amaç fonksiyonununun gerçekleşmesini sağlayacak, politikaları başarılı kılacaktır.

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**HYDRO-GEOCHEMICAL CHARACTERISTICS AND ECONOMIC POTENTIALS
OF NİĞDE, NEVŞEHİR AND AKSARAY GEOTHERMAL AREAS**

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Abstract

The importance of geothermal energy is growing rapidly in the world and in Türkiye due to the increasing demand for renewable energy resources. Türkiye ranks 1st in Europe and 3rd in the world in terms of geothermal energy potential. There are 415 geothermal wells in Türkiye with temperatures of 30°C and above. In 2022, Türkiye's power generation capacity is 38 companies, 1665 MWe of energy will be produced in 65 geothermal power plants. Using geothermal fluid, heating systems in 18 residential units provide heat equivalent to approximately 158,000 houses with a capacity of 1422 MWt. After Western Anatolia, Central Anatolia is the richest region in Türkiye in terms of geothermal potential. In order to determine the geothermal resource potential of the provinces of Niğde, Nevşehir and Aksaray in the Central Anatolian Region, geothermal fluids and surface waters collected from the field were investigated in terms of geochemical, hydrogeochemical and isotopic aspects. The Niğde, Nevşehir and Aksaray geothermal areas are divided into two groups: the area between the Tuz Gölü fault zone and the Kaçiboyduran-Melendiz fault, and the area north of the Keçiboyduran-Melendiz fault. In terms of hydro-geochemistry, the cold waters in the area are HCO₃-type mineral-poor waters, while the hot waters are SO₄-type waters. According to $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotope studies, the geothermal areas in the region have waters of meteoric origin fed from different depths. Silica geothermometer results show that the reservoir temperatures of geothermal areas in the region vary between 91 and 179 °C. According to all these studies, it appears that there is significant geothermal potential in the area. There is no problem with the reservoir or reservoir and overburden rocks of the geothermal system in the study area, but there is a problem with the geothermal fluid in the system.

Keywords: Niğde, Nevşehir, Aksaray, geothermal, hydrochemistry.

Introduction

The importance of geothermal energy is increasing rapidly in the world and in Türkiye due to the increasing demand for renewable energy resources. However, the easily exploitable and known resources (Tuscany-Italy and Western Anatolia-Türkiye) are rapidly depleting and therefore new and undiscovered resources need to be found. The study area, where the Neogene-Quaternary volcanism observed in our country is widespread, falls in the category of fields with low-medium enthalpy geothermal potential within the general distribution of geothermal fields in Türkiye. Within the region, geothermal areas such as Niğde (Narlıgöl, Çiftehhan, Deraldan), Aksaray (Ilısu, Ziga, Şahinkalesi) and Nevşehir (Kozaklı and Derinkuyu) springs have been used for balneotherapy and greenhouse purposes, especially in recent times (Figure 1).

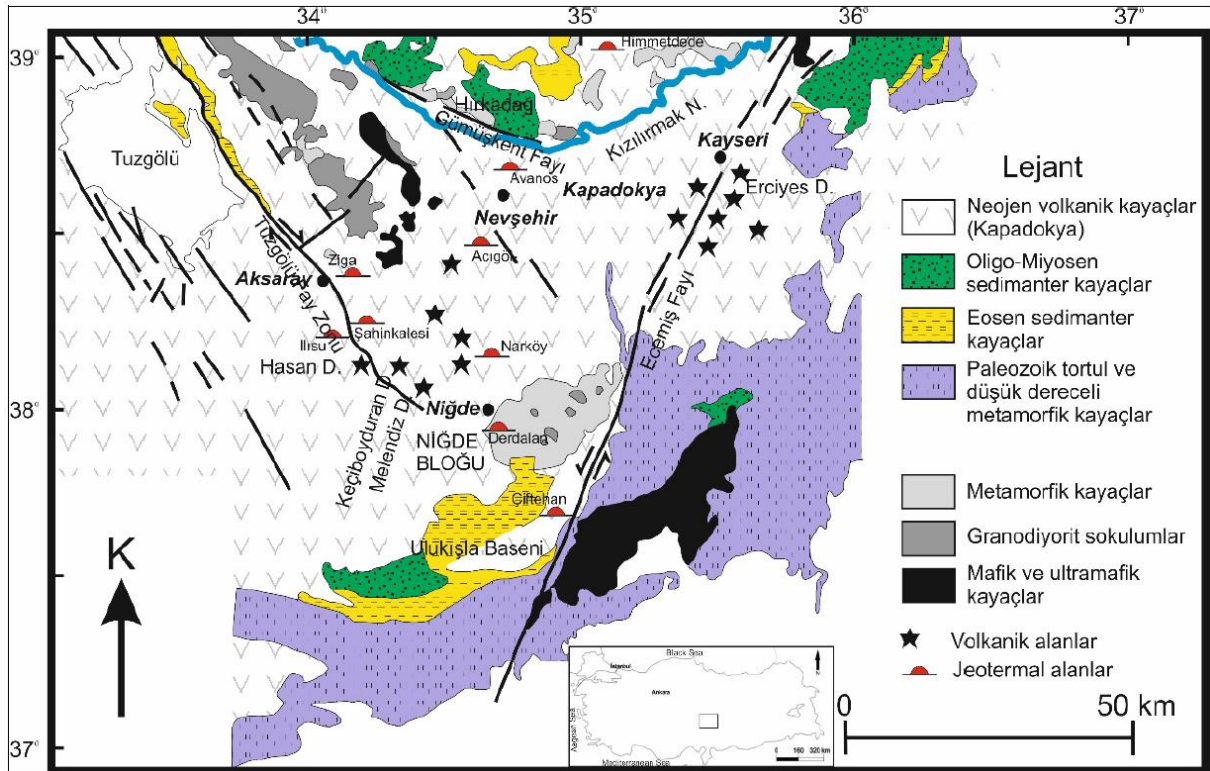


Figure 1. Landform and geology map of the study area (updated from Fayon et al., 2001, 1/100000 scale MTA maps were used).

These resources in the study area have the potential to contribute to the regional economy and employment. Geothermal resources in the study area are related to tectonism and volcanism (Figure 2). In the last fifty years, many studies have been carried out to understand the geological, volcanological and tectonic features of the region (Toprak and Göncüoğlu, 1993;

Dirik and Göncüoğlu, 1996; Özgür et al.) 2012; Şengör and Canitez, 2013; Şener, 2019). However, studies on the relationship between volcanism and tectonism of geothermal systems in the region are limited (Pasvanoğlu and Chandrasekharam, 2011; Şener et al. 2023). In this context, we aim to identify the geothermal systems in the study area, discuss the geological, structural and paleogeographical characteristics of the study area and its surroundings, hydrogeochemical findings and their results, and determine the potential and geological characteristics of the geothermal areas.

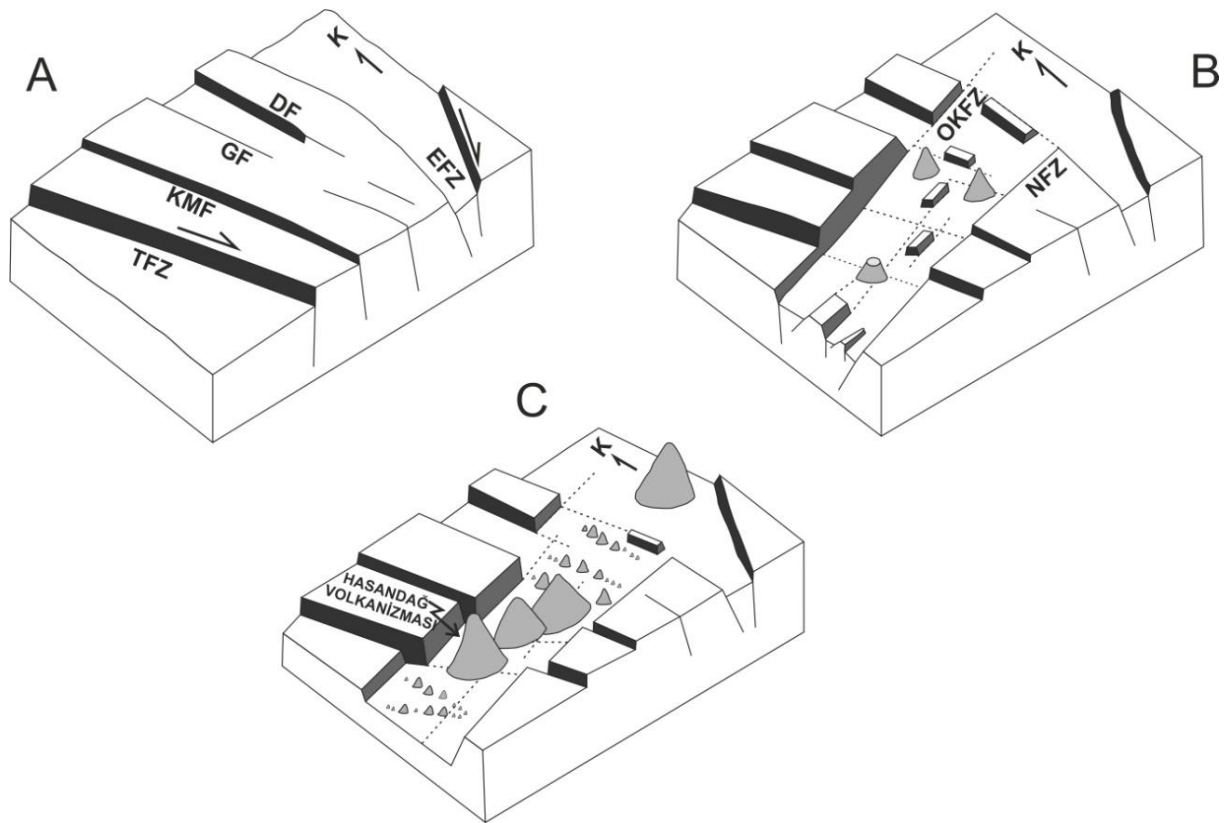


Figure 2. Movements of fault systems in the region from Miocene to present, A) Late Middle Miocene, B) Late Miocene-Early Pliocene, C) Late Pliocene Quaternary. (OKFZ: Orta Kızılırmak Fault Zone; DF: Derinkuyu Fault; EFZ: Ecemiş Fault Zone; KMF: Keçiboyduran-Melendiz Fault; NFZ: Niğde Fault Zone; TFZ: Tuzgölü Fault Zone) (Toprak and Göncüoğlu, 1993).

Changes in the geodynamic environment of the region, rotational movements and intersecting fault systems have most likely caused changes in the extensional rate and the development of crustal-scale fracture systems (Dirik et al., 1999). These faults and fracture systems 1) provide outlet routes for magma emplacement/eruption and 2) control the duration of magma in the

subsurface and hence its interaction with crustal material. The wide range of rock compositions within the same volcanic complex (calc-alkaline, tholeiite-alkaline transition and alkaline) can be directly explained by the residence time of the magma underground, which is controlled by tectonic movements. Based on these structural features, it can be predicted that the hydrothermal fluids in the Cappadocia geothermal province and the cracks and faults that release them are the product of a weakly stressed tectonic regime and that the magmatic elements that heat the system are related to the upward movement of the asthenosphere mentioned above. The paleotectonic structures that have developed in the region are pre-Middle Eocene structures and can be divided into three subgroups: (1) unconformities that formed before metamorphism, (2) folds that developed during metamorphism, and (3) structural elements that developed after metamorphism (Güncüoğlu and Toprak, 1992).

MATERIALS AND METHODS

In the study area, 6 water samples were collected during field studies and analysed to reflect the area. The results were also correlated with 7 water samples from Burçak (2009) and 6 water samples from Afşin et al. (2014), so a total of 19 water samples were analysed. In addition, major anion-cation and $\delta^{18}\text{O}$ - δD analyses were performed on all 19 water samples.

Hydrogeochemistry is an indispensable part of hydrogeological studies used to determine the chemical properties and qualities of groundwater, to investigate its origin, to study its possible relationships with surface and precipitation waters, to solve problems such as groundwater pollution and improvement, and similar research. The results of analyses of hot and cold water samples collected in the field were evaluated using Piper, Schoeller, Durov and Giggenbach plots generated in the Aquachem geochemistry program. The general purpose of geothermometers is to estimate the temperature of subsurface fluids (i.e. aquifer water temperature or reservoir temperature). Deep drilling is very expensive and time consuming. For this reason, estimating reservoir temperatures using various geothermal methods, which are applied prior to deep drilling to determine the water use areas, is an important part of geothermal research (Tarcan, 2002).

RESULTS

Chemical Classification of The Waters

According to the water chemistry results, the cold waters in the area are of Ca-Mg-HCO₃ and Ca-HCO₃ types; The hot and mineral waters containing tragacanth are of Ca-Na-SO₄ type;

Dertalan hot and mineral waters are of Ca-Mg-SO₄ type; Çiftehan thermal and mineral waters are of Na-Ca-SO₄ type; Acıgöl thermal and mineral waters are of Na-Ca-HCO₃-Cl type with B; Ziga hot and mineral waters are of Na-Cl-HCO₃ type with B content, and Şahinkalesi hot and mineral waters are of Ca-Na-HCO₃ type with low mineral content (Figure 3). Although it is observed that there is an increase in the amount of SO₄ in the cold waters of the study area, in the waters of the first geothermal system taken from the area between the Tuzgölü Fault and the Keçiboyduran-Melendiz Fault, as we move from NW to SE, the dominant anion in the waters is HCO₃. Based on this, it can be said that the waters in the study area are waters with deep circulation as they move from NW to SE.

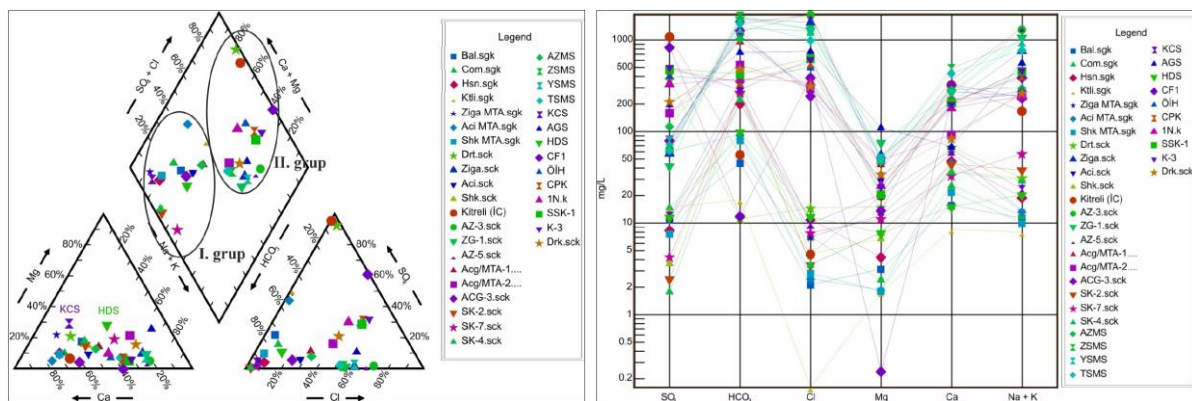


Figure 3 a) Piper diagram of hot and cold water samples from the study area (Piper, 1944), b) Semi-logarithmic Schoeller diagram of hot and cold water samples from the study area.

According to the Piper diagram, hot water samples taken from the study area are Ca-Mg-SO₄ type water. Hot waters show a distribution of Ca+Mg>Na+K according to their cations and SO₄+Cl> HCO₃ according to their anions. In addition, cold water samples are Ca-Mg-HCO₃ type water. Hot waters show a distribution of Ca+Mg>Na+K according to their cations and HCO₃+CO₃>Cl+SO₄ according to their anions (Figure 3a). Although Na⁺, HCO₃⁻ and Cl⁻ are at the highest values in the waters taken from the north of the Keçiboyduran-Melendiz fault, they cannot be found in the waters with the highest temperature in the study area. Therefore, the excess Cl content in this region can be explained not by the temperature of the water but by the saline units in the basement. (Figure 3b).

Silica Geothermometers

Silica geothermometers give good results between 150-225 °C. At higher temperatures, rapid silica precipitation is observed in the hot fluid moving from the aquifer to the surface. For this

reason, water coming from reservoir rocks with a temperature above 225 °C does not reflect the true temperature. Silica geothermometers are made based on the aquifer temperature, which affects the chemical reaction or cooling of hot water as it rises. Different geothermometer calculations are used depending on the type of silica modification with which the silica dissolved in the hot water is in equilibrium. Therefore, different reservoir temperatures are calculated for different silica types. The silica temperature range of 304-311oC obtained from the waters of Çiftahan geothermal area was accepted as a deviation. According to the calculations of chalcedony and quartz geothermometers (Fournier, 1977a), the maximum reservoir temperatures to be expected in the Dertalan, Melendizdağ, Keçiboyduran Dağı, Hasandağ (Keçikalesi), Ziga, Acıgöl and Derinkuyu fields are 150-173 °C, 88-117 °C, 91-120 °C, 94-122 °C, 131-156 °C, 157-179 °C; 152-174 °C ve 102-130 °C respectively.

Cation Geothermometers

As a result of the Na-K-Mg triangle geothermometer evaluations of the waters in the study area, the waters in the geothermal areas within the Cappadocia geothermal province correspond to the immature water region. As a temperature isotherm, it corresponds to 100-125 °C. The waters in this area are located in the Mg corner, in the lowest parts of the fresh cold groundwater raw water zone (Figure 4). Figure 4 shows the distribution of hot and cold water samples in the study area according to their main cation relationships. The samples are far from the water-rock equilibrium line, so it can be said that the waters in the study area have not reached the water-rock equilibrium.

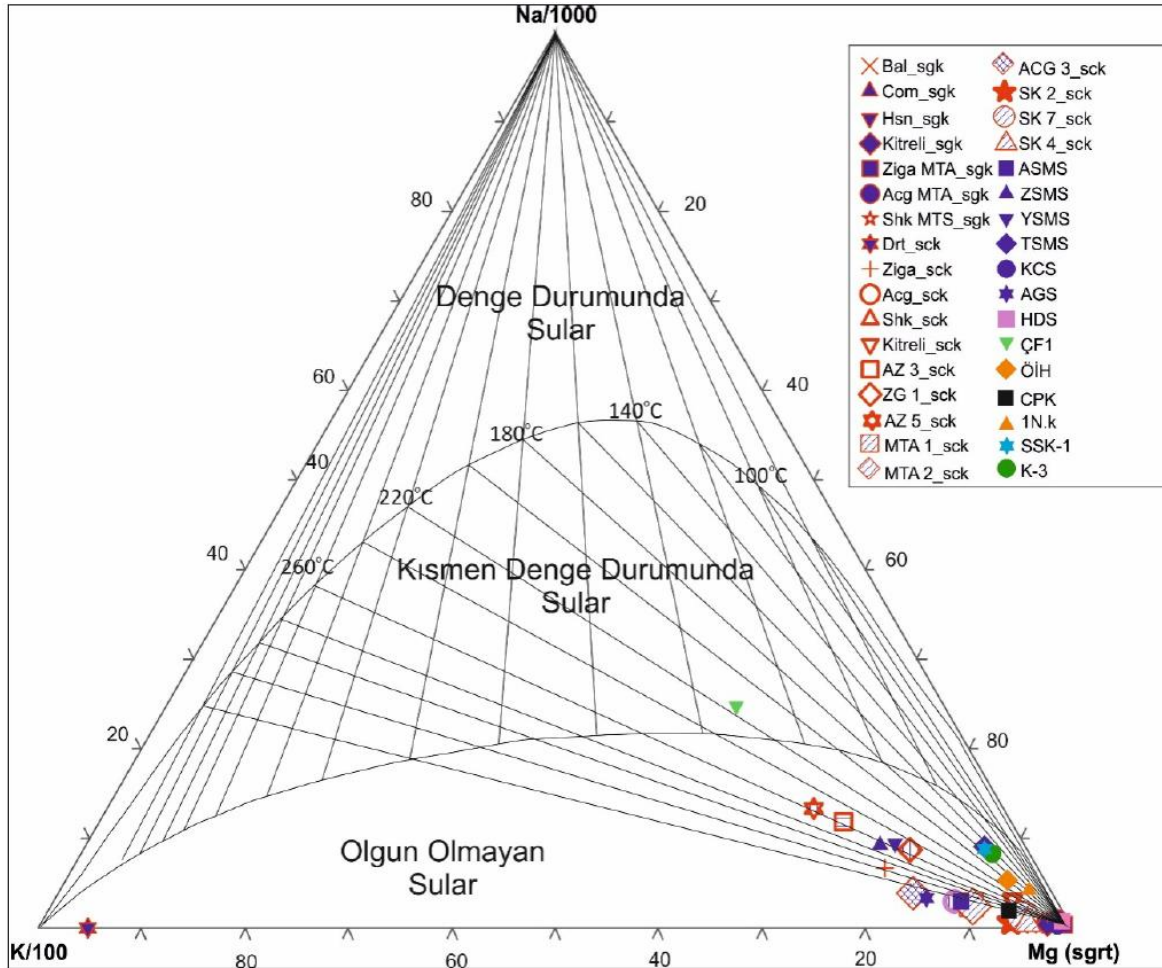


Figure 4. Maturity diagram of hot and cold water samples of the study area (Giggenbach, 1988).

$\delta^{18}\text{O}$ and δD Relationship of Waters

Examining the $\delta^{18}\text{O}$ and δD relationships of the 19 water samples analysed, it was found that the waters were meteoric, having infiltrated the rocks and heated due to the geothermal gradient as they descended and/or approached the magmatic masses. As a result of this study, which was based on the collection and analysis of water samples from geothermal sites within the study area, all the hot and cold waters in the geothermal sites of the study area are of meteoric origin.

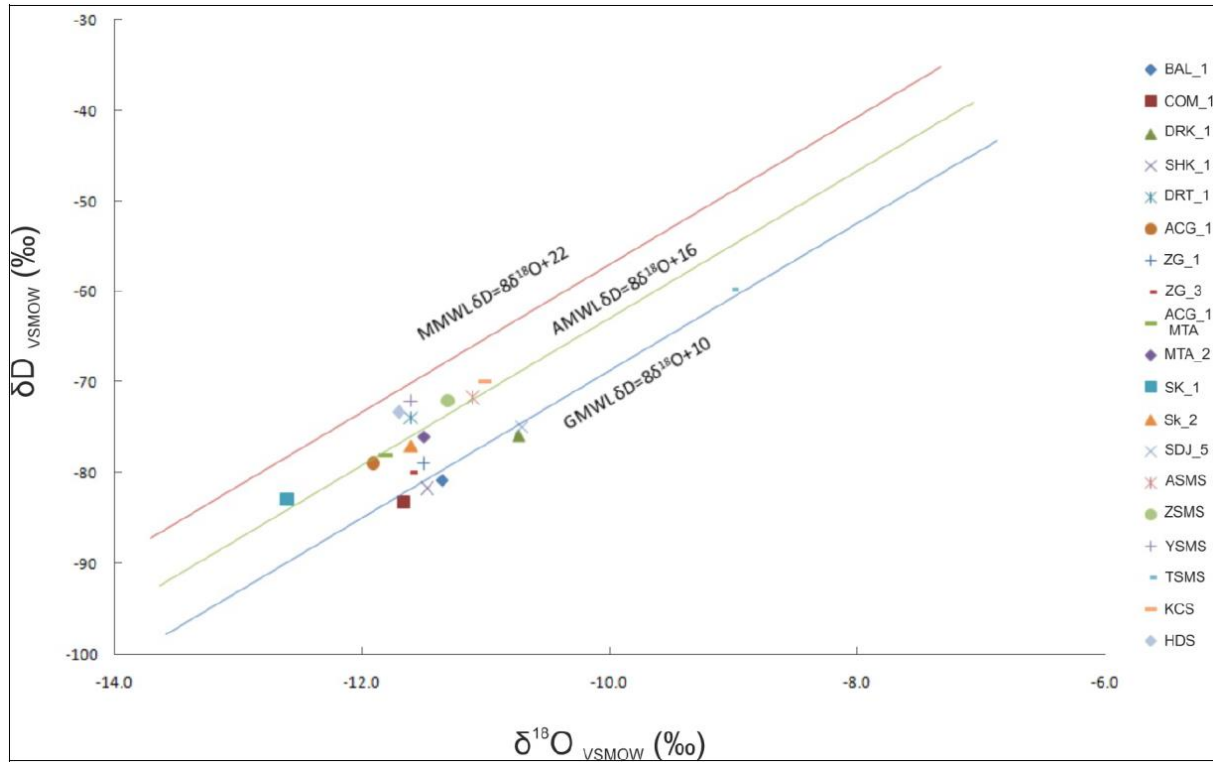


Figure 5. $\delta^{18}\text{O}$ and δD plots of water from the study area according to VSMOW: Vienna Standard Mean Ocean Water (Craig and Gordon, 1965), GMWL: Global Meteoric Water Line (Craig, 1961); AMWL: Ankara Meteoric Water Line (IAEA/ WMO, 2004); MMWL: Mediterranean Meteoric Water Line (Gat and Carmi, 1987).

Considering the altitudes from which the waters in the study area were collected and the elevation gradient line of these waters (not shown), it can be said that the recharge area extends to Itulumaz Mountain in the SE and Hasandağ in the SW. Waters other than Bal_1, Com_1, Drt_1 and SDJ_5, which were collected from the south of the study area, deviated from the Global Meteoric Water Line because they were enriched in $\delta^{18}\text{O}$ as well as the effect of surface evaporation. This indicates that these waters have deeper circulation and interact with the rocks for a longer period of time and are partially enriched in $\delta^{18}\text{O}$. Based on this, it can be said that more evaporation from the geothermal areas within the study area is effective in the areas located in the SE compared to the areas located in the NW (Figure 5).

DISCUSSION

As a result, the data obtained from geothermometers and geochemical studies show that, in addition to the geothermal fields in study area, there is also the potential for similar or even hotter (suitable for energy production) geothermal fields to emerge as a result of monitoring the

continuity of the geothermal system. The relationship between volcanism and tectonism, and the resulting increase in the density of hydrothermal alteration zones, is greatest at the intersection of the fault systems affecting the study area. Deep exploration drilling is planned in the region, especially in the areas where the Tuzgölü fault and the Niğde fault zone intersect in the south of Melendizdağ, in the areas on the Keçiboyduran-Melendiz fault in the Ziga and Şahinkalesi regions, and in the areas between the Derinkuyu fault and the Göllüdağ fault in the south of Nevşehir. According to chalcedony and quartz geothermometers, the reservoir temperatures range from 48 to 180°C; also, the results obtained from two different silica geothermometer applications match up with each other. Considering the geothermometer temperatures, provinces such as Niğde and Aksaray with the highly radiogenic granite area are excellent resources for initiating Enhanced Geothermal System (EGS) projects for geothermal energy

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ÖĞRETMENLERİN EĞİTİM PROGRAMI OKURYAZARLIK DÜZEYLERİNİN META ANALİZİ

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Özet

Bu araştırmanın temel amacı 2018-2023 yılları arasında Türkiye’de yapılmış olan öğretmenlerin eğitim programı okuryazarlık düzeylerini belirleyen araştırmaları, cinsiyet değişkenine göre meta analiz yöntemiyle incelemektir. Bu amaçla yapılan alanyazın incelemesinde YÖKTEZ, Google Akademik ve Science Direct veri tabanları dikkate alınmıştır. Literatür incelemesinde 2018-2023 yıllarını kapsayan ve dâhil edilme kriterlerine uygun olan, konu alanı ile ilgili doktora tezi, yüksek lisans tezi ve makale türünde 37 araştırma meta analiz kapsamına dâhil edilmiştir. Araştırmanın örneklem grubu, 7319 kadın ve 5028 erkek öğretmen olmak üzere toplamda 12347 öğretmenden oluşmaktadır. Dâhil edilen her çalışma için kodlama formu oluşturulmuş ve analizler için CMA programından yararlanılmıştır. Analizler sonucunda araştırmada yayın yanlılığının olmadığı belirlenmiştir. Rastgele etkiler modeline göre eğitim programı okuryazarlığı genel etki büyüklüğü değerinin erkek öğretmenlerin lehine ve orta düzeyde daha yüksek olduğu belirlenmiştir ($g=0.080$).

Anahtar Kelimeler: Eğitim programı okuryazarlığı, öğretmen, cinsiyet, meta analiz.

META-ANALYSIS OF TEACHERS' EDUCATION PROGRAM LITERACY LEVELS

Abstract

The main purpose of this research is to examine the studies conducted in Turkey between 2018 and 2023 that determine the literacy levels of teachers' education programs using the meta-analysis method according to the gender variable. In the literature review conducted for this purpose, YÖKTEZ, Google Scholar, and Science Direct databases were scanned. As a result of the screening, 37 studies in the form of doctoral theses, master's theses, and articles related to the subject area, covering the years 2018-2023 and meeting the inclusion criteria, were included in the scope of the meta-analysis. The sample group of the research consists of 12347 teachers in total, 7319 female and 5028 male teachers. A coding form was created for each included study and the CMA program was used for analysis. According to the random effects model, it was determined that the general effect size value of curriculum literacy was moderately higher in favor of male teachers ($g = 0.080$).

Keywords: Curriculum literacy, teacher, gender, meta-analysis.

Giriş

Eğitim programları, eğitimi şekillendirecek olan değerlerin ortaya koyulması ve toplumun okullaşma ile ilgili amaçlarını gösteren bir plandır (Bolat, 2021: 2). Bu planlar eğitim kurumlarının çocuklar, gençler ve yetişkinler için hedeflediği tüm faaliyetleri içinde barındırır. Hangi hedeflerin bu plana dâhil edilmesi bir yandan kurumun diğer yandan ise milli eğitimin hedeflerine göredir (Özdemir, 2012: 372). Okullaşma ile alakalı hedefler siyasi ve ideolojik bir temele dayandırılır ve bir nevi siyasi bir belge şeklinde karşımıza çıkar. Dolayısıyla eğitim programları muhakkak içinde bulunulan toplumun kurucu değerlerini ve siyasal yapılarından etkilenmiştir (Bolat, 2021: 2). Ayrıca geliştirilen toplumun maddi ve de manevi değerlerini sürdürmek, gelecek kuşaklara aktarmak ve nitelikli insan yetiştirmek önemli amaçlarından (Sarica, 2021: 133).

Eğitim programının uygulayıcısı olan öğretmenlerin programı anlaması ve programın beklentileri doğrultusunda uygulaması da programın içeriği kadar önemlidir. Öğretmenlerin uygulayıcılar olarak program ve dönemin şartlarına uygun şekilde işe koşamadığı program, çok yetkin ve kusursuz dahi olsa yazılı bir plan olmaktan öteye geçemeyecektir (Demir ve Toraman, 2021: 1518). Bu bağlamda Bolat (2017: 127) program hakkında yeterli seviyede bilgi sahibi olmak, programın içerik ve beklentilerinden hareketle programı uygulamak, uygun öğrenme yaşantıları ve süreçlerini hazırlamak gibi yeterlilikleri temsil eden “eğitim programı okuryazarlığı” kavramını ele almıştır. Eğitim programı okuryazarlığı, eğitimde ve programın hedeflerine ulaşması noktasında niteliğin artırılması yönünden ele alınması gereken önemli bir yeterliliktir (Çetinkaya ve Tabak: 298).

Eğitim programı okuryazarlığı, programın felsefi, sosyal, ekonomik, psikolojik gibi temellerini, amaçlarını, ön planda olan değerlerini, becerilerini, yeterliklerini ve temeline aldığı öğrenme-öğretmen sürecini bilmekle alakalıdır. Öğretmen bunları eğitim durumu ile ölçme-değerlendirme süreciyle bağdaştırabilmeli ve tüm öğeler arasında ilişki kurabilmelidir. Program okuryazarı bir öğretmen programa yorum katabilir, doğru ve etkili bir şekilde planlama yaparak programı uygulayabilir (Özden, 2022: 216). Eğitim programları okuryazarlığı ile ilgili yapılan çalışmaların son yıllarda artış göstermesi bu yeterliliğin önem kazandığını göstermektedir (Bolat, 2017; Erdem ve Eğmir, 2018; Çetinkaya ve Tabak, 2019; Kahramanoğlu, 2019; Saral, 2019; Aslan, 2019; Erdamar ve Akpunar, 2020; Yar Yıldırım, 2020; Keskin, 2020; Sural ve Dedebeali, 2021; Nasırcı, 2022; Şahin ve Tekkol, 2023; Berkant ve Mansuroğlu, 2023). Ayrıca konu alanı ile ilgili yapılan çalışmalarda öğretmenlerin eğitim programı okuryazarlık düzeyleri

cinsiyete göre incelendiğinde farklı sonuçlara ulaşılmıştır. Yapılan bu çalışmalarda örneklem grubunda çoğunlukla öğretmenler, öğretmen adayları veya eğitim yöneticileri yer almıştır. Konu alanı ile ilgili nicel, nitel veya karma desenle yürütülmüş birçok çalışmaya ulaşılmış ancak meta-analiz yöntemi ile öğretmenlerin eğitim programı okuryazarlık düzeylerinin cinsiyet değişkenine göre incelendiği bir çalışmaya rastlanmamıştır. Eğitim programı okuryazarlığı ile ilgili genel ve bütüncül bir bakış açısı sunma ve sonraki araştırmalara kaynaklık etme noktasında bilgi birikimine olanak sağlaması amacıyla böyle bir araştırma yapma ihtiyacı ortaya çıkmıştır. Bu düşünceden hareketle, 2018-2023 yılları arasında Türkiye’de yapılmış olan öğretmenlerin eğitim programı okuryazarlık düzeylerini belirleyen araştırmaların, cinsiyet değişkenine göre meta analiz yöntemiyle incelenmesi bu araştırmanın temel amacıdır.

ARAŞTIRMA

Bu araştırmada sistematik sentezleme yöntemlerinden biri olan meta analiz yöntemi kullanılmıştır. Meta analiz yöntemi, belirli bir konuda birbirinden bağımsız farklı çalışmaların nicel bulgularını kullanarak istatistiksel olarak sentezleme ve yorumlama olarak tanımlanabilir (Cumming, 2012; Ellis, 2010; Yeşilyurt, 2021; Yeşilyurt ve diğerleri, 2019). Ayrıca meta analiz yöntemi belirli araştırmaların bir araya getirilerek ortak bir yargıya varılmasına olanak sağlar (Yeşilyurt, Gurbetoğlu ve Yılmaz, 2019). Bu araştırmada her çalışmanın etki büyüklüğünün ve genel etki büyüklüğünün hesaplanmasında Comprehensive Meta-Analysis (CMA) programından yararlanılmıştır.

Verilerin Toplanması

Öğretmenlerin eğitim programı okuryazarlığının konu edildiği bu çalışmanın veri kaynağını Türkiye’de yapılmış makaleler ve tezler oluşturmaktadır. İlgili çalışmalara ulaşmak amacıyla YÖKTEZ, Google Akademik ve Science Direct veri tabanları taranmıştır. Yapılan taramada “*eğitim programı okuryazarlık, eğitim programı okuryazarlığı, program okuryazarlık, program okuryazarlığı, curriculum literacy*” anahtar kelime olarak kullanılmıştır. Ulaşılan bu araştırmalardan dâhil edilme kriterlerine uygun olan 37 çalışma olduğu belirlenmiştir. Dâhil edilen bu çalışmalara ilişkin olarak araştırmanın örneklem grubu, 7319 kadın ve 5028 erkek öğretmen olmak üzere toplamda 12347 öğretmenden oluşmaktadır.

Dâhil Edilme Kriterleri

İlgili literatürde bulunan çalışmaların meta analize dâhil edilmesi için bir takım kriterler takip edilmiştir. Bu kriterler aşağıda sıralanmıştır.

1. Çalışmaların örneklem grubunun Türkiye’de olması,
2. Çalışmaların 2018-2023 (son yayınlanma tarihi: Ekim 2023) yılları arasında yapılmış olması,
3. Çalışmaların öğretmenlerin eğitim programı okuryazarlığında cinsiyet değişkenini içeren çalışmalar olması,
4. Çalışmaların etki büyüklüğünün hesaplanabilmesi için cinsiyet gruplarında örneklem büyüklüğü, ortalama puan, standart sapma değerlerinin rapor edilmesi.

Yapılan taramalar ve uygulanan kriterler doğrultusunda meta-analiz çalışmasında 9’u makale, 26’sı yüksek lisans tezi ve 2’si doktora tezi olmak üzere toplamda 37 çalışmanın etki büyüklüğü hesaplanmıştır.

Çalışmaların Kodlanması

Araştırma verilerinin sistemli şekilde gruplanması ve kolayca erişilebilmesi amacıyla araştırmanın kapsamına dâhil edilen her çalışma için kodlama formu oluşturulmuştur. Kodlama formu “Çalışma Künyesi” ve “Çalışma Verileri” isimli iki bölümden oluşturulmuştur. Çalışma künyesi bölümünde *çalışmanın numarası, çalışmanın adı, yayın yılı, yazar/yazarlar başlıklarına* yer verilmiştir. Çalışma verileri bölümü ise cinsiyet gruplarının *aritmetik ortalaması, standart sapması ve örneklem büyüklüğünü* içermektedir. Oluşturulan kodlama formlarına ilişkin kayıtların güvenilirliğini sağlamak amacıyla çalışmayı yürüten araştırmacılar dışındaki bir araştırmacı tarafından kodlama formlarının incelenmesi sağlanmıştır.

Yayın Yanlılığı

Yayın yanlılığı, birbirinden bağımsız çalışmaları bir araya getirmekten doğan potansiyel hatalardır (Çarkungöz & Ediz, 2009). Yayın yanlılığın olup olmadığı istatistiksel yöntemler (Huni Grafiği ve Begg and Mazumdar rank correlation) ile test edilmiştir.

BULGULAR

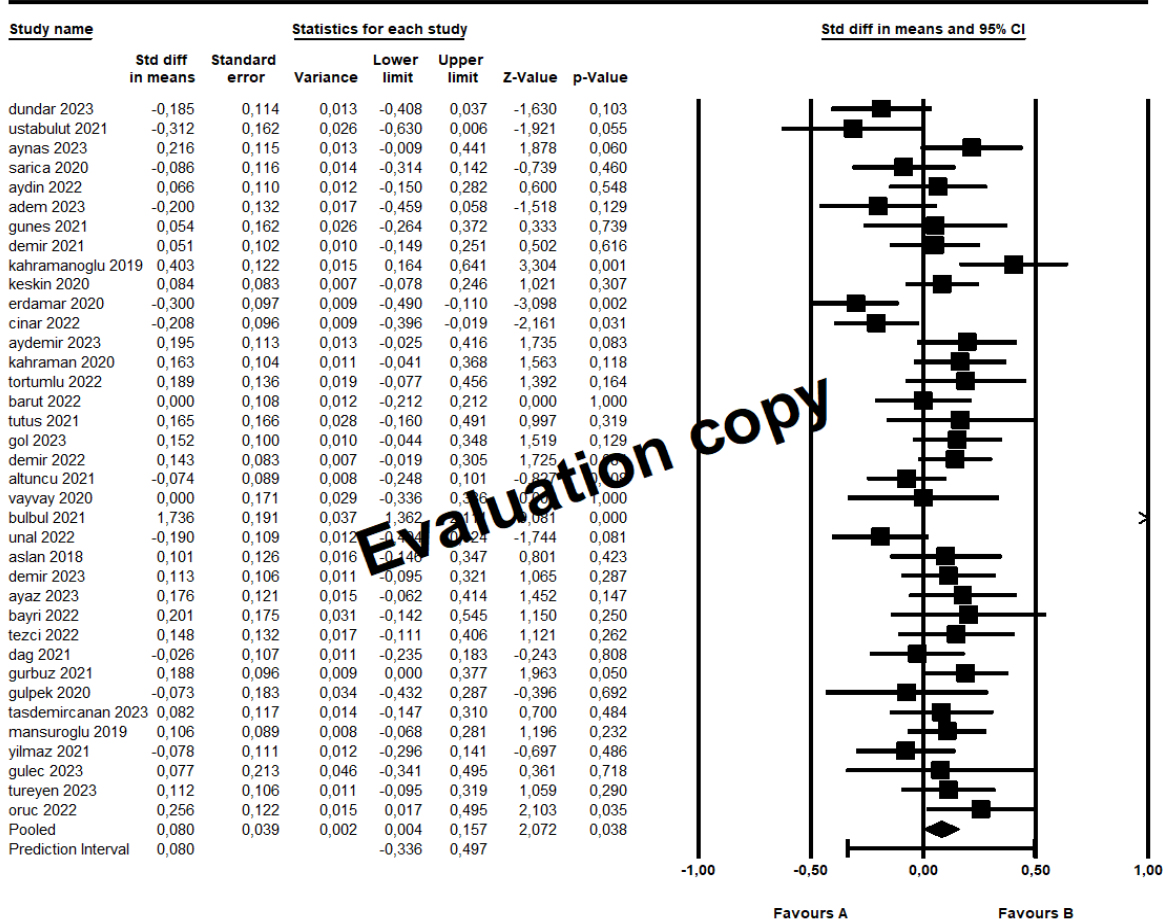
Eğitim programı okuryazarlık düzeylerini belirlemek amacıyla 2018 ile 2023 yılları arasında yapılmış çalışmalar incelenmiştir. Bu çalışmalardan ilk olarak dâhil edilme kriterlerine uygun olan 37 çalışma veri analizine dâhil edilmiştir. Analizler için Hedges’s g modeli kullanılmıştır. Rastgele veya sabit etkiler modeline karar vermek amacıyla heterojenlik testi yapılmıştır. Heterojenlik testinin istatistiksel verileri Şekil 1’ de yer almaktadır..

Model	Effect size and 95% confidence interval						Test of null (2-Tail)		Prediction Interval		Between-study		Other heterogeneity statistics			
	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Lower limit	Upper limit	Tau	TauSq	Q-value	df (Q)	P-value	I-squared
Fixed	37	0,062	0,019	0,000	0,025	0,099	3,316	0,001					147,134	36	0,000	75,532
Random	37	0,080	0,039	0,001	0,004	0,156	2,072	0,038	-0,335	0,496	0,201	0,040				

Şekil 1. Heterojenlik Testi Sonuçları

Elde edilen bulgulara göre p değeri ($p=0,000$) $0,05$ 'ten küçüktür. Bu bulguya göre gruplar arasında anlamlı bir fark olduğu söylenebilir. Q değeri $147,134$ olan bu çalışmanın heterojen olduğu görülmektedir. Bu sebeple çalışmada Rastgele Etkiler Modeli ile analizlerin yapılmasına karar verilmiştir. Rastgele Etkiler Modelinin analiz sonuçları ise Şekil 2'de yer almaktadır.

Meta Analysis

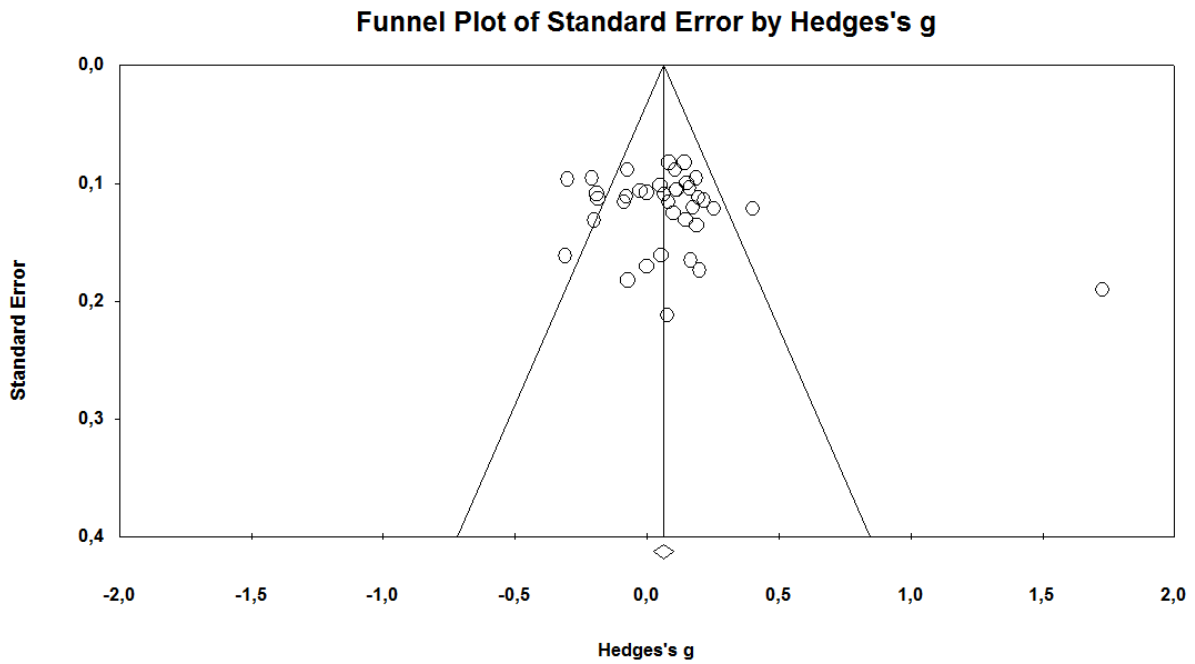


Şekil 2. Rastgele Etkiler Modeli Altında Yapılan Analiz Sonuçları

Şekil 2'de, eğitim programı okuryazarlık değişkeninin cinsiyete göre incelenmesine ait orman grafiği verilmiştir. Bu grafik eğitim programı okuryazarlık düzeyini inceleyen 37 çalışmadan elde edilen Hedges's g değerlerini içermektedir. Grafikteki kareler her bir çalışmanın etki büyüklüğünü gösterirken iki yandan uzanan çizgiler de tahmin için %95 güven aralığını

göstermektedir. Şeklin en sonunda bulunan elmas şekli ise genel etkiyi gösterir. Çalışmanın genel etkisi Rastgele Etkiler Modeli'ne göre $g=0.080$ olarak hesaplanmıştır. Grafik incelendiğinde yapılan çalışmalarda erkekler lehine sonuçlara daha fazla ulaşılmıştır. Bireysel etki büyüklüğü en yüksek dört çalışma Bülbül, 2021 (EB: 1,728); Kahramanoğlu, 2019 (EB:0,401); Oruç, 2022 (EB:0,256) ve Aynas, 2023 (EB: 0,215) şeklinde bulunmuştur. Etki büyüklüğü en düşük dört çalışma ise Ustabulut, 2021 (EB:-0.311); Erdamar, 2020 (EB -0,300); Çınar, 2022 (EB: -0.207) ve Adem, 2023 (EB: -0,200) şeklinde sıralanmıştır.

Yayın yanlılığın var olup olmadığını belirlemek amacıyla ilk olarak huni saçılım grafiği bakılmıştır.



Şekil 3. Eğitim Programı Okuryazarlık Düzeyleri Verilerini İçeren 37 Çalışmanın Huni Saçılım Grafiği

Huni grafiğinin saçılımı incelendiğinde, çalışmaların daha çok huninin üst bölgesinde toplandığı görülmektedir. Huninin dışında kalan çalışmalar da mevcuttur. Bu bulgulardan yayın yanlılığın olup olmadığının belirlenememesi nedeniyle Begg and Mazumdar rank correlation istatistiklerine başvurulmuştur. Begg and Mazumdar rank correlation istatistik sonuçları Şekil 4'de verilmiştir.

Begg and Mazumdar rank correlation

Kendall's S statistic (P-Q) 42,00000

Kendall's tau without continuity correction

Tau 0,06306
z-value for tau 0,54931
P-value (1-tailed) 0,29140
P-value (2-tailed) 0,58279

Kendall's tau with continuity correction

Tau 0,06156
z-value for tau 0,53623
P-value (1-tailed) 0,29590
P-value (2-tailed) 0,59180

Şekil 4. Begg and Mazumdar Rank Correlation İstatistiği Sonuçları

Begg and Mazumdar rank correlation istatistiğine göre iki kuyruklu p değerinin 0.05'in altında, Tau değerinin ise 1.00'a yakın olması beklenir (Dinçer, 2022). Yapılan analizin bulgularına göre p değerinin 0.05'den büyük olması sebebiyle bu çalışmada yayın yanlılığın olmadığı sonucuna varılmıştır.

SONUÇ

Yapılan meta-analiz çalışmasının temel amacı öğretmenlerin eğitim programı okuryazarlık düzeyi açısından cinsiyet değişkeninin etki büyüklüğünü hesaplamaktır. Bunun için Türkiye'de yapılmış olan 37 makale ve tez çalışmaya dâhil edilmiştir. İncelenen 37 çalışmada 7319 kadın ve 5028 erkek öğretmen olmak üzere toplamda 12347 öğretmen toplam örneklemini oluşturmaktadır. Çalışmaların bireysel etki büyüklüklerinin hesabı için kodlama formları kullanılmış olup analizler gerçekleştirilmiştir. Daha sonra ise cinsiyet değişkenine bağlı olarak genel etki hesaplanmıştır.

Araştırmaya dâhil edilen çalışmalarda yayın yanlılığını test etmek amacıyla huni saçılım grafiği ve Begg and Mazumdar Rank Correlation istatistiği sonuçlarına bakılmıştır. Huni saçılım grafiğinde çalışmaların daha çok huninin üst bölgesinde toplandığı görülür. Begg and Mazumdar Rank Correalation istatistiğinin sonuçlarında ise iki kuyruklu p değeri ($p=,58$) yayın yanlılığın olmadığını kanıtlar. Yapılan heterojenlik testiyle gruplar arası anlamlı bir farkın olduğu belirlenmiştir. Hedges's g modeli kullanılarak Q değeri ($Q=147,134$) hesaplanmıştır. Bu durum çalışmaya dâhil edilen araştırma sonuçlarının heterojen bir dağılım gösterdiğini ispatlamaktadır. Heterojenlik testinin sonucuna göre rastgele etkiler modeli ile genel etki

büyüküğü hesaplanmıřtır. alıřmada genel etki büyüküğü ($g=0.080$) deęeri erkek öęretmenlerin lehine olup orta düzeyde daha yüksek olduęu görölmüřtür.

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Ek 1. Kodlama Formu

1- Çalışma Künyesi		
Çalışma Numarası	:	
Çalışmanın Adı	:	
Yayın Yılı	:	
Yazar/Yazarlar	:	
2- Çalışma Verileri		
Çalışmaya Ait Veriler		
	Kadın Grubu	Erkek Grubu
<i>Örneklem Sayısı</i>		
<i>Aritmetik Ortalama</i>		
<i>Standart Sapma</i>		

**VERTEBRAL KALP SKORU VE VERTEBRAL SOL ATRİUM BOYUTU:
SAĞLIKLI YENİ ZELANDA BEYAZ TAVŞANLARINDA EKOKARDİYOĞRAFIYE
DAYALI REFERANS ARALIK ÇALIŞMASI**

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Özet

Köpeklerde vertebral kalp skoru (VHS) ve vertebral sol atrium boyutu (VLAS), sırasıyla kardiyomegali ve sol atriyal genişlemeyi tahmin etmek için yaygın olarak kullanılan iki radyografik kardiyak indekstir. Doğru VHS ve VLAS ölçümleri için kalbin ve kaudal vena kavanın tüm sınırlarının açık olması gerekir. Ne yazık ki, tavşanların lateral düz radyografilerinde kalp silüetinin kranial sınırı ve kaudal vena kava görülemez. Bu çalışmanın amacı sağlıklı, yetişkin 58 Yeni Zelanda beyaz tavşanında VHS ve VLAS için ekokardiyografiye dayalı referans aralıklarını tanımlamaktır. VHS ve VLAS kontrast sağ lateral torakal radyografilerden ölçüldü. Kontrast toraks radyogramlar, 1 ml/kg non-iyonik opak kontrast maddenin safen venden enjeksiyonu ile elde edildi. İki radyografik kardiyak indeks ve ekokardiyografik parametreler (diastol sonu sol ventrikül iç çapı (LVIDd) ve sol atriumun aorta oranı (LA/Ao)) arasındaki korelasyonlar değerlendirildi. Referans aralıkları ile ortalama veya medyan değerler VHS için $7,94 \pm 0,31$ vertebra (v) (7,2-8,6 v) ve VLAS için 1,5 v (1-2 v) idi. Vücut ağırlığının VHS ve VLAS üzerinde herhangi bir etkisi tespit edilmedi. VHS ve VLAS açısından erkekler (n=31) ve dişiler (n=27) arasında fark yoktu. VHS ile LVIDd ($r=0,538$, $P<0,0001$) veya VLAS ile LA/Ao ($r=0,629$, $P<0,0001$) arasında orta derecede pozitif korelasyon belirlendi. VHS ve VLAS değerlerinde aynı gözlemci için (intraobserver) mükemmel uyum bulundu (sınıf içi korelasyon katsayıları VHS için (ICC)=0,894, $P<0,0001$ ve VLAS için ICC=0,961, $P<0,0001$). Sonuç olarak kontrast torakal radyografi, VHS ve VLAS'ın doğru ölçümü için kolay, etkili ve komplikasyonsuz bir görüntüleme tekniğidir. Mevcut çalışma, VHS ve VLAS değerleri için referans aralıkları belirledi ve bu indekslerin ölçümlerinin tavşanlarda tekrarlanabilir ve güvenilir olduğunu gösterdi.

Anahtar Kelimeler: Ekokardiyografi, referans aralık, tavşan, vertebral kalp skoru, vertebral sol atrium boyutu.

**VERTEBRAL HEART SCORE AND VERTEBRAL LEFT ATRIAL SIZE: A
REFERENCE INTERVAL STUDY IN HEALTHY NEW ZEALAND WHITE
RABBITS BASED ON ECHOCARDIOGRAPHY**

Abstract

In dogs, VHS and VLS are two radiographic cardiac indices commonly used to predict cardiomegaly and left atrial enlargement, respectively. For accurate VHS and VLAS measurements, all borders of the heart and caudal vena cava must be clear. Unfortunately on lateral plain radiographs of rabbits, the cranial border of the heart silhouette and the caudal vena cava are not visible. The aim of this study was to define reference intervals for vertebral heart score (VHS) and vertebral left atrial size (VLAS) of healthy, adult 58 New Zealand white rabbits based on echocardiography. The VHS and VLAS were measured from contrast right lateral (RL) thoracic radiographs. The contrast thoracic radiographs were obtained by bolus injection of 1 ml/kg of non-ionic opaque contrast agent from saphenous vein. The correlations between two radiographic cardiac indices and echocardiographic parameters (left ventricle internal diameter in diastole (LVIDd) and ratio of left atrium to aort (LA/Ao)) were evaluated. The mean or median values with a reference interval were 7.94 ± 0.31 vertebrae (v) (7.2-8.6 v) for VHS or 1.5 v (1-2 v) for VLAS. No effect of body weight on VHS and VLAS was detected. There was no difference between males (n=31) and females (n=27) in VHS and VLAS. A moderate positive correlation was found between VHS and LVIDd ($r=0.538$, $P<0.0001$) or VLAS and LA/Ao ($r=0.629$, $P<0.0001$). Excellent intraobserver agreement was found for VHS and VLAS (intraclass correlation coefficients (ICC)=0.894, $P<0.0001$ for VHS and ICC=0.961, $P<0.0001$ for VLAS). In conclusion, contrast thoracic radiography is an easy, effective, and uncomplicated imaging technique for accurate measurements of VHS and VLAS. The present study provided a reference interval for values of VHS and VLAS, and demonstrated that measures of these indices are repeatable and reliable in rabbits.

Keywords: Echocardiography, rabbit, reference range, vertebral heart score, vertebral left atrial size

Giriş

Pet hayvan olarak daha popüler hale gelen tavşanlarda kalp hastalıkları son dönemlerde daha fazla teşhis edilmeye başlandı (Orcutt ve Malakoff, 2021). Pet tavşanlarda kardiyovasküler hastalıkların prevalansı % 2,6'dır (Ozawa ve ark., 2021). Ayrıca tavşanlar, ateroskleroz, endokardit ve ilaca bağlı kardiyomiyopatiler gibi kardiyovasküler hastalıklar için hayvan modeli olarak kullanılmaktadır (Pogwizd ve Bers, 2008). Kalp hastalıklarında kullanılan gelişmiş teşhis yöntemleri, hem pet hem de laboratuvar tavşanları için giderek daha önemli hale gelmiştir. Tavşanlarda toraks radyografisi, elektrokardiyografi ve ekokardiyografi kesin tanıya ulaşmada, tedavi planının geliştirilmesinde ve hastalık prognozunun takibine faydalıdır (Orcutt ve Malakoff, 2021). Ekokardiyografi, hem insan hem de veteriner hekimliğinde kardiyak morfolojinin ve fonksiyonların değerlendirilmesinde köklü bir yöntem olmasına rağmen, uygulayıcıya bağımlı bir yöntem olup, uluslararası yönergelere uygun olarak tekniğe ilişkin kapsamlı eğitim ve temel bilgi gerektirir. Toraks radyografileri, kalp silüetinin şeklinin ve boyutunun değerlendirilmesine izin vererek kalp hastalığı hakkında kritik bilgiler sağlar. Vertebral kalp skoru (VHS) ölçümleri, progresif kalp büyümesinin etkili bir göstergesidir (Buchanan, 2000). VHS, sağlıklı tavşanların (Moarabi ve ark. 2015; Turner Giannico ve ark., 2015; Onuma ve ark., 2010) yanı sıra köpeklerde (Buchanan, 2000), kedilerde (Lister & Buchanan, 2000), diğer hayvan türlerinde de rapor edilmiştir (Çetinkaya ve Kaya, 2022). VHS'de olduğu gibi, köpeklerde sol atriyum boyutunu objektif olarak değerlendirmesinde vertebral sol atriyum boyutu (VLAS) kullanılmaktadır (Malcom ve ark., 2018). Ayrıca, VLAS ayrıca sağlıklı (Çetinkaya ve Kaya, 2022) ve hipertrofik kardiyomiyopati sığıçanlarda (Şirin ve ark., 2022) kontrast toraks radyografisi kullanılarak tanımlanmıştır. Buna rağmen sağlıklı tavşanlarda VLAS değerinin referans aralığı bildirilmemiştir.

Sığıçanlarda olduğu gibi (Çetinkaya ve Kaya, 2022), tavşanların lateral torakal düz radyografilerinde kaudal vena kavanın (CaVC) ve kalp silüetinin kranial sınırının belirginliği oldukça yetersizdir (Turner Giannico ve ark., 2015). Bu radyografik özellik, VHS ve VLAS'ın hatalı ölçümüne neden olabilir. Hipotezimiz, torakal kontrast radyografilerde ölçüm bölgelerinin belirgin olması nedeniyle, kalp silüetinden bağımsız olarak, kalp büyüklüğünün ve sol atrium (LA) boyutunun daha doğru değerlendirilebileceği yönündedir. Dolayısıyla bu çalışmanın amacı, sağlıklı, yetişkin Yeni Zelanda beyaz (NZW) tavşanlarının ekokardiyografiye dayalı torakal kontrast radyografilerinden elde edilen VHS ve VLAS değerleri için referans aralıkları tanımlamaktır.

Gereç ve Yöntem

Deney protokolü Akdeniz Üniversitesi Hayvan Bakımı Etik Kurulu tarafından hayvanların kullanımına ilişkin olarak onaylandı (No: B.30.2.AKD.0.05.07.00/45). Fizik muayene, toraks radyografileri ve ekokardiyografi temelinde tüm hayvanlar sağlıklıydı. Tavşanların oskültasyonunda herhangi bir üfürüm, anormal kalp veya solunum sesi, aritmi; düz torakal radyografilerde pulmoner ve vasküler paternler, torasik vertebral anormallikleri, konjestif radyografik bulguları; ekokardiyografide kalp kapaklarında, sistolik ve diastolik fonksiyonlarda anormallikler, perikardial veya pleural efüzyon yoksa sağlıklı kabul edildi. Kontrast madde verilmesi için lateral safen venden damar yolu açıldı. Göğüs röntgeni ve ekokardiyografi sedasyon veya anestezi olmadan yapıldı.

Transtorasik 2 boyutlu (2D), M-mod ve Doppler görüntülemeyi içeren tam ekokardiyografik incelemeler, sektör problu (8-12 MHz) ultrasonografi cihazı (Mindray DC-80, Shenzhen Mindray Bio-medical Electronics, Çin) kullanılarak gerçekleştirildi. Sağ parasternal kısa eksen görünümünden papillar kaslar ve mitral kapak aralığından diastol sonu sol ventrikül iç çapı (LVIDd) M-mod ölçüm değerleri ve 2D transaortik görüntüden sol atrium (LA) ve aort (Ao) ölçümleri elde edildi ve LA/Ao oranı hesaplandı.

Her hayvan sağ lateral (RL) projeksiyonda hem düz hem de non-iyonik kontrast madde (1 ml/kg Iohexol (300 mg I/ml), Opaxol®, Opakim, Türkiye) safen venden verilerek görüntülendi. Ancak VHS ve VLAS ölçümleri RL kontrast radyografilerden yapıldı. Radyografik görüntüleri elde etmek için bilgisayarlı radyografi okuyucusu (FCR Prima T2, FujiFilm®, Tokyo, Japonya) kullanıldı. Radyografik ölçümler, ekokardiyografik sonuçlara kör olan gözlemci tarafından bilgisayar yazılımı (Image Intelligence™, FujiFilm®, Tokyo, Japonya) kullanarak yapıldı.

VHS'nin uzun ekseni (L) (trakea biforkasyonundan apekse kadar) ve kısa ekseni (S) (kalbin kaudal sınırı ile CaCV'nin dorsal sınırının kesişme noktasından kranial sınıra kadar) ölçüldü. Bu iki eksene ait ölçümler 4. torakal vertebranın kranialden başlanarak vertebral sayıya (v) dönüştürülüp toplanarak VHS değeri elde edildi (Buchanan, 2000). Trakea biforkasyonundan LA ve CaVC'nin kesişimine kadar olan mesafenin ölçülmesinden sonra VHS de olduğu gibi V değere dönüştürülerek VLAS elde edildi (Malcom ve ark., 2018). Aynı gözlemci, VHS ve VLAS için gözlemci uyumunu değerlendirmek amacıyla rastgele seçilen 10 tavşanın ölçümlerini 7 gün ara ile iki kez yaptı.

İstatistiksel analiz ticari yazılım (IBM SPSS İstatistik 22.0, SPSS Inc., ABD) üzerinde gerçekleştirilmiştir. Verilerin normalliğini test etmek için Shapiro-Wilk testi kullanıldı. Normal dağılan verileri ifade etmek için ortalama \pm standart sapma (SD), dağılmayan verileri ifade etmek için medyan ve çeyrekler arası aralık (IQR) kullanıldı. Erkekler ve dişiler arasındaki farkın belirlenmesinde, VLAS için Mann-Whitney U testi ve VHS iki örneklem t-testi kullanıldı. Radyografik ölçümler (VHS ve VLAS) ve ekokardiyografik veriler (LVIDd ve LA/Ao) arasındaki korelasyonlar zayıf: 0,1 ile 0,3, orta: 0,4 ile 0,6, yüksek: 0,7 ile 0,9 veya mükemmel: 1 katsayıları ile değerlendirildi (Dancey ve Reidy, 2007). Mevcut tavşan popülasyonundaki VHS ile literatürde bildirilen VHS'nin ortalama referans değerleri arasındaki farklar, tek-örneklem testi kullanılarak değerlendirildi. VHS daha önceki yayınlarda $7,99 \pm 0,58$ v (Onuma ve ark., 2010), $7,6 \pm 0,32$ v (Moarabi ve ark., 2015), $7,6 \pm 0,39$ v (Turner Giannico ve ark., 2015) ve $7,55 \pm 0,49$ v (Ngosurachet ve ark., 2022) olarak rapor edilmiştir. Gözlemci uyumu, sınıf içi korelasyon katsayısı (ICC) tahminleri ve %95 güven aralığı (CI) kullanılarak VHS ve VLAS için ICC değerleri $>0,8$ "iyi", $0,61-0,8$ arası "anlamlı", $0,41-0,6$ arası "orta", $0,21-0,4$ arası "yetersiz" ve $0-0,2$ arası "kötü" olarak kabul edildi (Puccinelli ve ark., 2021). $P < 0,05$ istatistiksel olarak önemli kabul edildi.

Bulgular

Analizlere 31'i (%53,44) erkek ve 27'si (%46,56) dişi olmak üzere 58 NZW tavşanı dahil edildi. Ortalama yaş, vücut ağırlığı (BW) ve kalp atım oranı (HR) değerleri sırasıyla $11,5 \pm 0,363$ ay (9-17 ay), $3,17 \pm 0,38$ kg (2,6-4,1 kg) ve $231,4 \pm 26,85$ bpm (197-289 bpm) idi. Hiçbir hayvanda kontrast maddeye bağlı bir sorun ve ölüm yaşanmadı. Düz radyografilerde kranial kalp sınırı, CaVC ve aort görülmezken, kontrast radyografilerde kalbin, sol atriumun ve CaVC'nin sınırları iyi derecede belirgindi. Böylece kontrast radyografilerden VHS ve VLAS herhangi bir sorun olmadan ölçüldü. Ekokardiyografik parametreler Tablo 1'de özetlenmiştir.

VHS'nin ortalama değeri (%95 CI ve minimum-maksimum değerler) $7,94 \pm 0,31$ v (7,83-8,04 v; 7,2-8,6 v) ve VLAS'ın medyan değeri (IQR) 1,5 v (1-2 v) idi. Erkekler [VHS için $8,04 \pm 0,23$ v (7,95-8,12 v); VLAS için 1,5 v (1,1-2 v)] ve dişiler [VHS için $7,89 \pm 0,36$ v (7,71-7,99 v), VLAS için 1,4 v (1 -1,9 v) arasında fark belirlenmedi.

Tablo 1 Yeni Zelanda beyaz tavşanlarında ekokardiyografik parametrelerin ortalama±SD, % 95 CI, and minimum-maksimum değerleri.

Parametreler	Ortalama ± SD	% 95 CI	Minimum-Maksimum
LVIDd (cm)	1.34±0.12	1.31-1.37	1.06-1.71
EF (%)	69.5±5.69	68-71	56-83
FS (%)	35.9±4.35	34.9-37.2	29-43
LA (cm)	0.89±0.12	0.86-0.92	0.66-1.22
Ao (cm)	0.75±0.09	0.73-0.78	0.59-0.95
LA/Ao	1.18±0.14	1.15-1.22	1-1.46

Kısaltmalar: SD, standart sapma; CI, güven aralığı; LVIDd, diastol sonu sol ventrikül iç çap; EF, ejeksiyon fraksiyonu; FS, fraksiyonel kısalma; LA, sol atrium; Ao, aorta; LA/Ao, sol atrium-aort oran.

Bu çalışmadaki ortalama VHS değeri ($7,94 \pm 0,31$ v), Moarabi ve ark. ($7,6 \pm 0,39$ v), Turner Garcia ve ark. ($7,6 \pm 0,32$ v) ve Ngosurachet ve ark. ($7,55 \pm 0,49$ v) tarafından belirlenen referans değerlerden daha yüksekti ($P < 0,002$), ancak Onuma ve ark. ($7,99 \pm 0,58$ v) tarafından önerilen referans değerinden önemli ölçüde farklı değildi ($P = 0,637$).

BW ile radyografik kardiyak indeksler arasında anlamlı bir korelasyon bulunamadı (VHS için $r = 0,031$, $P = 0,416$; VLAS için $r = 0,106$, $P = 0,231$). VHS ile LVIDd ($r = 0,538$, $P < 0,0001$) ve VLAS ile LA/Ao (and $r = 0,629$, $P < 0,0001$) arasında orta derecede pozitif korelasyon belirlendi.

ICC değerleri kullanılarak değerlendirilen gözlemci uyum değişkenliği VHS ($ICC = 0,894$, % 95 CI = $0,827-0,935$, $P < 0,0001$) ve VLAS ($ICC = 0,961$, % 95 CI = $0,935-0,977$, $P < 0,0001$) için mükemmeldi.

Tartışma ve Sonuç

Yapılan literatür taramaya dayanarak bildiğimiz kadarıyla bu çalışma, NZW tavşanlarında ekokardiyografik parametrelere dayalı olarak VHS ve VLAS için referans aralıkları öneren ilk çalışmadır. VHS, kalp hastalığından şüphelenilen hastalarda eksantrik hipertrofi veya dilate kardiyomyopatiye bağlı kardiyomegalinin değerlendirilmesinde geçerli bir yöntemdir (Buchanan, 2000). Normal tavşanlarda lateral radyografilerde kardiyak kranial sınırı, yumuşak doku opasitesi (timus ve intratorasik yağ) nedeniyle genellikle kranial mediastenden ayırt edilemez (Turner Giannico ve ark., 2015). Perikarddaki yağ, özellikle obez tavşanlarda, kalp silüetinin daha büyük görünmesine neden olur (Orcutt Malakoff, 2021). Tavşanlarda VHS ölçümleri tüm bu faktörlerden olumsuz etkilenebilir. Bu nedenle VHS referans aralıkları sağlıklı tavşanlarda tanımlanmış olmasına rağmen (19, 22, 24, 34), köpek ve kedilerin aksine klinik uygulamada yaygın olarak kullanılmamaktadır (Orcutt ve Malakoff, 2021). Bu çalışmada atrial genişlemeyi de dâhil etmek için VHS'nin kısa eksenini CaCV'nin dorsal sınırından ölçüldü (Buchanan, 2000). Bundan dolayı daha önceki çalışmalara (Onuma ve ark., 2010; Moarabi ve ark., 2015; Turner Garcia ve ark., 2015; Ngosurachet ve ark., 2022) göre VHS ölçümleri farklı yapılmıştır. Tavşanların lateral torakal düz radyografilerinde CaVC belirgin olmamasına rağmen (Turner Garcia ve ark., 2015), kontrast radyografilerde kalbin tüm

sınırlarının ve CaVC'nin görselleştirilmesi oldukça yeterliydi, böylece VHS ve VLAS kalp silüetinden bağımsız olarak sorunsuz bir şekilde ölçülebildi. Bu çalışmamızdaki ortalama VHS değeri, Onuma ve ark. (2010) hariç, önceki diğer üç çalışmadan (Moarabi ve ark., 2015; Turner Garcia ve ark., 2015; Ngosurachet ve ark., 2022) önemli derecede yüksekti. Bu istatistiksel fark, hem kontrast toraks radyogramlarının kullanılmasından hem de kalp kısa ekseninin diğer çalışmalardan farklı ölçülmesinden kaynaklanmaktadır.

VHS köpeklerde ırka özgü bir indekstir (Puccinelli ve ar., 2021). Bulldog, Boston Terrier, Boxer, Pug ve Cavalier King Charles spaniel (Bagardi ve ark., 2021; Jepsen-Grant ve ark., 2012) gibi bazı köpek ırklarında ortalama VHS değerleri Buchanan ve Bucheler (1995) tarafından bildirilen referans aralığının üzerindedir. Kedilerde toraks yapısı tek tip olmasına rağmen Moon Cain ırkı kedilerde VHS diğer kedi ırklarına göre daha yüksektir (Oliveira ve ark., 2014). Sıçanlarda VHS değerleri üzerine ırkın etkisi olduğu bildirilmiştir (Çetinkaya ve Kaya, 2022). Ancak farklı tavşan ırklarından elde edilen VHS değerleri arasında farklılık saptanmamıştır (Wiphusunti ve ark., 2020; Ngosurachet ve ark., 2022). Tavşanlarda VHS üzerine cinsiyetin etkisi olmasa da (Onuma ve ark., 2010; Moarabi ve ark., 2015; Turner Garcia ve ark., 2015), BW etki olduğu bildirilmiştir (Onuma ve ark., 2010). Ancak bu çalışmada radyografik kardiyak indeksler BW ile korele değildi. Bunun nedeni değerlerin vücut ağırlığı 2,6 ile 4,1 kg arasında olan tavşanlardan elde edilmiş olması olabilir.

Ozawa ve ark. (2021), pet tavşanlarda sol taraf kalp büyümesinin %54,1, sağ taraf kalp büyümesinin %51,4, hem sol hem de sağ taraf kalp büyümesinin prevalansının %27 olduğunu bildirmişlerdir. Bu çalışmada en sık dejeneratif kalp kapak hastalığı (%40,5) teşhis edilmiş olup, bunu dilate kardiyomiyopati (%18,9), sınıflandırılmamış kardiyomiyopati (%10,8), restriktif kardiyomiyopati (%8,1) ve hipertrofik kardiyomiyopati (%5,4) takip etmektedir. Bu kalp patolojileri, özellikle dejeneratif kapak hastalıkları, sonuçta atrium dilatasyonuna neden olacaktır. Mitral kapak hastalığı olan köpeklerde LA dilatasyonu güçlü bir prognostik faktördür ve konjestif yetmezliğin en bildik başlangıcıdır (Malcom ve ark., 2018). Köpeklerde LA boyutlarını objektif bir şekilde değerlendirmek mümkündür. Miksomatöz mitral kapak hastalığının tanısı VLAS ile radyografik olarak konulabilir (Lamb ve ark., 2001; Malcom ve ark., 2018; Mikawa ve ark., 2020). Mitral kapak hastalığı olmayan köpeklerde bildirilen değerler VLAS için 1,79 v ile 2,1 v arasındadır (Malcom ve ark., 2018; Baisan ve Vulpe, 2022). Sağlıklı sıçanlarda VLAS için ortalama değer 1,95 v'dır (Çetinkaya ve Kaya, 2022). Bu çalışmada VLAS hem köpeklere hem de sıçanlara göre daha düşüktü. VHS'ye benzer şekilde VLAS köpeklerde ırka özgü bir indekstir (Puccinelli ve ark., 2021; Baisan ve Vulpe, 2022). Bu

indekslerin tavşanlarda cinse özgü olup olmadığını belirlemek için şu an daha fazla araştırmaya ihtiyaç vardır. Köpeklerde kardiyomegaliyi belirlemek için VHS eşik değerinin belirlenmesinde ekokardiyografik vücut ağırlığına göre normalleştirilmiş LVIDd ($>1,7$) kriter olarak kullanılmaktadır. Ekokardiyografik LA/Ao oranı ($>1,6$) genellikle LA dilatasyonunu öngörmeye VLAS eşik değerinin belirlenmesinde bir kriter olarak benimsenmektedir (Sanchez Salguero ve ark., 2018; Mikawa ve ark., 2020). Bu iki ekokardiyografik kriterin eşik değerleri tavşanlarda belirlenmemiştir. Ancak bu çalışmada LVIDd ile VHS ve VLAS ile LA/Ao arasında pozitif korelasyon belirlenmesine dayanarak VHS ve VLAS ekokardiyografik değerlendirme yapma olanağı olmayan veteriner klinisyenler ve kardiyovasküler deneysel çalışma yapan araştırmacılar için kalp büyüklüğünün ve LA boyutlarının nicel değerlendirmesine izin verebilir.

Sonuç olarak; torakal kontrast radyografisi, radyografik kardiyak indekslerin doğru ölçümü için kolay, etkili ve komplikasyonsuz bir görüntüleme tekniğidir. Bu çalışma VHS ve VLAS için referans aralığı sağlamakta ve bu indekslerin ölçümlerinin tavşanlarda tekrarlanabilir ve güvenilir olduğunu ortaya koymaktadır.

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ÖRGÜTSEL DESTEĞİN DUYGUSAL BAĞLILIĞA ETKİSİNDE İŞ TATMİNİNİN ARACILIK ROLÜ: SAĞLIK PROFESYONELLERİNDE BİR UYGULAMA

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Özet

Türkiye, OECD ülkelerine kıyasla sağlık profesyoneli sayısında oldukça geridedir. Mevcut sağlık profesyonellerine destek verilmesi ve onların sistem içerisinde kalmaları gerekmektedir. Bu çalışmanın amacı, sağlık çalışanlarında örgütsel desteğin duygusal bağlılığa etkisinde iş tatmininin aracılık rolünü incelemektir. Araştırma bir özel hastanede çalışan ve araştırmaya katılmayı kabul eden 250 sağlık profesyoneli üzerinde gerçekleştirilmiştir. Araştırmada kolayda örneklem yöntemi kullanılmış olup, verilerinin analizinde SPSS ve SPSS Macro uzantısı kullanılmıştır. Veriler eğiklik ve basıklık değerine göre normal dağılmaktadır. Ayrıca aracılık analizi yapabilmeyen şartlarını sağlamaktadır (çoklu bağıntı problemi yoktur, bağımsız değişkenlerin bağımlı değişkenler üzerindeki etkiler anlamlıdır). Bu sebeple parametrik testlerden yararlanılmıştır. Araştırma değişkenlerinin ortalama puanları; örgütsel destek için $2,75 \pm 1,05$, duygusal bağlılık $2,65 \pm 1,07$ ve iş tatmini için $2,97 \pm 0,40$ olarak tespit edilmiştir. Elde edilen bulgulara göre örgütsel destek ile iş tatmini ($p < 0,05$; $r = 0,33$) ve duygusal bağlılık ($p < 0,05$; $r = 0,62$) arasındaki ilişki anlamlı ve pozitifdir. İş tatmini ile duygusal bağlılık arasındaki ilişki de benzer şekilde istatistiksel olarak anlamlı ve pozitifdir ($p < 0,05$; $r = 0,36$). Kurulan modelinde örgütsel desteğin iş tatminine ($\beta = ,339$, $p < ,001$) ve duygusal bağlılığa ($\beta = ,567$, $p < ,001$) etkisi anlamlı ve pozitifdir. Ayrıca, iş tatmininin duygusal bağlılığa etkisi de anlamlı ve pozitifdir ($\beta = ,168$, $p < ,001$). Modeldeki doğrudan ve dolaylı etkiler değerlendirildiğinde örgütsel desteğin duygusal bağlılık üzerindeki etkisinde iş tatmininin kısmi aracılık rolü bulunmaktadır. Sağlık çalışanlarında örgütsel desteğin duygusal bağlılığa etkisinde iş tatmininin aracılık rolünün incelendiği bu çalışmada anlamlı ve önemli bulgular elde edilmiştir. Buna göre sağlık çalışanlarının duygusal bağlılık kazanmalarında örgütsel destek önemli bir role sahiptir ve iş tatmini bu etkide kısmi aracılık rolüne sahiptir.

Anahtar Kelimeler: İş tatmini, duygusal bağlılık, örgütsel destek

**MEDIATING ROLE OF JOB SATISFACTION IN THE EFFECT OF
ORGANIZATIONAL SUPPORT ON AFFECTIVE COMMITMENT: AN
APPLICATION IN HEALTHCARE WORKERS**

Abstract

Türkiye is far behind in the number of health professionals compared to OECD countries. Existing health professionals need to be supported and they need to stay within the system. The purpose of this study was to examine the mediating role of job satisfaction in the effect of organizational support on affective commitment in healthcare professionals. The research was conducted on 250 health professionals who worked in a private hospital and agreed to participate in the research. Convenience sampling method was used in the research, and SPSS and SPSS Macro extension were used to analyze the data. The data are normally distributed according to the skewness and kurtosis values. In addition, it meets the conditions for mediation analysis (there is no multicollinearity problem, the effects of the independent variables on the dependent variables are significant). For this reason, parametric tests were used. Mean scores of research variables were determined as 2.75 ± 1.05 for organizational support, 2.65 ± 1.07 for affective commitment and 2.97 ± 0.40 for job satisfaction. According to the findings, the relationship between organizational support and job satisfaction ($p < 0.05$; $r = 0.33$) and affective commitment ($p < 0.05$; $r = 0.62$) is significant and positive. The relationship between job satisfaction and affective commitment is similarly statistically significant and positive ($p < 0.05$; $r = 0.36$). In the established model, the effect of organizational support on job satisfaction ($\beta = .339$, $p < .001$) and affective commitment ($\beta = .567$, $p < .001$) is significant and positive. Additionally, the effect of job satisfaction on affective commitment is significant and positive ($\beta = .168$, $p < .001$). When the direct and indirect effects in the model are evaluated, job satisfaction has a partial mediator role in the effect of organizational support on affective commitment. Significant and important findings were obtained in this study, which examined the mediating role of job satisfaction in the effect of organizational support on affective commitment in healthcare workers. Accordingly, organizational support has an important role in healthcare workers' affective commitment, and job satisfaction has a partial mediator role in this effect.

Keywords: Job satisfaction, affective commitment, organizational support

GİRİŞ

Literatürde yer alan çalışmalar incelendiğinde örgütsel destek duygusal bağlılığın önemli bir belirleyicisi olduğu anlaşılmaktadır (Tamer ve Bozaykut Bük, 2020). Sağlık çalışanları zorlu şartlar altında çalışan ve büyük fedakarlıklar yapan bir grubu temsil etmektedir. Halihazırda sağlık insan gücü yetersizliği sorunu ile karşı karşıya kalmış olan Türkiye için çalışanların bağlılığının önemi her geçen gün artmaktadır. Bu sebeple, gerçekleştirilen çalışma ile sağlık çalışanlarının algılamış oldukları örgütsel destek düzeyleri, duygusal bağlılıkları ve iş tatminleri incelenmiş olup, örgütsel desteğin duygusal bağlılık üzerine etkisinde iş tatmininin aracılık rolü değerlendirilmiştir.

Örgütsel Destek

Bireyin sağlık, mutluluk ve verimliliği açısından belirleyici olan destek algısı, iş yaşamında olduğu gibi özel hayatımızda da önemlidir. İş ortamında desteklenmek ve yanında birilerinin olduğunu bilmek, bireyin duygusal ve profesyonel açıdan güçlenmesine katkı sağlar ancak, değerlendirmeler subjektif olduğu için, bir durum bir birey için olumsuz bir etki yaratırken, başka bir birey için olumlu olarak algılanabilir (Tamer ve Bozaykut Bük, 2020). Sosyal Mübadele Teorisi'ne göre, bir kişi diğerine olumlu davranışlarda bulunduğu anda, karşılıklılık ilkesi gereği, olumlu davranışın karşılığını alması beklenir. Bu teori, örgütlerdeki ilişkilerin karşılıklı değişim temeline dayandığını öne sürer. Değiş-tokuş, sadece maddi kaynakları değil, aynı zamanda sosyal ve duygusal kaynakları da içerebilir. Bir başka ifade ile, örgüt içindeki ilişkiler sadece para, hizmet ve bilgi gibi somut kaynaklarla sınırlı kalmaz; aynı zamanda takdir, saygı ve sevgi gibi sosyal ve duygusal unsurları da kapsar. Bu teori, örgütsel destek algısının oluşumunu ve sürdürülmesini, bireyler arasındaki karşılıklı etkileşim ve değişimlerle açıklamaya çalışır. (Durmuş ve Şahin, 2015). Bu kurama göre, örgütler çalışanlarının mutluluğu için yatırım yaptıkları ve bunun çalışanlar tarafından doğru algılanmasını sağladıkları sürece sosyal değişimi başlatıp devam ettirmektedirler (Taştan, İşçi, ve Arslan, 2014). Altaş (2021)'a göre algılanan örgütsel destek, “Örgütün çalışanlarına bağlı olduğu, onlara değer verdiği, bu da çalışanların örgütlerine ilişkin bağlılığı arttırması” olarak ifade edilmektedir. Bu nedenle, çalışanların algıladığı örgütsel destek, örgütleriyle kurdukları sosyal ve ekonomik değişim ilişkilerinin sağlamlığına, karşılıklı yükümlülük algılarına ve bu yükümlülüklerin karşılıklı olarak yerine getirilmesine dayalıdır. Ayrıca, bu algı, diğer sosyal etkileşim değişkenleriyle de ilgilidir (Altaş, 2021). Eisenberger (1986) örgütsel desteği “Örgüt değerlerinin çalışanların katkıları ve mutluluğunu dikkate alması” olarak ifade etmiştir (Tamer ve Bozaykut Bük, 2020).

Bir başka ifade ile örgütsel destek, örgüt değerlerinin çalışanların esenliğini dikkate alması ve onların mutluluklarını artırıcı nitelik taşıması durumudur (Taştan ve ark., 2014).

Duygusal Bağlılık

1990'lardan bu yana ise, örgütsel bağlılık, birçok araştırmamanın başlıca konusu haline gelmiş; bu süreçte kavramla ilgili çok sayıda tanım yapılmış ve konunun teorik gelişimine büyük önem verilmiştir (Taştan ve ark., 2014). Duygusal bağlılık “Örgütsel amaçları benimseme, onlara bağlanma ve onunla özdeşleşme ile ilgili olumlu duygulara sahip olmaktır” ve örgütsel amaçlara ve kurallara karşı duyulan saygı, yöneticilere duyulan sevgi ve saygı, duygusal yakınlık, örgütsel vizyon ve misyonun paylaşılması ile oluşan bağlılık türüdür (Tutar, 2007). Meyer ve Allen (1991, 1997) tarafından oluşturulan örgütsel bağlılık modeli, günümüzde en yaygın kabul gören ve yapılan çalışmalar açısından en güçlü desteklenen modellerden biridir. Bu model, geçerliliği ve güvenilirliği bakımından öne çıkar, bilimsel araştırmaların ışığında en sağlam temele dayanan örgütsel bağlılık modeli olarak değerlendirilebilir. (Taştan ve ark., 2014). Duygusal bağlılık Meyer ve Allen tarafından geliştirilen modelin bir alt boyutu olarak karşımıza çıkmaktadır ve “bireylerin duygusal olarak kendi tercihleri ile çalıştıkları örgütte kalma arzusu” olarak ifade edilmektedir (Taştan ve ark., 2014). Örgütsel bağlılığın en önemli boyutlarından olduğu ifade edilen duygusal bağlılık, çalışanlarının motive olmasında oldukça önemli olarak görülmektedir (Taşlıyan, Güler, ve Kahveci, 2021).

İş Tatmini

İş tatmini, çalışanların görevlerinden duydukları memnuniyet veya memnuniyetsizlik duygularının, işin özelliğiyle ve çalışanların beklenti ve istekleriyle kesiştiği noktada ortaya çıkar. (Keser ve Bilir, 2019). Literatürde en yaygın kullanılan iş tatmini tanımının Davis'in tanımıdır. Bu tanıma göre iş tatmini; “Kişilerin işlerinden duydukları memnuniyet ya da memnuniyetsizliktir” (Söyük, 2018). Landy (1989)'nin yapmış olduğu tanıma göre ise iş tatmini “Bireyin işine ait kişisel değerlendirmeleri neticesinde oluşan duygusal durumdur” (Keser ve Bilir, 2019). Bir tutum olarak iş tatminin hem bireysel ve hem de örgütsel açıdan sonuçları vardır. Çalışanın yaptığı işten tatmin olması, hem yaşam tatmini ve hem de üretkenliğini önemli derecede etkilemektedir (Özyer, Ersin, ve Serhat, 2015). İş tatmini bireylerin gerek iş yaşamı gerekse iş dışındaki yaşamı açısından önemlidir. İş tatmini yüksek olan kişi özel yaşamında da daha iyimser ve mutlu olmaktadır. İş tatminsizliği ise hem örgütsel hem de bireysel pek çok olumsuz sonuca neden olabilmektedir (Söyük, 2018). Bir örgütte koşulların bozulduğunu gösteren en önemli kanıt iş doyumunun düşük olmasıdır. İş doyumsuzluğu, daha gizli biçimlerde, ani grevler, iş yavaşlatma, düşük verimlilik, disiplin

sorunları ve diğer örgütsel sorunların ardında yer alır (Çalışkan, 2005). Sağlık kurumlarının başarısı, çalışanlarını kurumsal hedeflere motive ederek etkili bir şekilde yönlendirmelerine bağlıdır. Teknolojinin gelişmişliği, ancak insan kaynaklarının bu teknolojiyi etkili bir şekilde kullanmasıyla amacın gerçekleşmesine katkı sağlar. Sağlık hizmetlerinde, personelin performansı doğrudan sunulan hizmetin kalitesini belirleyen temel faktördür. Dolayısıyla, kurumlar çalışan memnuniyetini göz ardı etmeden, personeli istekli ve motive ederek başarılarını sürdürebilirler (Söyük, 2018).

MATERYAL VE YÖNTEM

Katılımcılar ve Prosedür

Araştırma bir özel hastanede çalışan ve araştırmaya katılmayı kabul eden 250 sağlık profesyoneli üzerinde gerçekleştirilmiştir. Araştırma için İstanbul'da yer alan özel hastaneden ilgili izin alınmıştır. Katılımcıların; ortalama yaşı $29,16 \pm 11,96$, %72'si kadın, %55'i evli, %83,6'sı lisans ve lisansüstü eğitim düzeyine sahip ve %58'i hemşirelerden oluşmaktadır. Hemşireler dışında araştırmaya katılan diğer meslek grupları arasında hekimler, ebeler, teknisyen/teknikerler, tıbbi sekreterler, memurlar ve diğer sağlık profesyonelleri bulunmaktadır. Araştırma yüz yüze anket yöntemi ile gerçekleştirilmiştir. Katılımcıların gönüllü onamları alındıktan sonra anket formları dağıtılmış ve yaklaşık 10 dakika tamamlama süresi beklendikten sonra geri toplanmıştır. Verilerin araştırma amacı ile toplandığı ifade edilmiş ve anonimliği garanti altına alınmıştır.

Araştırma kapsamında geliştirilen ve test edilen hipotezler:

H₁: Algılanan örgütsel desteğin duygusal bağlılık üzerine anlamlı bir etkisi vardır.

H₂: Algılanan örgütsel desteğin iş tatmini üzerine anlamlı bir etkisi vardır.

H₃: İş tatminin duygusal bağlılık üzerine anlamlı bir etkisi vardır.

H₄: Algılanan örgütsel desteğin duygusal bağlılık üzerindeki etkisinde iş tatmininin aracılık rolü vardır.

Veri Toplama Araçları

Araştırmada kullanılan veri toplama aracı dört bölümden oluşmaktadır. İlk bölümde sosyodemografik sorular, ikinci bölümde örgütsel destek ölçeği, üçüncü bölümde duygusal bağlılık ölçeği ve son bölümde iş tatmini ölçeği yer almaktadır.

Örgütsel destek ölçeği: Chiang ve Hsieh (2012) tarafından geliştirilmiş olup, Türkçe'ye uyarlaması Gün, Söyük, ve Özsarı (2021) tarafından gerçekleştirilmiştir. Ölçek 5 maddeden oluşmakta olup 5'li Likert tiptedir (1=kesinlikle katılmıyorum, 5=kesinlikle katılıyorum). Ölçek elde edilen ortalama puanın artması örgütsel desteğin arttığını göstermektedir.

Duygusal bağlılık ölçeği: Meyer, Allen, ve Smith (1993) tarafından geliştirilmiş olup, dil geçerliliği, açıklayıcı ve doğrulayıcı faktör analizleri yapılarak yapı geçerliliği (Gün ve ark., 2021) tarafından yapılmıştır. Ölçek 6 maddeden oluşmakta olup 5'li Likert tiptedir (1=kesinlikle katılmıyorum, 5=kesinlikle katılıyorum). Ölçek elde edilen puan arttıkça duygusal bağlılık artmaktadır.

İş tatmini ölçeği: Türkçe geçerlilik ve güvenilirliği Keser ve Bilir (2019) tarafından gerçekleştirilen iş tatmini ölçeği 5 maddeden oluşmakta olup 5'li Likert tiptedir (1=kesinlikle katılmıyorum, 5=kesinlikle katılıyorum). Ölçek elde edilen ortalama puanın artması iş tatmininin arttığını ifade etmektedir.

Verilerin Analizi

Araştırmada kolayda örneklem yöntemi kullanılmış olup, verilerinin analizinde SPSS ve SPSS Macro uzantısı kullanılmıştır. Veriler eğiklik ve basıklık değerine göre normal dağılmaktadır. Ayrıca aracılık analizi yapabilmenin şartlarını sağlamaktadır (çoklu bağıntı problemi yoktur, bağımsız değişkenlerin bağımlı değişkenler üzerindeki etkiler anlamlıdır). Bu sebeple parametrik testlerden yararlanılmıştır. SPSS aracılığı ile frekans, ortalama, standart sapma, eğiklik ve basıklık, korelasyon analizleri yapılmış olup, doğrudan ve dolaylı etkiler (Hayes, 2017) tarafından SPSS için geliştirilen Process v4.3 uzantısı ile gerçekleştirilmiştir.

BULGULAR

Araştırmada kullanılan bağımlı ve bağımsız değişkenlerin normal dağılıma uygun olup olmadığını incelediğimiz eğiklik ve basıklık değerlerine göre elde edilen indisler ± 2 aralığındadır ve George ve Mallery (2010) önerdiğine paralel olarak verilerin normal dağılıma uygun olduğuna karar verilmiştir. Normal dağılım gösteren verilerin analizinde parametrik testlerin gücünden yararlanılmış olup, aracılık analizi yapabilmenin şartları kontrol edilmiştir. Araştırmada bağımlı değişken (X) örgütsel destek, bağımsız değişken duygusal bağlılık (Y) ve aracı değişken de (M) iş tatmini olarak alınmıştır. Her bir değişkenin bir diğeri üzerinde etkisinin anlamlı olup olmadığı basit doğrusal regresyon analizi ile test edilmiş ve araştırma modeli bu testin ardından kurulmuştur. Katılımcıların örgütsel destek ölçeği ortalama puanı $2,75 \pm 1,06$, duygusal bağlılık ölçeği ortalama puanı $2,65 \pm 1,08$ ve iş tatmini ortalama puanı $2,97 \pm 0,41$ olarak tespit edilmiştir. Ayrıca ölçeklerin Cronbach's Alpha değerleri sırası ile 0,84, 0,89 ve 0,79 olarak belirlenmiştir. Değişkenler arasındaki ilişkiler Pearson Korelasyon Analizi ile incelenmiş olup, örgütsel destek ile iş tatmini ($p < 0,05$; $r = 0,33$) ve duygusal bağlılık ($p < 0,05$; $r = 0,62$) arasındaki ilişki anlamlı ve pozitifdir. İş tatmini ile duygusal bağlılık

TARTIŞMA

Sağlık çalışanlarında örgütsel desteğin duygusal bağlılığa etkisinde iş tatmininin aracılık rolünü incelemek amacıyla gerçekleştirilen bu çalışma özellikle sağlık insangücü açısından gelişmiş ülkelerin ardında kalanlar için önemli bulgular ileri sürmektedir. Sağlık kurumları profesyonel sağlık çalışanlarının buldukları emek yoğun kurumlar olmalarından, insan için kritik ve yaşamsal değer olan sağlık ile ilgilenmelerinden dolayı toplumda önemli bir yeri olan hizmet örgütleridir (Durmuş ve Şahin, 2015).

Araştırma sonucunda örgütsel destek ile duygusal bağlılık arasında anlamlı bir ilişki olduğu tespit edilmiş ve örgütsel desteğin örgütsel bağlılık üzerinde anlamlı bir etkisi olduğu sonucuna ulaşılmıştır. İlgili literatür incelendiğinde araştırma bulgularına benzer şekilde örgütsel desteğin örgütsel bağlılığı artırdığı ifade edilmektedir (Altaş, 2021). Algılanan örgütsel destek ve örgütsel bağlılık arasındaki ilişkinin incelendiği bir çalışmada, iki değişken arasında anlamlı, pozitif ve güçlü bir ilişki olduğu sonucuna ulaşılmıştır. Ayrıca örgütsel destek örgütsel bağlılık üzerinde anlamlı ve pozitif bir etkiye de sahiptir (Taştan ve ark., 2014). Duygusal bağlılık, çalışanların algıladıkları örgütsel desteğin önemli bir sonucu olduğu ifade edilmiştir. Adalet, yönetici desteği gibi özellikle sosyoduygusal bileşenlere odaklanan duygusal bağlılık, çalışanların örgütleri tarafından duygusal olarak desteklendiklerini ve katkılarının takdir edildiğini hissettiklerinde artmaktadır (Tamer ve Bozaykut Bük, 2020).

Sökmen ve Ekmekçioğlu (2016)'nın bir kamu kuruluşunda çalışan 1280 kişiye gerçekleştirmiş olduğu çalışmada bizim çalışmamız sonuçlarına paralel şekilde algılanan örgütsel desteğin duygusal bağlılığı anlamlı ve pozitif yönlü olarak etkilediği, algılanan örgütsel desteğin iş tatminini anlamlı ve pozitif yönlü etkilediği ve iş tatmininin duygusal bağlılığı anlamlı ve pozitif olarak etkilediği sonucuna da ulaşılmıştır. Çalışmada ayrıca, algılanan örgütsel destek ile duygusal bağlılık ilişkisinde iş tatminin kısmi aracılık rolü sergilediği tespit edilmiştir. Elde edilen sonuçlar her iki çalışma için de oldukça benzerlik göstermektedir.

SONUÇ VE ÖNERİLER

Araştırma sonucunda örgütsel destek için $2,75 \pm 1,05$, duygusal bağlılık $2,65 \pm 1,07$ ve iş tatmini için ortalama puanlar $2,97 \pm 0,40$ olarak tespit edilmiştir. Elde edilen bulgulara göre örgütsel destek ile iş tatmini ($p < 0,05$; $r = 0,33$) ve duygusal bağlılık ($p < 0,05$; $r = 0,62$) arasındaki ilişki anlamlı ve pozitifdir. İş tatmini ile duygusal bağlılık arasındaki ilişki de benzer şekilde istatistiksel olarak anlamlı ve pozitifdir ($p < 0,05$; $r = 0,36$). Kurulan modelinde örgütsel desteğin iş tatminine ($\beta = ,339$, $p < ,001$) ve duygusal bağlılığa ($\beta = ,567$, $p < ,001$) etkisi anlamlı ve

pozitifdir. Ayrıca, iş tatmininin duygusal bağlılığa etkisi de anlamlı ve pozitiftir ($\beta = ,168, p < .001$). Modeldeki doğrudan ve dolaylı etkiler değerlendirildiğinde örgütsel desteğin duygusal bağlılık üzerindeki etkisinde iş tatmininin kısmi aracılık rolü bulunmaktadır. Sağlık çalışanlarında örgütsel desteğin duygusal bağlılığa etkisinde iş tatmininin aracılık rolünün incelendiği bu çalışmada anlamlı ve önemli bulgular elde edilmiştir. Buna göre sağlık çalışanlarının duygusal bağlılık kazanmalarında örgütsel destek önemli bir role sahiptir ve iş tatmini bu etkide kısmi aracılık rolüne sahiptir. Elde edilen bulgular eşliğinde araştırma kapsamında test edilen hipotezlerin hepsi kabul edilmiştir.

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FARKLI ORGANİK TOPRAK DÜZENLEYİCİLER VE YEŞİL GÜBRE BİTKİ KOMBİNASYONLARININ TOPRAK SAĞLIĞI İLE ZEYTİN VERİMİ ÜZERİNE ETKİSİ

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Özet

Bu çalışma ile kentsel stabilize arıtma çamurunun toprak sağlığı ve bitki verimi üzerine etkisi temelinde, diğer bazı ticari organik gübreler ile rekabet yeteneği yanında mineral gübrelemeye alternatif olabilme düzeyi de ortaya koyulmaya çalışılmıştır. Bu amaç doğrultusunda İzmir ili Menderes ilçesindeki Typic Xerorthent zeytin bahçesinde (*Olea europea* var. Ayvalık) 2018-2020 yılları arasında bir deneme yürütülmüştür. Stabilize arıtma çamuru (SAÇ), 50 t ha⁻¹ düzeyinde, ticari ahır ve tavuk gübre kompostları ise üretici firmalarının tavsiye edilen dozları dikkate alınarak 4 t ha⁻¹ olarak uygulanmıştır. Bezelye (B) ve fiğ (F) yeşil gübre bitkileri ise 160 kg ha⁻¹ olarak ekilmiştir. Dört dönemde alınan toprak örneklerinde mikrobiyal parametreler ve iki dönemde alınan toprak örneklerinde ise bazı kimyasal toprak özellikleri analiz edilmiştir. Organik materyal uygulamalarıyla incelenen tüm mikrobiyal parametreler %1-116 arasında artış göstermiştir (P<0.05). Amonifikasyon ve nitrifikasyon sonucu topraklarda oluşan NH₄-N'u ortalama %46 ve NO₃-N'u ortalama %212 düzeylerinde artmıştır. Yeşil gübrelemesiz uygulamalara göre fiğ yeşil gübrelemesi ortalama %10.4 düzeyinde bir artış sağlarken, bu oran bezelye gübrelemesi için %8.6 olarak gerçekleşmiştir. SAÇ uygulaması, incelenen mikrobiyal parametreleri diğer organik gübre uygulamalarından çok daha fazla ve önemli düzeyde arttırmıştır. SAÇ+B uygulamasının SAÇ+F uygulamasına göre daha fazla sayıda mikrobiyal parametre üzerinde etkili olduğu belirtilebilir. Toprakların kimyasal özelliklerinden pH, EC, P ve Fe en fazla ve önemli düzeyde etkilenen parametreler olmuşlardır. Zeytin verimini her iki yılda en fazla arttıran organik madde kaynağı stabilize arıtma çamuru olmuştur. Yapılan PCA analizi sonuçlarına göre varyansı % 46.6 ile en çok açıklayarak ilk faktörde ağırlıklarını gösteren değişkenler toprakların C, N ve P döngüleriyle ilgili biyokimyasal parametreleri olmuştur. İki yıllık çalışma sonuçları dikkate alındığında Akdeniz iklim koşulları altında toprak sağlığını arttırmak ve sürdürülebilir hale getirmek için sofralık/yemlik bezelye bitkili yeşil gübreleme ile birlikte kombinasyon halinde stabilize arıtma çamuru uygulaması (60 kg SAÇ ağaç⁻¹ + 200 g bezelye ağaç⁻¹) önerilmektedir.

Anahtar kelimeler: Stabilize arıtma çamuru, zeytin, hidrolitik toprak enzimleri, azot mineralizasyonu, toprak solunumu, temel bileşen analizi

THE EFFECT OF DIFFERENT ORGANIC SOIL AMENDMENTS AND GREEN MANURE CROPS COMBINATIONS ON SOIL HEALTH AND OLIVE YIELD

Abstract

The aim of the study was to evaluate the potential of being an alternative to mineral fertilization, as well as the ability to compete with some other commercial organic fertilizers based on the effect of municipal stabilized sewage sludge (SSS) on soil health and plant yield. For this purpose, the experiment was conducted between the years of 2018 and 2020 in the Typic Xerorthent olive soil (*Olea europea* var. Ayvalık) in Menderes district of İzmir-Turkey. SSS was applied at the level of 50 t ha⁻¹ while the commercial farmyard and poultry manure composts were applied, taking into account the recommended doses of the companies. Pea (P) and vetch (V) green manure plants were sown at a rate of 160 kg ha⁻¹. Microbial parameters (soil respiration, potential nitrogen mineralization, NH₄-N and NO₃-N, and enzyme activities of dehydrogenase, alkaline phosphatase and β-glucosidase) in soil samples taken in four periods and some chemical soil properties in soil samples taken in two periods were analyzed. All microbial parameters increased between 1-116% (P<0.05) in response to the organic treatments. The concentrations of NH₄-N and NO₃-N increased by an average of 46% and 212%, respectively. Comparing to the treatments without green manuring, vetch manuring provided an average of 10.4% increase, while this rate was 8.6% for pea. SSS enhanced the microbial parameters more and significant than the others. SSS+P was effective on most of the microbial parameters compared to SSS+V. In general, pH, EC, P, and Fe were mostly and significantly affected parameters by the treatments. SSS was the source of organic matter that increased olive yield the most in both years. According to the PCA analysis, the variables that were the biochemical parameters related to the C, N, and P cycles of the soils showed their weights in the first factor and explained 46.6% of the total variances. Finally, it can be recommended to use SSS (60 kg tree⁻¹ + 200 g pea tree⁻¹) in combination with pea to increase soil health in olive soils under Mediterranean climate conditions.

Keywords: stabilized sewage sludge, olive, hydrolytic soil enzymes, nitrogen mineralization, soil respiration, principal component analysis

1. GİRİŞ

Tarımda sürdürülebilir verimliliğin sağlanmasının en önemli bileşeni toprak organik maddesinin devamının sağlanabilmesidir. Bu nedenle, organik madde miktarı düşük olan tarım topraklarımıza kullanılacak organik atıkların döndürülmesi hayati öneme sahiptir. Tarım arazileri için arıtma çamuru uygulamalarının birçok olumlu yönleri vardır ve küresel açıdan bakıldığında özellikle fosfor gibi besin kaynaklarının azaldığı topraklarımızın verimliliğini artırmak için besin elementlerinin geri dönüşümünü sağlamaktadır (Van Vuuren vd., 2010). Atıksu arıtma seviyesi ve tesisleri gelişmekte olan ve de gelişmiş ülkelerde artmaya devam ettikçe, çamur üretiminin de artmaya devam edeceği tahmin edilebilir. Tarım arazilerine ya doğrudan ya da kompostlama sonra arıtma çamuru uygulaması; 27 AB üyesi devletlerin yarısından fazlasında ürettikleri çamurun % 50'den fazlasını tarım topraklarına döndürmeleri ile artık kullanılan ve kabul gören bir uygulama yöntemi olduğunu göstermiştir (European Commission, 2010; Kelessidis ve Stasinakis, 2012). Arıtma çamurları yüksek organik madde ve bitki besin elementi yükü nedeniyle özellikle Akdeniz ikliminin hakim olduğu tarımsal alanlarda kullanılması gelecek vaat eden bir uygulama olması yanında, toprak ya da bitki üzerindeki potansiyel tehlikeli etkileri önlemek için kullanımlarından önce mutlaka stabilize edilmelidir (Kayıkcıoğlu ve Delibacak, 2018; Kayıkcıoğlu vd., 2019). Bu amaç için farklı stabilizasyon yöntemleri bulunmakta, fakat kompostlaştırma gibi bazıları ise çok fizibil ve kolay uygulamalar olmamaktadır. Buna karşılık, termal kurutma gibi son teknolojilerin uygulanması, daha kısa sürede daha özel kullanım koşulları ile bir son ürün elde edilmesine izin verir. Bu modern yöntem, son yıllarda atık su arıtma tesislerinde artan sayıda uygulanmaktadır. Bununla birlikte, termal kurutulmuş arıtma çamurunun toprak biyotası ve bitki verimi üzerine etkileri yaygın olarak bugüne kadar çalışılmamıştır. Bu amaçla yapılan bir çalışmada, kompostlaştırılarak ve termal olarak kurutulmuş stabilize edilen arıtma çamurunun arpa verimi ile toprakların biyolojik kimyasal ve biyokimyasal özellikleri üzerine kümülatif ve bakiye etkilerini araştırmak ve karşılaştırmak amacıyla; farklı dönemlerde (tek veya yıllık uygulamalar) ve iki dozda (20 ve 80 t ha⁻¹) olmak üzere üç yıllık bir deneme gerçekleştirilmiştir. Kümülatif etkilerinin araştırıldığı denemede her iki atık çamurunun yüksek dozu, toprağın toplam organik karbon içeriğinde bir artış meydana getirmiş fakat aynı zamanda ürün veriminde, toprak enzim aktiviteleri ve mikrobiyal biyokütle karbonu içeriğinde belirgin bir azalma oluşturmuştur. Buna karşılık, düşük dozlarda her iki tip arıtma çamurunun kümülatif uygulamaları, özellikle kompostlaştırılmış çamur, genel olarak daha iyi bir arpa verimi sağlamış, bunun yanında istatistiki olarak önemli düzeyde daha yüksek bir mikrobiyal biyokütle

karbonu içeriğini meydana getirmiştir. Arpa verimi için en iyi sonuçlar kompostlaştırılmış arıtma çamurunun yılda bir kez uygulandığı topraklarda elde edilmiştir. Araştırmacılar, termal kurutulmuş arıtma çamuruna oranla çok daha olgun ve stabil bir organik madde sunan kompostlaştırılmış arıtma çamurunun toprağa uygulanması ile elde edilen yararların daha fazla olacağını ve uygulamanın aşırı dozda yapılmasının (80 t ha^{-1}), analiz edilen toprak özellikleri üzerine zararlı etkisinin olduğunu vurgulamaktadırlar (Fernández vd., 2009). Arıtma çamurunun ışınla ve kompostlaştırma ile stabilizasyon yöntemlerinin karşılaştırıldığı bir diğer araştırmada, 80 t ha^{-1} dozunda uygulanan arıtma çamuruyla bir inkübasyon denemesi gerçekleştirilmiştir. Araştırmacılar, ışınla stabilize edilen arıtma çamuru uygulamalarının daha yüksek oranda biyodegradasyona uğradığı ve C-mineralizasyon değeri verdiğini, buna karışık eğer kurak bölge topraklarında toplam C içeriğinin artırılması isteniyorsa kompostlaştırılma yoluyla stabilize edilen arıtma çamurunun kullanılması gerektiğini belirtmişlerdir (Fernández vd., 2007). Bir başka stabilizasyon yöntemi olan ışınla sterilizasyon yöntemidir. Bu yöntem ile (^{60}Co -10 kGy) stabilize edilmiş ve edilmemiş arıtma çamurlarının kullanıldığı bir inkübasyon çalışmasında; 0.023 g g^{-1} toprak dozunda yapılan uygulamalar arasında analiz edilen toprak solunumu (CO_2 -üretimi) ve azot mineralizasyonu yönüyle istatistiksel olarak bir fark bulunamamıştır (Barajas-Aceves vd., 2002).

Arıtma çamuru kompostu (AÇK) ve diğer yöntemlerle stabilize edilmiş arıtma çamuru sahip olduğu ağır metal yüküyle tarımsal veya diğer topraklara uygulanmasıyla; topraklardaki ağır metal içeriği ile bunların bitki tarafından alınma miktarı artış göstermektedir. Topraktaki bu alınabilirlikleri üzerine toprak matriksi ile organik bağlı bulunan metal arasındaki kimyasal ilişkinin yapısı, toprakların pH düzeyleri, topraktaki ve arıtma çamuru içindeki elementlerin konsantrasyonu ile bitkilerin element alımındaki seçiciliklerini düzenlemedeki yetenekleri etkili olur. AÇK uygulamaları bitirildikten sonra topraklardaki organik maddenin ayrıştığı gibi AÇK'nun da ayrışarak artan düzeylerde alınabilir formda ortama metalleri bıraktığı üzerine herhangi bir bulgu yoktur. Buna karşılık, kompostlaştırılmış biyokatıların (AÇK) diğer stabilize edilmiş arıtma çamurları ile kıyaslandığında metallerin biyoyararlılıklarının ve bitki tarafından alınımının azaldığını gösteren güzel araştırma sonuçları bulunmaktadır. Dolayısıyla diğer atık biyostabilizasyon teknikleri ile karşılaştırıldığında, kompostlaştırma sürecinin uygulama yapılmış topraklardaki metallerin alınabilirlikleri düşürdüğü sonucuna varılabilir (Smith, 2009).

Farklı yöntemler ile stabilize edilmiş (anaerobik, kompostlaştırma, termal kurutma) arıtma çamuru uygulamalarının toprakların mikrobiyotası ile mezofaunası üzerine etkilerinin ortaya

koyulduğu çalışma İspanya’da yürütülmüştür. Deneme alanı olarak yanmış Akdeniz ormanı arazisinin kullanıldığı çalışmada, artıma çamurları 6 ton ha⁻¹ organik madde olacak şekilde uygulama yapılmıştır. Beklenildiği şekilde her üç tip stabilize artıma çamuru uygulaması ile toprak organik maddesi ve toplam azot konsantrasyonu artış göstermesine rağmen, termal olarak stabilize edilen arıtma çamuru uygulaması, toprak bozunumunun bir göstergesi olarak kabul edilen toprak mikrobiyal metabolik sabitinde geçici bir yükselmeye sebep olmuştur. Arıtma çamuru uygulamalarından bir yıl sonra, toprak mikrobiyal aktivite üzerindeki etkisi ortadan kalkmıştır. Eklem bacaklıların yoğunluğu ve biyolojik çeşitliliği açısından yapılan incelemede arıtma çamuru uygulamalarının toprakların biyolojik kalitesini arttırmadığı, en zarar verici olanının ise taze çürütülmüş çamur olduğu ortaya koyulmuştur. Arıtma çamuru uygulamalarından 3 yıl sonra bile omurgasız toprak canlılarının üzerindeki etkisinin hala belirgin olması; bu canlıların toprak bozunumuna mikrobiyal çeşitlilikten daha hassas olduklarını göstermektedir (Andrés vd., 2011).

Mikroorganizmalar aracılığıyla toprakta gerçekleşen önemli biyokimyasal olayların başında sembiyotik diazot fiksasyonu gelmektedir. Arıtma çamuru uygulamalarının özellikle içerdiği ağır metal içeriğinin sembiyotik azot fiksasyonu ve bunu gerçekleştiren sembiyotik azot fikse ediciler üzerine olan etkileri konusunda da bazı araştırmalar bulunmaktadır (McGrath vd., 1988; Giller vd., 1989). İngiltere’nin doğusundaki Woburn şehri topraklarında gerçekleştirilen denemelerde; çamur uygulanmış topraklardaki yüksek Cd içeriğinin azot fikse edici toprak mikroorganizmaları üzerinde olumsuz etkilerin ortaya çıkmasındaki önemli bir etken olduğu saptanmıştır (McGrath, 1984; MAFF/DoE, 1993; Gendebien vd., 1999). Bunun karşılık Braunschweig, Almanya’da gerçekleştirilen denemelerde ise aynı etkiyi Zn elementinin yaptığı ortaya koyulmuştur (Chaudri et al.,1993). Uzun dönemde yapılan diğer çalışmalarda ise topraklardaki metal kontaminasyonu ile Rhizobium bakterilerine olan toksisitesi arasında bir ilişki saptanamamıştır (Smith, 1997). Yapılan bu çalışmada, toprak pH’sı ve yetiştirilen bitki gibi diğer faktörlerin topraklardaki serbest yaşamlı bakteriler üzerine topraktaki ağır metal konsantrasyonlarına oranla daha etkili olduğu belirtilmektedir. Çamur uygulanmış topraklardaki mikrobiyal biyokütle içeriği üzerine yapılan araştırmalar; topraktaki en üst kritik toksik Zn konsantrasyonunun 580 mg kg⁻¹ kuru toprak olduğunu ortaya koymaktadır (Smith, 1998). Bunun yanında, 5.4 – 7.0 pH aralığına sahip olan kumlu topraklarda yapılan tarla denemelerinde; 450 mg kg⁻¹ kuru toprak düzeyindeki çinkonun; topraktaki mikrobiyal biyokütle üzerine herhangi bir etkisinin olmadığı saptanmıştır (Smith vd., 1999).

Speir vd. (2004), maksimum doz olarak 200 t ha⁻¹ yıl⁻¹ (kuru çamur) düzeyinde kompostlaştırılmış arıtma çamurunu; iki pH düzeyine sahip (5.0–5.5 and 6.0–6.5) kumlu topraklara uygulamışlar ve son uygulamadan sonra toprakların bazı biyolojik özelliklerini analiz etmişlerdir. Topraklarda bulunan maksimum metal konsantrasyonu 184 mg Zn kg⁻¹, 101 mg Cu kg⁻¹; 19mg Ni kg⁻¹ and 0.63 mg Cd kg⁻¹ kuru toprak olarak saptanmıştır. Uygulama yapılmamış kontrol toprağının ağır metal içeriği ise 45 mg Zn kg⁻¹, 14.5 mg Cu kg⁻¹, 12 mg Ni kg⁻¹, 0.18 mg Cd kg⁻¹ kuru toprak olarak bulunmuştur. Kontrol parselleri ile karşılaştırıldığında arıtma çamuru kompostu uygulanmış parsellerdeki toprak solunumu, mikrobiyal biyokütle karbonu ve anaerobik mineralize olan azot içeriği istatistiksel olarak daha yüksek analiz edilmiştir. İstatistiksel olarak önemli olmamasına rağmen, toprak enzimlerinden sülfataz ve fosfataz enzimlerinin aktivitesi de arıtma çamuru uygulanmış topraklarda artış göstermiştir. Araştırmacılar, arıtma çamuru uygulamalarının N-fikse eden bakteriler, Rhizobium bakterileri, toprakta serbest yaşamlı organizmalar üzerine bir etkisinin olmadığını ortaya koymuşlardır. Toprağı organik madde içeriği bakımından zenginleştirerek fiziksel, kimyasal ve biyolojik özelliklerini iyileştirme, erozyonu engelleme ve toprak nemini korumanın yollarından biri de “yeşil gübreleme”dir. Yeşil gübreleme, toprak erozyonunu ve bitki besin elementlerinin (K, Ca, Mg, NO₃) topraktan yıkanmasını engeller (Soyergin, 2006), toprağın fiziksel özelliklerini iyileştirir (Watson vd., 2002), organik madde miktarını (Sullivan, 2003; Duyar, 2007) ve alınabilir besin madde miktarını artırır (Sullivan, 2003; Dinnes vd., 2002). Ayrıca, yabancı ot kontrolüne yardımcı olur (Sullivan, 2003), toprak mikroorganizmalarına besin kaynağı sağlanması nedeniyle toprakta mikroorganizmaların nicelik ve işlevleri üzerine de olumlu etki yapar (Açıkgöz, 2001; Urzua vd., 2001). Yeşil gübreleme ile özellikle nematod ve köklerdeki fungal patojenler baskılanır ve toprak fumigasyonunda kullanılan toksik kimyasalların miktarı azalır. Yeşil gübrelemede kullanılan bitkiler baklagiller ve baklagil olmayanlar olmak üzere iki grupta incelenmektedir (Açıkgöz, 2001; Soyergin, 2006). Baklagil (*Leguminaceae*) familyasındaki bitkiler, *Rhizobium* sp. bakterileri ile oluşturdukları simbiyotik yaşam sonucunda önemli miktarda atmosfer azotunu doğal olarak toprağa bağlamaktadır (Urzua vd., 2001; Thorup-Kristensen vd., 2003; İnal vd., 2005; Stagnari ve Pisante, 2010; Campiglia vd., 2010; Askegaard vd., 2011). Diğer taraftan, önemli miktarda biyokütle oluşturan buğdaygil familyası (*Graminaceae*) türleri ile bazı *Brassica* türleri de yeşil gübre olarak kullanılmaktadır. *Brassica* türleri yeşil gübre olarak kullanılacaksa bu türlerin toprağa N katkısının fazla olmaması nedeniyle yetiştirme döneminde veya sürümden sonra iyi bir N gübrelemesi yapılmalıdır (Açıkgöz, 2001; Campiglia vd., 2010; Nolan vd., 2011).

Çalışma kapsamında stabilize arıtma çamurunun toprak sağlığı ve bitki verimi üzerine etkisi temelinde, diğer bazı ticari organik gübreler ile rekabet yeteneği yanında mineral gübrelemeye alternatif olabilme düzeyi de ortaya koyulmaya çalışılmıştır. Ülkemizde kısıtlı olarak arıtma çamurları ile ilgili yapılmış olan araştırmalar bulunsa da yapılan bu çalışmalarda arıtma çamurlarının tarımda kullanımını düzenleyen yönetmelik çerçevesinde gerçekleştirilmemiş olup, daha çok toprakların fiziksel ve kimyasal özellikleri üzerine yoğunlaşmış, arıtma çamurlarının esas olarak etkinliğini ortaya çıkaran toprağın biyolojik özellikleri ihmal edilmiştir. Bu çalışma ile arıtma çamurlarının, toprakların biyolojik özellikleri üzerine etkinliği üzerine odaklanılmış olduğundan, bu alandaki düşük düzeyde bulunan bilimsel bilgi düzeyi de arttırılmıştır. Dahası, arıtma çamuru ile yapılan önceki araştırmalarda, herhangi bir yeşil gübre bitkisi ile kombine uygulamalarına rastlanılmamış olmamasının da çalışmanın önemini ve özgün değerini arttırdığı düşünülmektedir.

2. MATERYAL VE YÖNTEM

2.1 Materyal

2.1.1 Deneme Kullanılan Materyaller

Çalışmada kullanılan organik materyallerden stabilize arıtma çamuru (SAÇ), İzmir Büyükşehir Belediyesi Çiğli Atık Su Arıtma Tesisinden çıkan, anaerobik koşullarda stabilize edilmiş ve %90 kuruluğa getirilmiş granül haldeki organik materyaldir. Arıtma çamuru uygulaması için İzmir Büyükşehir Belediyesi Çiğli Atıksu Arıtma Tesisinden çıkan termal stabilize edilmiş ve maksimum %10 nem düzeyinde olan arıtma çamuru kullanılmıştır. Arıtma çamurunun tarım topraklarına uygulanmasında, 03.08.2010 tarih ve 27661 sayılı Resmi Gazete’de yayımlanan “Evsel ve Kentsel Arıtma Çamurlarının Toprakta Kullanılmasına Dair Yönetmelik” hükümleri dikkate alınmıştır. Tavuk gübresi kompostu (TGK) olarak, Ege Bölgesi’nde faaliyet gösteren büyük çaplı bir yumurta tavukçuluğu işletmesinin yaklaşık 8 hafta süren aerobik kompostlaştırma sonucu üretilen ticari ve ruhsatlı pelet gübre ürünü kullanılmıştır. Ahır gübresi kompostu (AGK) ise yine bölgemizde büyük çaplı bir yem ve besicilik alanında faaliyet gösteren bir işletmenin ticari ve ruhsatlı bir ürünü olan fermente edilmiş büyükbaş hayvan gübresi kullanılmıştır. Tavuk ve ahır gübresi kompost ticari ürünleri, 29.03.2014 tarih ve 28956 sayılı Resmi Gazete’de yayımlanan “Tarımda Kullanılan Organik, Organomineral Gübreler ve Toprak Düzenleyiciler ile Mikrobiyal, Enzim İçerikli ve Organik Kaynaklı Diğer Ürünlerin Üretimi, İthalatı, İhracatı ve Piyasaya Arzına Dair Yönetmelik”e uygun olarak lisans almış ürünlerdir. Projede kullanılan organik materyallerin bazı özellikleri Çizelge 1’de verilmiştir.

Çizelge 1. Organik materyallerin bazı fizikokimyasal özellikleri

Parametre	SAÇ	TGK	AGK
Organik Madde (%)	51.2	55	50
Toplam N (%)	2.99	3	2
Toplam P ₂ O ₅ (%)	0.52	3	2
Suda Çözünür K ₂ O (%)	0.41	1.5	2
EC (dS m ⁻¹)	1.95	6.9	9.5
pH	7.18	5.2-7.2	6.8-8.8
Maksimum nem (%)	10	20	20
C/N	9.93	10.63	14.50

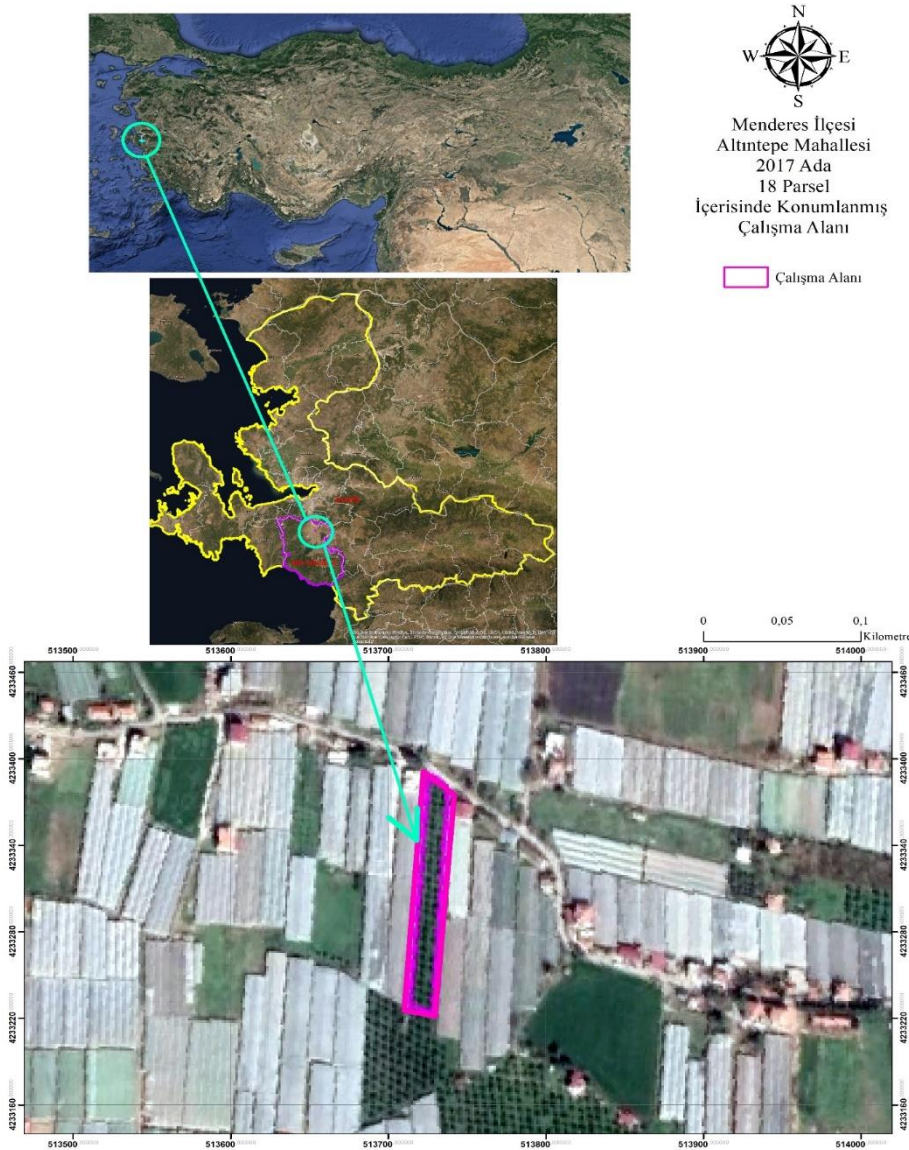
Denemede Ege Bölgesi koşullarına uygun yerli baklagil yem bitkisi çeşidi olarak Ege Tarımsal Araştırma Enstitüsü Müdürlüğü tarafından 21.04.1982 tarihinde tescil edilen ve 31.12.2013 tarihinde ise tescil süresi uzatılan Kubilay-82 çeşidi erkenci özellikle adi fiğ (*Vicia sativa* var. Kubilay 82) kullanılmıştır. Bezelye çeşidi olarak ise Seminis firmasına ait yemlik ve sofralık olarak değerlendirilebilen bezelye (*Pisum sativum* var. Utrillo) baklagil bitkileri seçilmiştir. Biyolojik azot fiksasyonu yapabilme kapasitesine sahip olan baklagil bitkilerinin tohumları bir bayiden tedarik edilmiştir. Denemede pozitif kontrol olarak kullanılacak kimyasal gübre uygulaması (NPK) için 15-15-15 kompoze (%15 NH₄-N, %15 P₂O₅, %15 K₂O), amonyum sülfat (%21 NH₄-N) ve DAP (%18 NH₄-N + %46 P₂O₅) gübreleri uygulanmıştır.

2.1.2 Deneme Alanı

Bahçe denemesi, tipik Akdeniz ikliminin görüldüğü, çok yıllık bitkilerinin % 60'ını zeytin ağaçlarının oluşturduğu, İzmir ili Menderes ilçesi Altın-tepe mahallesindeki 38°14'49.19"N kuzey enlemi, 27°9'25.01"E doğu boylamı koordinatlarında (rakım: 97 m) bulunan bir Typic Xerorthent toprağa ve "İyi Tarım Uygulamaları" (İTU) sertifikasına sahip bir üreticinin zeytin bahçesinde (*Olea europea* var. Ayvalık) iki yıl çakılı deneme şeklinde gerçekleştirilmiştir.

Menderes, İzmir'in güneyinde yer alır. İl merkezine uzaklığı 20 km, yüzölçümü 775 km² dir. Kuzeyinde Gaziemir ve Konak; doğusunda Torbalı; batısında Seferihisar; güneyinde Selçuk ve Ege Denizi ile çevrelidir. Rakımı 115 m'dir. Akarsu yönünden fakir ilçenin; Karakuyu, Görece, Kısık, Tahtalı ve Develi Çayları birleşerek Bulgurca Çayına kavuşmaktadır. Daha önceleri Ege denizine dökülen bu çay, çevrilerek "Tahtalı Barajı"na akıtılmaktadır. Ayrıca, Balaban ve Sandı Göletleri ilçede tarım alanlarının sulanmasında kullanılmaktadır. Zeytin yetiştiriciliği yapılan alan çok yıllık yetiştiricilik yapılan alanın %60'ına, toplam alanın ise %23.4'üne karşılık gelmektedir. İlçede tipik Akdeniz iklimi hâkimdir. Yazları sıcak ve kurak, kışları ılık ve yağışlı

geçmektedir. Yazın sıcaklık ortalaması 27.5°C civarında, kışın ise 9.6°C civarına düşmektedir. Deneme alanının lokasyonu Şekil 1’de gösterilmektedir. Deneme öncesinde, hem uygulama konuları arasında yer alan mineral gübre uygulamasındaki kimyasal gübre dozlarını belirleyebilmek, hem de genel arazi özelliklerini ortaya koyabilmek amacıyla çok yıllık zeytin (0-30 derinlikten) denemesinin kurulacağı alandan deneme başlamadan önce toprak örnekleri alınmıştır. Analiz edilen bu özelliklere ait değerler Çizelge 2’de verilmiştir.



Şekil 1. Deneme alanının Google Earth görüntüsü

Çizelge 2. Deneme toprağının bazı fiziksel ve kimyasal özellikleri

pH _{H2O} ^a	7.77	Al.P _{Olsen} ^e	7.12
EC ^b	0.86	Eks.N _{aNH4OAc} ^c	47
Kireç ^c	4.60	Al.K _{NH4OAc} ^c	325
Bünye	Kumlu tın	Al.Ca _{NH4OAc} ^e	3650
Kum ^d	59.98	Al.Mg _{NH4OAc} ^e	193
Mil ^d	26.00	Al.Fe _{DTPA} ^e	8.10
Kil ^d	14.02	Al.Cu _{DTPA} ^e	1.24
OM ^d	1.12	Al.Zn _{DTPA} ^e	0.83
Top.N _{Kjeldahl} ^d	0.058	Al.Mn _{DTPA} ^e	12.10

* Tüm değerler 4 tekerrürün ortalaması olup, etüv kuru ağırlık üzerinden hesaplanmıştır. Parantez içerisindeki rakamlar, ortalamanın standart sapmasını vermektedir. Kısaltmalar; EC: elektiriksel iletkenlik; OM: organik madde; Top.: Toplam; Al.: alınabilir; Eks.: ekstrakte edilebilir. ^a: su ile doymuş çamurda; ^b: su ile doymuş çamurda dS m⁻¹; ^c: toplam karbonatlar - %; ^d: %; ^e: mg kg⁻¹

2.2 Yöntem

2.2.1 Bahçe Denemesinin Kurulması ve Yürütülmesi

Bahçe denemesinde Çizelge 3’de gösterildiği gibi üç farklı organik materyal, üç farklı yeşil gübreleme ile kontrol ve mineral gübre uygulaması olmak üzere toplamda 11 uygulama konusu bulunmaktadır. Ahır gübresi kompostu ile tavuk gübresi kompostunun uygulama oranlarının hesaplanmasında ticari ürünlerin üreticileri tarafından zeytin ağacı için önerilen dozları dikkate alınmıştır. Mineral gübre uygulaması için ise İzmir İl Tarım Müdürlüğü tarafından bölge üreticilerine zeytin plantasyonları için önerilen doz göz önüne alınarak hesaplama yapılmıştır. Arıtma çamurunun uygulama dozu hesaplanmasında ise aynı materyali kullanan çalışmalar dikkate alınmıştır. Kayıkcıoğlu ve Delibacak (2018) tek yıllık mısır yetiştiriciliği için verimi desteklemek açısından 20 t ha⁻¹ arıtma çamuru dozunu önerirken, toprak düzenleyicisi olarak düşünülen kullanımlarda ise toprakların mikrobiyolojik aktivitesini en fazla arttıran 30 t ha⁻¹ dozunu tavsiye etmişlerdir. Okur vd. (2005) ise kentsel arıtma çamuru uygulamalarının 60 ton ha⁻¹ dozunun üzerine çıkılmamasını tavsiye etmektedirler. Bu bağlamda önerilen bu projede stabilize arıtma çamurunun dozu, gerek ekosistem sağlığı korunarak sürdürülebilir atık yönetimine destek olabilmek, gerekse de test bitkisi olarak kullanılan çok yıllık bitkinin beslenme ihtiyacı göz önüne alınarak belirlenmiş olup, denemede 50 t ha⁻¹ arıtma çamuru dozunun etkinliğinin saptanması amaçlanmıştır. Doz hesaplamalarında bir zeytin ağacının taç izdüşüm alanı 3.5 m x 3.5 m = 12.25 m² olarak hesaplamaya dâhil edilmiştir.

Çizelge 3. Bahçe denemesi uygulama konuları ve dozları

Sıra No	Kısaltma	Uygulama konusu ve dozu
1	SAÇ	Stabilize arıtma çamuru (60 kg ağaç^{-1})
2	TGK	Tavuk gübresi kompostu (5 kg ağaç^{-1})
3	AGK	Ahır gübresi kompostu (5 kg ağaç^{-1})
4	SAÇ+F	Stabilize arıtma çamuru (60 kg ağaç^{-1}) + Fiğ (200 g ağaç^{-1})
5	TGK+F	Tavuk gübresi kompostu (5 kg ağaç^{-1}) + Fiğ (200 g ağaç^{-1})
6	AGK+F	Ahır gübresi kompostu (5 kg ağaç^{-1}) + Fiğ (200 g ağaç^{-1})
7	SAÇ+B	Stabilize arıtma çamuru (60 kg ağaç^{-1}) + Bezelye (200 g ağaç^{-1})
8	TGK+B	Tavuk gübresi kompostu (5 kg ağaç^{-1}) + Bezelye (200 g ağaç^{-1})
9	AGK+B	Ahır gübresi kompostu (5 kg ağaç^{-1}) + Bezelye (200 g ağaç^{-1})
10	K	Kontrol
11	NPK	Kimyasal gübre uygulaması

Zeytin denemesi, 12 yaşında Ayvalık cinsi zeytin ağaçlarını içeren üretici bahçesinde gerçekleştirilmiştir. Denemesi tesadüf blokları deneme desenine göre, 3 tekrarlı ve her bir tekrar 3 tane zeytin ağacı içerecek şekilde tesis edilmiştir. Denemede, 11 uygulama x 3 tekerrür x 3 ağaç olmak üzere toplamda 99 ağaç kullanılmıştır. Kimyasal gübre uygulamaları için kullanılan dozlar, İzmir İl Tarım Müdürlüğü tarafından bölge üreticilerine zeytin plantasyonları için önerilen dozlar olup 10 kg N da^{-1} , $10 \text{ kg P}_2\text{O}_5 \text{ da}^{-1}$ ve $8 \text{ kg K}_2\text{O da}^{-1}$ düzeyinde besin elementleri için NPK uygulamasında 15-15-15 kompoze, amonyum sülfat (% 21) ve DAP (% 18-46-0; N-P-K) gübrelere kullanılmıştır. Deneme başlangıcında 750 g ağaç^{-1} dozunda uygulanan 15-15-15 gübresi, $900 \text{ g amonyum sülfat ağaç}^{-1}$ ve $350 \text{ g DAP ağaç}^{-1}$ ile desteklenmiştir. Sulama mevsiminde ise damlama sulama ile Mayıs-Ağustos ayları arasında MAP (%12 $\text{NH}_4\text{-N}$ + %61 P_2O_5) ve Üre (% 46 $\text{NH}_4\text{-N}$) gübrelere ile takviye yapılmıştır. Denemede tüm uygulamalar ağaçların taç izdüşümündeki toprak yüzeyine yapıldıktan sonra el ile toprağın yüzeyden 12-15 cm derinliğine karıştırılmıştır.

Bahçe denemesinin ilk yılında, 21 Aralık 2018 tarihinde Çiğli Atıksu Arıtma Tesisinden kurutulmuş arıtma çamuru alınmıştır. Aynı gün yanmış ahır gübresi, fiğ ve bezelye tohumları temin edilmiştir. Fiğ ve bezelye tohumları bölgede yaygın olarak yapılan uygulamalar baz alınarak $16 \text{ kg tohum da}^{-1}$ düzeyinde topraklara el ile serpe şeklinde ekilmiştir. Arazide uygulamalar 22 Aralık 2018 tarihinde başlanmıştır ve aynı gün sona ermiştir. 7 Ocak 2019 tarihinde her bir materyalin uygulandığı ağaçların altından mikrobiyolojik ve fizikokimyasal analizler yapılmak üzere toprak örneği (1. Dönem) alınmıştır. Yeşil gübreleme için bezelye ve

fiğın fenolojisi takip edilmiş, bitkilerde %10 düzeyinde çiçeklenme görüldüğü 22 Nisan 2019 tarihinde toprağa gömülmüştür. 6 Mayıs 2019 tarihine ise yeşil gübrelemenin uygulanmasından 15 gün sonra mikrobiyolojik amaçlı ikinci toprak örnekleme (2. Dönem) yapılmıştır.

Bahçe denemesinin ikinci yılında ise 19 Ocak 2020 tarihinde deneme alanında ağaç üzerindeki zeytinlerin hasadı sona ermiştir. Hasat, kış yağmurlarının geç gelmesi sebebiyle tanelerin şişmemesi ve Kasım ayında yapılan ilk hasatlardan elde edilen zeytinyağının 8:1 oran gibi çok yüksek oranda asitli çıkması sebebiyle normal sezona göre daha geç olarak Aralık ayında başlamıştır. Ağaç altına dökülen ve sabun yapımı için kullanılan zeytinlerin toplanması da 26 Ocak 2020 tarihinde bitmiştir. Deneme alanında arıtma çamuru, tavuk gübresi, çiftlik gübresi, kimyasal gübreleme ve yeşil gübreleme için fiğ ve bezelye tohumlarının ekimi 30 Ocak 2020 tarihinde yapılmıştır. Yağışların durumu ve tarlanın toprak örneği alınması için uygun tava gelmesinin beklenmesi nedeniyle 24 Şubat 2020 tarihinde mikrobiyolojik ve fizikokimyasal parametrelerin analizi için toprak örnekleme (3. Dönem) yapılmıştır. Yeşil gübreleme için bezelye ve fiğın fenolojisi takip edilmiş, bitkilerde %10 düzeyinde çiçeklenme görüldüğü 19 Nisan 2020 tarihinde toprağa gömülmüştür. Nisan-2020 ayının yağışlı geçmesi nedeniyle mikrobiyolojik analizler için 13 Mayıs 2020 tarihinde ikinci dönem toprak örneği (4. Dönem) alınmıştır. Parsellerden mikrobiyolojik analizler için 0-20 cm derinlikten kompoze toprak örnekleme yapılmıştır (Öhlinger, 1995). Her bir uygulama ağacının 4 yönünden olmak üzere toprak örnekleri alınarak, buz kutuları içerisinde laboratuvarlara getirilmiş ve nemli olarak 4 mm'lik elekten elenerek analizler tamamlanana kadar +4°C'de buzdolabında saklanmıştır. Mikrobiyolojik analizler her iki yılda da 30 gün içerisinde tamamlanmıştır. Fizikokimyasal parametreler ise her iki yılda da organik materyal uygulamalarından 15 gün sonra (1. Dönem ve 3. Dönem) 0-30 cm toprak derinliğinden alınan kompoze örneklerde gerçekleştirilmiştir. Fiziksel ve kimyasal parametrelerin analizleri için alınan bu toprak örnekleri, hava kurusu hale getirildikten sonra 2 mm'lik elekten elenerek analize hazır hale getirilmiştir.

2.2.2 Fiziksel, Kimyasal ve Mikrobiyolojik Analiz Yöntemleri

(a) Organik materyallerin kimyasal analizleri:

Birinci ve ikinci yıl gerçekleştirilecek bahçe denemesine uygulanmadan önce organik materyal örneklerinden usulüne uygun şekilde alınarak 65-70°C'deki kurutma dolabında kurutulmuştur. Hava kurusu haline gelen örnekler 2 mm'lik elekten elenerek analizlere hazır hale getirilmiştir.

1. pH ve elektriksel iletkenlik değerlerinin belirlenmesi: Gübreler 1:10 oranında saf su ile sulandırılacak ve 1 saat çalkalandıktan sonra bir saat bekletilen örneklerde direkt pH-metre

(Inolab level1, WTW, Germany) ve EC-metre (İnolab level1, WTW, Germany) kullanılarak gerçekleştirilmiştir (Richards, 1954).

2. Organik madde ve organik karbon içeriğinin belirlenmesi: Potasyum dikromat ($K_2Cr_2O_7$) ile yaş yakılarak organik karbon değeri bulunacak (Rauterberg and Kremkus, 1951) ve bu değer Van Benmelen faktörü olan 1,724 ile çarpılarak hesaplanmıştır (Black, 1965).

3. Toplam azot (N) belirlenmesi: Gübre örneklerinde toplam azot miktarları Bremner ve Schaw'ın modifiye makro Kjeldahl metodu (Bremner, 1965) uygulanarak saptanmıştır.

4. Makro (P, K, Ca, Mg) ve mikro elementlerin (Fe, Cu, Zn, Mn) saptanması: Analize hazırlanan gübre örneklerinden 1 gram tartılarak konsantre nitrik-perklorik asit karışımı ile yaş yakma yapılarak 100 ml'lik balonlara filtre edilmiştir. Yaş yakma ile elde edilen ekstraktan alınan örneklerde fosfor vanadamolibdofosforik sarı renk yöntemi ile kolorimetrik olarak analiz edilmiştir. Gübrelerde potasyum, kalsiyum ve sodyum analizleri alev fotometresinde tayin edilmiştir. Örneklerde magnezyum, demir, çinko, mangan ve bakır miktarları, yaş yakma ile elde edilen süzükte Atomik Absorbsiyon Spektrofotometresinde (AAS) tayin edilmiştir (Kacar ve İnal, 2008).

(b) Deneme toprağının mikrobiyolojik analizleri:

1. CO_2 -oluşumu (BSR): 0.1 N NaOH çözeltisi kullanılarak ve $25^\circ C$ ' de 24 saatlik bir inkübasyon süresi sonunda saptanmıştır (Isermeyer, 1952; Jäggi, 1976).

2. N-mineralizasyonu (N_{min}): Su ile doygun hale getirilen topraklar $40^\circ C$ ' de 7 gün inkübasyonda bırakıldıktan sonra açığa çıkan NH_4-N ' u modifiye edilmiş Bertholet reaksiyonu ile saptanmıştır (Keeney, 1982).

3. Dehidrogenaz aktivitesi (DHG, EC 1.1): Toprak bünyesi ve organik madde miktarına göre farklı konsantrasyonlarda TTC (Trifenil tetrazolium klorür) çözeltisi verilen toprak örneklerinin 16 h $25^\circ C$ ' de inkübasyondan sonra oluşan TPF (trifenil formazan)'ın 546 nm dalga boyunda fotometrik ölçümü ile belirlenmiştir (Thalman, 1968).

4. Alkalın fosfotaz aktivitesi (ALKPA, EC 3.1.3.1): Tamponlanmış p-nitrophenyl fosfat çözeltisinin ilavesinden sonra toprak örnekleri $37^\circ C$ ' de 1 h inkübe edilecek ve fosfomonoesteraz aktivitesi ile ortaya çıkan p-nitrophenol, sodyum hidroksit ile renklendirildikten sonra 400 nm' de fotometrik olarak ölçülmüştür (Tabatabai and Bremner, 1969; Eivazi and Tabatabai, 1977).

5. B-glikozidaz aktivitesi (GLU, EC 3.2.1.21): Toprak örneğinin Salicin ile $37^\circ C$ ' de 3 h inkübe edilmesinden sonra açığa çıkan Saligen'in spektrometrik tayini ile saptanmıştır (Hoffman ve Dedekan, 1965).

(c) Deneme toprağının fizikokimyasal analizleri:

pH ve elektriki iletkenlik (EC) değerlerinin belirlenmesi sature hale getirilmiş ve suda çözünebilir iyon geçişinin tamamlanması için 2 saat bekletilmiş toprak macununda (Richards, 1954); tane irilik dağılımının belirlenmesi Bouyocous silindiri ve hidrometre kullanılarak (Bouyocous, 1951); organik madde ve organik karbon içeriğinin belirlenmesi, potasyum dikromat ($K_2Cr_2O_7$) ile yaş yakılarak (Rauterberg ve Kremkus, 1951) ve Van Benmelen faktörü olan 1.724 ile çarpılarak (Black, 1965); toplam karbonatların belirlenmesi, Scheibler kalsimetresi kullanılarak (Schlichting ve Blume, 1966); toplam azot makro Kjeldahl metodu ile (Bremner, 1965); alınabilir fosfor, Olsen vd. (1954) tarafından bildirildiği şekilde (Kacar, 1995); alınabilir K, Ca, Mg, Na, 1 N Amonyum Asetat (pH: 7) ile ekstrakte edilerek (Carson, 1980); Fe, Cu, Zn ve Mn DTPA (pH: 7.3) ile ekstrakte edilerek (Lindsay ve Norvell, 1978); alınabilir B, 0.01 M Mannitol + 0.01 M Kalsiyum Klorür çözeltisi ile ekstrakte edilerek (Kacar ve Fox, 1966); amonyum azotu (NH_4-N) $CaCl_2 + NaCl$ çözeltisi ile ekstrakte edilerek (Kandeler ve Gerber, 1988); nitrat azotu (NO_3-N) $CaCl_2 + NaCl$ çözeltisi ile ekstrakte edilerek (Scharpf ve Wehrmann, 1976) belirlenmiştir.

(d) Bitki verim parametresi (Verim): Toprak analizlerinin yanı sıra yapılan uygulamalarının zeytin verimi üzerindeki etkisi de ortaya konmuştur. Ayvalık çeşidi zeytin ağaçları meyvelerinin siyah olgunluk döneminde hasadı yapılarak verimleri belirlenmiştir.

2.2.3. İstatistiksel Analiz

Laboratuvar çalışmaları sonucunda elde edilen tüm veriler öncelikle normal dağılıma uygun olup olmadıklarının ortaya koyulabilmesi amacıyla normallik ve dağılım homojenliği testlerine (Shapiro – Wilk) tabi tutulmuşlardır. Farklı organik gübre uygulamalarının (stabilize arıtma çamuru, tavuk gübresi kompostu, ahır gübresi kompostu) ve bunlara eşlik eden çeşitlendirilmiş yeşil gübre uygulamalarının (yeşil gübrelemesiz, fiğ yeşil gübrelemesi, bezelye yeşil gübrelemesi) oluşan uygulamaların (KONU), dönemlerin (2018-2019/1, 2018-2019/2, 2019-2020/1, 2019-2020/2, DÖNEM) ve bunların interaksiyonlarının (KONUxDÖNEM) oluşturduğu faktörlerin; analiz edilen tüm bağımlı mikrobiyal değişkenlerin üzerine etkisini ortaya koyabilmek amacıyla genelleştirilmiş doğrusal model olan MANOVA ile iki yönlü varyans analizi gerçekleştirilmiştir. Deneme topraklarına yapılan 11 farklı uygulama konusunun mikrobiyal parametreler üzerinde sağladığı değişiklikleri belirlemek için toplamda dört dönemde ve 3 tekrarlamalı alınan toprak örneklerine (n=132), fizikokimyasal parametreleri belirlemek için toplamda iki dönemde ve 3 tekrarlamalı alınan toprak örneklerine (n=66) ve

toplamda iki yıl gerçekleştirilen hasada ait zeytin verimine ait (n=66) analiz sonuçlarının istatistiki analizi; IBM SPSS Statistics 20.0 programında tesadüf blokları deneme desenine göre analiz edilmiştir. Ayrıca toprak örneklerine ait elde edilen verilerinin ortalamaya göre yayılmasını gösteren “Standart Sapma” değeri de aynı program aracılığı ile hesaplanmıştır. Ortalama değerlerin karşılaştırılması ise “Duncan” çoklu karşılaştırma testi ile ve $P<0.05$ önem düzeyine göre aynı program ile yapılmıştır.

3. BULGULAR ve TARTIŞMA

3.1 Bağımsız Değişkenlerin Toprakların Mikrobiyolojik ve Biyokimyasal Özellikleri Üzerine Etkisi

Toprak kalitesindeki değişiklikleri tahmin etmek için en yaygın olarak kullanılan genel biyokimyasal parametreler, mikrobiyal biyokütle, dehidrogenaz aktivitesi ve N mineralizasyon kapasitesi olarak sayılabilir. En sık kullanılan spesifik parametreler ise asit veya alkali fosfataz, β -glukozidaz ve üreaz aktivitelerini içerir (Gil-Sotres vd., 2005). Bu çalışmada toprak solunumu (BSR), azot mineralizasyonu (N_{min}), amonifikasyon sonucu oluşan amonyum (NH_4-N) ve nitrifikasyon sonucu oluşan nitrat (NO_3-N) azotu değerleri ile dehidrogenaz (DHG), alkalın fosfataz (ALKPA) ve β -glukozidaz (GLU) enzim aktiviteleri proje kapsamındaki mikrobiyolojik ve biyokimyasal özellikleri karakterize eden bağımlı değişkenleri oluşturmuştur. Bahçe denemesi sonuçlarından elde edilen verilerin istatistiksel analizine göre; %99 güvenle “DÖNEM”, “KONU” ve “DÖNEM x KONU” faktörlerinin bağımlı biyolojik değişkenler üzerinde istatistiksel olarak anlamlı bir etkisi belirlenmiştir. Deneme planında tesis edilen tekerrürlerin ise istatistiksel olarak önemsiz bulunması, çalışmadan elde edilen verilerin daha sağlıklı bir şekilde değerlendirilebileceğinin göstergesi olmaktadır.

İki bağımsız değişkenin bağımlı biyolojik değişkenler üzerindeki iki yönlü etkilerini gördüğümüz varyans analizine göre; DÖNEM ve KONU bağımsız değişkenleri ile bunların interaksiyonunun (DÖNEMxKONU) incelenen mikrobiyal bağımlı değişkenlerin hepsini $P<0.01$ düzeyinde etkilediği belirlenmiştir. Bir diğer ifade ile uygulama konularının, örnek alma dönemlerinin ve bunların interaksiyonunun bağımlı değişkenlerin ortalamaları arasında oluşturduğu fark istatistiksel olarak anlamlı bulunmuştur ($P<0.01$). Dolayısıyla organik gübre uygulamalarının tek başlarına ve çeşitlendirilmiş yeşil gübre ile birlikte uygulanmasının toprakların mikrobiyal aktivitesi üzerinde incelenen parametreler bazında önemli düzeyde etkinliğinin olduğu hipotezi de kabul edilmiş olmaktadır. Bu işlemin ardından ANOVA sonrası belirlenen anlamlı farklılığın hangi uygulamalardan kaynaklandığını belirlemek üzere

tamamlayıcı post-hoc analizi Duncan yöntemi ile her bir bağımlı değişken parametresi (BSR, N_{min} , NH_4-N , NO_3-N , DHG, ALKPA, GLU) için gerçekleştirilmiştir. Bununla birlikte iki farklı dönemde toprağa ilave edilen organik gübreler (1. Dönem ile 3. Dönemden 15 gün önce) ile %10 çiçeklenme dönemlerinde toprağa karıştırılan yeşil gübrelerin (2. Dönem ve 4. Dönemden 15 gün önce) etkinlikleri değerlendirirken toprakların nem düzeyleri de mikrobiyal aktiviteyi etkileyen önemli bir faktör olabilmektedir. İklim koşullarının etkisiyle mikrobiyal aktivite hızlanabilmekte veya yavaşlayabilmektedir. Dört toprak örneği alma döneminin ortalama toprak nem değerleri (%) 1. Dönem için 19.50 ± 3.69 , 2. Dönem için 8.16 ± 1.91 , 3. Dönem için 13.42 ± 2.54 ve 4. Dönem için ise 7.37 ± 2.27 olarak belirlenmiştir.

3.1.1 Toprak solunumu (BSR) üzerine etkileri

Araştırma topraklarında saptanan BSR değeri üzerine toprak örnekleme dönemi (DÖNEM), yeşil gübreleme uygulama konularının (KONU) ve DÖNEM x KONU interaksiyonunun birlikte etkisi $P < 0.01$ düzeyinde önemli bulunmuştur. Çizelge 4'den de görüleceği üzere, araştırma topraklarının BSR değeri $3.69 - 17.34 \mu g CO_2-C g^{-1} h^{-1}$ arasında değişim göstermiştir. Yapılan tüm uygulamalar hem kontrol toprağındakinden hem de mineral gübre uygulamasından daha fazla BSR değeri sağlamışlardır.

Stabilize arıtma çamuru uygulamasıyla birlikte fiğ (SAÇ+F) ve bezelye (SAÇ+B) yeşil gübreleme bitkilerinin yetiştirilmesi, BSR değerini ilk dönem örneklerinde anlamlı bir şekilde yükseltmiştir ($P < 0.05$). Buna karşılık organik materyallerin tek başlarına uygulamaları sonucu ise en yüksek aktiviteyi $8.94 \mu g CO_2-C g^{-1} h^{-1}$ değeri ile TGK göstermiştir. Ancak organik materyallerin uygulanmasını takip eden dört aylık süreçte BSR değerini %115 ile en fazla arttıran uygulama SAÇ olmuştur. Bunu %94 ile AGK uygulaması izlerken, TGK uygulaması ise %86 ile son sırada yer almıştır. Bahar dönemi ile birlikte iklimsel koşulların toprak mikroorganizmalarını teşvik etmesi argümanı kontrol uygulamasında gerçekleşen %104 düzeyindeki artışla doğrulansa da, bu uygulamanın ulaştığı $7.66 \mu g CO_2-C g^{-1} h^{-1}$ düzeyindeki BSR değeri, yine diğer uygulamaların sağladığı BSR değerinin gerisinde kalmıştır.

İkinci dönem toprak örneklerinde bir diğer dikkat çekici yükseliş ise fiğ bitkisi ile desteklenen TGK uygulaması ile bezelye bitkisi ile desteklenen AGK uygulamasının BSR değerini yaklaşık %108 düzeyinde arttırmalarıdır. Ancak aynı uygulamalar diğer yeşil gübre bitkisiyle BSR değerinde benzer bir dikkat çekici yükseliş gösterememişler, artışlar sırasıyla TG+B için %83 ve AGK+F için ise %55 düzeylerinde kalmıştır.

İkinci yıl kış döneminde yapılan ikinci organik materyal uygulamalarını takip eden 3. toprak örnekleme döneminde, havaların soğumasına bağlı olarak NPK ve K parsellerinde trajik BSR değeri düşüşü, organik materyal uygulamalarıyla hafifletilmiştir. Dahası SAÇ ve SAÇ+F uygulama parselleri, BSR değerinde bir önceki döneme göre artış saptanan parseller olarak belirlenmiştir ($P>0.05$). Son dönem örneklerindeki BSR değerlerinde ise genel bir düşüş gözlenmiştir.

Uygulamalardan bağımsız dönem ortalama değerleri dikkate alındığında BSR değerinin en yüksek gerçekleştiği dönem olarak 2. Dönem, $13.9 \mu\text{g CO}_2\text{-C g}^{-1} \text{h}^{-1}$ BSR değeri ile belirlenmiştir ($P<0.05$). Organik materyallerinin tekrarlı uygulanmasına bağlı olarak 1. Dönem BSR değerine göre 3. Dönem BSR değerinin daha yüksek belirlenmiş ve bu farklılığın istatistiksel olarak da önemli olması kayda değer bir sonuç olarak değerlendirilmiştir. Tüm dönemlere ait uygulamaların BSR değerlerinin ortalamaları dikkate alındığında ise iki yılın sonunda BSR değerini istatistiki olarak en fazla arttıran uygulamalar olarak SAÇ, SAÇ+F ve SAÇ+B uygulamaları belirlenmiştir ($P<0.05$). NPK uygulamasına göre %104-110, kontrol uygulamasına göre ise %85-91 düzeyinde sağlanan artışlar önemlidir. Bununla birlikte TGK ve AGK organik materyalleri ile karıştırıldığında, topraktaki heterotrof mikroorganizmaların faaliyetini daha fazla teşvik eden SAÇ uygulamasının bu etkinliği daha önce yapılan çalışmalarla da ortaya koyulmuştur (Kayıkcıoğlu ve Delibacak, 2018; Kayıkcıoğlu vd., 2019). BSR analizinde toprağın orijinal neminden bağımsız olarak her örnek için optimum nem düzeyleri sağlandığından dolayı elde edilen sonuçlar direkt olarak topraktaki mikrobiyal aktivite fazlalığı ve kolay değerlendirilebilir organik materyal miktarı ile ilişkili olacaktır. Çalışmamızda kullanılan SAÇ, daha dar C:N oranı ile (9.93:1) topraklarda TGK ve AGK'ya göre daha hızlı ayrışabilmektedir. Ayrıca SAÇ'ın bu etkinliğinin sahip olduğu karbon bileşiklerinin kimyasal yapısının kolay ayrışabilir olmasından da kaynaklandığı düşünülmektedir.

Topraktaki heterotrof mikrobiyal aktivitenin (BSR) artmasıyla birlikte GLU ($r=0.855$), ALKPA ($r=0.669$), $\text{NH}_4\text{-N}$ ($r=0.496$), $\text{NO}_3\text{-N}$ ($r=0.423$), N_{min} ($r=0.371$) ve DHG ($r=0.359$) değerlerinin de bundan % 1 önemli düzeyde ve olumlu yönde etkilendikleri belirlenmiştir (Çizelge 10). Topraktaki nem miktarı ile BSR değeri arasında aynı yönde ve güçlü bir ilişki ortaya çıkmıştır ($P<0.01$).

3.1.2 Azot mineralizasyonu (N_{min}) üzerine etkileri

Organik azot miktarına ve kalitesine göre toprakta saptanan N_{min} değerleri değişiklik göstermektedir. Potansiyel olarak mineralize olabilecek N-ürünlerinin belirlenmesi, bitki gelişmesi için ortamdaki N-yarayışlılığının güvenilir bir göstergesi olarak kabul edilebilir (Keeney, 1982). Proje kapsamında N_{min} belirlenmesi amacıyla kullanılan yöntemde, suyla doymuş ortamda gerçekleştirilen inkübasyonda nitrifikasyon engellenmekte ve sadece NH_4^+ miktarları ölçülmektedir. Yüksek sıcaklıklarda ve nitrifikasyonun herhangi bir etkinliğinin olmadığı koşullarda gerçekleştiğinden, aerobik koşullarla kıyaslandığında daha fazla organik bağlı azotun mineralize olabileceği söylenebilir. Yüksek miktarda NH_4^+ 'ün doymuş ortam koşullarındaki salınmasında, ayrıca, düşük N-immobilizasyonunun da etkili olacağı düşünülmektedir. Projede belirlenen N_{min} değeri, arazide potansiyel olarak mineralize olabilecek organik azotlu bileşiklerin niceliğini gösterdiğinden, yapılacak uygulamalar ile bu parametrenin artırılması önem taşımaktadır.

Araştırma topraklarında saptanan N_{min} değeri üzerine toprak örnekleme dönemi (DÖNEM), yeşil gübreleme uygulama konularının (KONU) ve DÖNEM x KONU interaksyonunun birlikte etkisi $P<0.01$ düzeyinde önemli bulunmuştur. Çizelge 5'den de görüleceği üzere, araştırma topraklarının azot mineralizasyonu (N_{min}) değeri $0.29 - 1.15 \mu g NH_4-N g^{-1} h^{-1}$ arasında değişim göstermiştir. SAÇ, SAÇ+F, TGK+F, SAÇ+B, TGK+B ve AGK+B uygulamaları NPK ve K uygulamalarından daha fazla N_{min} değeri sağlamışlardır ($P>0.05$). BSR değerine benzer şekilde stabilize arıtma çamuru uygulamaları N_{min} değerlerini de diğer uygulamalara göre önemli düzeyde arttırmıştır. 1. Dönem, 2. Dönem ve 3. Dönemde SAÇ+B uygulaması istatistiki olarak en yüksek N_{min} aktivitesi sağlarken, 4. Dönemde ise SAÇ+B ile birlikte SAÇ+F ve SAÇ uygulamaları da en yüksek N_{min} aktivitesi göstermişlerdir.

Dönemler bazında incelendiğinde yeşil gübre uygulamalarının yapılmasını takiben Mayıs aylarında alınan toprak örnekleme istatistiki açıdan önemli düzeyde yüksek N_{min} değerleri belirlenmiştir. En yüksek N_{min} değerine sahip dönem ise $0.65 \mu g NH_4-N g^{-1} h^{-1}$ ile 4. Dönem olarak belirlenmiştir ($P<0.05$). İkinci yıl yapılan yeşil gübreleme ile ilk yıla göre daha yüksek N_{min} değerlerine ulaşılması, toprakların biyolojik aktivitesini de destekleyen yeşil gübrelemenin tekrarlayan uygulamalarının sürdürülebilir toprak verimliliğine olumlu bir katkı yaptığı şeklinde yorumlanabilir. İki yıllık veriler sonucunda, SAÇ+B uygulamasının $0.90 \mu g NH_4-N g^{-1} h^{-1}$ ile en yüksek N_{min} değeri sağladığı belirlenmiştir ($P<0.05$).

Çizelge 4. Bağımsız değişkenlerin toprak solunumu (BSR) üzerine etkileri ($\mu\text{g CO}_2\text{-C g}^{-1} \text{h}^{-1}$)

Uygulama Konuları	2018-2019 üretim yılı		2019-2020 üretim yılı		Ort.
	1. Dönem ^a	2. Dönem ^b	3. Dönem ^c	4. Dönem ^d	
SAÇ ^e	6.95 ^e c B (± 1.06) ^f	14.92 cd A (± 1.17)	15.86 a A (± 0.90)	6.14 ab B (± 0.39)	11.0 A
TGK ^h	8.94 b B (± 0.45)	16.63 a-c A (± 0.36)	7.54 d-f C (± 0.69)	6.38 a D (± 0.40)	9.87 B-D
AGK ⁱ	6.89 c C (± 0.60)	13.33 d A (± 0.70)	9.05 cd B (± 0.85)	6.61 a C (± 1.24)	8.97 DE
SAÇ+F ^j	9.96 a AB (± 0.29)	13.23 d A (± 0.89)	13.42 ab A (± 3.58)	6.53 a B (± 0.66)	10.8 AB
TGK+F ^k	8.15 b B (± 0.25)	16.97 ab A (± 1.39)	9.32 cd B (± 0.66)	3.95 c C (± 0.74)	9.60 C-E
AGK+F ^l	8.70 b B (± 0.25)	13.46 d A (± 1.16)	7.92 de B (± 1.21)	5.02 a-c C (± 0.62)	8.78 E
SAÇ+B ^m	10.74 a B (± 0.99)	15.25 b-d A (± 0.81)	11.50 bc B (± 0.95)	5.31 a-c C (± 0.62)	10.7 AB
TGK+B ⁿ	8.27 b BC (± 0.80)	15.10 b-d A (± 0.86)	8.65 d B (± 1.99)	5.81 ab C (± 0.69)	9.46 C-E
AGK+B ^o	8.31 b B (± 0.45)	17.34 a A (± 1.98)	8.15 d B (± 1.00)	5.93 ab B (± 1.09)	9.93 BC
K ^p	4.46 d B (± 0.19)	9.11 e A (± 0.14)	5.03 f B (± 0.28)	4.46 bc B (± 1.44)	5.77 F
NKP ^r	3.69 d C (± 0.18)	7.66 e A (± 0.08)	5.36 ef B (± 1.12)	4.32 bc BC (± 1.45)	5.25 F
Ort.	7.73 C	13.9 A	9.26 B	5.50 D	

^a: 1. Dönem, 7 Ocak 2019 tarihli toprak örnekleme dönemi; ^b: 2. Dönem, 6 Mayıs 2019 tarihli toprak örnekleme dönemi; ^c: 3. Dönem, 24 Şubat 2020 tarihli toprak örnekleme dönemi; ^d: 4. Dönem, 13 Mayıs 2020 tarihli toprak örnekleme dönemi; ^e: Tüm değerler üç tekerrürün ortalaması olarak kuru madde bazında verilmiştir; ^f: Standart sapma; ^g: SAÇ, stabilize arıtma çamuru uygulaması; ^h: TGK, tavuk gübresi kompostu uygulaması; ⁱ: AGK, ahır gübresi kompostu uygulaması; ^j: SAÇ+F, stabilize arıtma çamuru + fiğ uygulaması; ^k: TGK+F, tavuk gübresi kompostu + fiğ uygulaması; ^l: AGK+F, ahır gübresi kompostu + fiğ uygulaması; ^m: SAÇ+B, stabilize arıtma çamuru + bezelye uygulaması; ⁿ: TGK+B, tavuk gübresi kompostu + bezelye uygulaması; ^o: AGK+B, ahır gübresi kompostu + bezelye uygulaması; ^p: K, kontrol uygulaması; ^r: NPK, kimyasal gübre uygulaması. * Aynı harfle gösterilen ortalamalar Duncan testine göre birbirinden istatistiksel olarak farklı değildir (P<0.05). Küçük harfler aynı dönem içindeki farklı UYGULAMALARIN, büyük harfler ise aynı

1. ve 3. Dönem topraklarına göre toprak nemi parametresinde 2. Dönem toprak örneklerinde % 58.2 ve 4. Dönem topraklarında ise % 45.1 düzeyinde bir azalma meydana gelerek toprak nemi % 7-8'ler düzeyine gerilemiştir. Bu nedenle azot mineralizasyonu aktivitesi toprakta azalmış, bir diğer deyişle potansiyel olarak mineralize olabilecek organik-N miktarında bir artış sağlanmıştır. Bunun ise laboratuvar sonuçlarında daha yüksek N_{\min} değerlerinin belirlenmesine yol açtığı düşünülmektedir.

Azot mineralizasyonu da aynı BSR gibi analiz edilen tüm mikrobiyal parametreler ile pozitif ilişkiye sahip parametre olmuştur (Çizelge 10). N_{\min} , güçlü pozitif korelasyonu ALKPA ($r=0.668$), DHG ($r=0.675$) ve $\text{NO}_3\text{-N}$ ($r=0.760$) parametreleriyle göstermiştir ($P<0.01$). $\text{NH}_4\text{-N}$ ile arasında ise pozitif ama orta düzeyde bir ilişki belirlenmiştir ($P<0.01$). Çalışmamızda N_{\min} ile BSR ve GLU arasında ise zayıf düzeyde bir ilişki saptanmıştır ($P<0.01$).

3.1.3. Dehidrogenaz aktivitesi (DHG) üzerine etkileri

İntraselüler bir enzim olan DHG aktivitesinin, toprağın mikroflorasının toplam oksidatif aktivite aralığını yansıttığı düşünülmektedir ve mikrobiyal aktivitenin iyi bir göstergesi olarak kabul edilmektedir (Nannipieri vd., 1990). Araştırma topraklarında saptanan DHG değeri üzerine toprak örnekleme dönemi (DÖNEM), organik gübreleme uygulama konularının (KONU) ve DÖNEM x KONU interaksiyonunun birlikte etkisi % 1 düzeyinde önemli bulunmuştur.

Proje kapsamında topraklara organik materyallerle yapılan ilk uygulamanın ardından, materyalin özelliğine bağlı olarak mikrobiyal gelişimi en çok arttıran uygulamalar olarak TGK+F, SAÇ+B, SAÇ ve TGK+B ön plana çıkmıştır ($P<0.05$). Bu uygulamalar ile NPK ve K parsellerine göre topraklardaki mikrobiyal popülasyon %27-60 arasında arttırılabilmektedir. Buna karşın, 1. Dönem örneklerinde belirlenen bu artışın diğer örnekleme dönemleri ile karşılaştırıldığında en düşük seviyede kalması, iki yıl boyunca uygulanan organik materyallerin toprakların mikrobiyal popülasyonu üzerine herhangi bir olumsuz etkinliğinin olmadığını bir göstergesi olarak kabul edilebilir. Gerçekten de aynı dönem içindeki yapılan tüm uygulamaların ortalamaları dikkate alındığında en düşük DHG aktivitesinin $85 \mu\text{g TPF g}^{-1}$ 1. Dönemde olduğu görülmektedir. İkinci yıl aynı zamana denk gelen toprak örnekleme dönemi ifade eden 3. Dönem örneklerinde ortalama DHG aktivitesi %89.4 düzeyinde bir artış göstererek $161 \mu\text{g TPF g}^{-1}$ düzeyine yükselmesi dikkate değer bir durumdur ($P<0.05$).

BSR parametresindeki eğilime benzer şekilde, yeşil gübreleme sonrasında toprağa karıştırılan bitkisel materyallerin de teşvikiyle ortalama DHG aktivitesi, 2. Dönem örneklerinde $179 \mu\text{g TPF g}^{-1}$ düzeyine ulaşmıştır ki bu dönemler arasındaki en yüksek değer olarak belirlenmiştir ($P<0.05$). Son dönem örneklerinin yağışlardan sonraki periyoda rastlaması bu dönem örneklerinin ortalama DHG aktivitesinde, her ne kadar ilk dönem ortalama DHG aktivitesine göre %71.8'lik düzeyde bir artış sağlamış olsa da $146 \mu\text{g TPF g}^{-1}$ değeri ile aynı kültürel işlemin ilk yıldaki karşılığı olan 2. Dönem örneklerinin sağladığı aktivitenin gerisinde kalmıştır (Çizelge 6). Hücre içi aktivite gösteren DHG, mikrobiyal popülasyonun büyüklüğü ile direkt ilişkili olup, yapılan uygulamalarının mikrobiyal popülasyon büyüklüğü üzerindeki etkiyi de net bir şekilde yansıtabilmektedir (Kayıkcıoğlu vd., 2020).

Çizelge 6'dan görülebileceği üzere, 2. Dönem örneklerinde, yine ilk dönemde yüksek DHG aktivitesi sağlayan uygulamalardan olan TGK+F, SAÇ ve TGK+B uygulamaları ön plana çıkmış ve hatta bunlara $221.26 \mu\text{g TPF g}^{-1}$ düzeyindeki bir aktivite değeri sağlayan AGK+B uygulaması da dâhil olmuştur ($P<0.05$). Bir taraftan yeşil gübre uygulaması bu dönem DHG aktivitesinin artmasında önemli bir etken konumunda bulunurken, diğer taraftan bahar ayı nedeniyle atmosfer sıcaklığının yükselmesinin topraklardaki DHG aktivitesinin önemli düzeyde yükselmesine neden olduğu söylenebilir. Bu iki faktörün interaksyonu ile 2. Dönem örneklerinde en yüksek ortalama DHG aktivitesi belirlenmiştir.

Uygulamalar bazında dört dönemin ortalama değerleri dikkate alındığında, deneme sonucunda DHG aktivitesini kontrole göre en çok arttıran uygulamanın %79 ile SAÇ olduğu ve bunu %68 ile SAÇ+B ve %61 ile TGK+B uygulamalarının izlediği görülmektedir. Bu üç uygulamanın

DHG üzerinde sağladığı etki, diğer uygulamalardan da %95 güven aralığında anlamlı düzeyde farklı bulunmuştur. Mikrobiyal aktivite üzerinde önemli bir etki yaratamayan NPK uygulaması ise, kontrol parsellerinin sağladığı aktiviteden bile düşük düzeyde bir etki ortaya çıkarmıştır.

Yapılan bu çalışmada DHG ile ilişki göstermeyen tek parametre olarak NH₄-N konsantrasyonu belirlenmiştir (Çizelge 10). Bunun yanında DHG ile ve NO₃-N arasında zayıf negatif bir korelasyon (r=-0.255) belirlenmiştir (P<0.01). Benzer bir sonuç 1. Dönem örneklerinde ortaya çıkmış, istatistiksel olarak en yüksek NO₃-N konsantrasyonunun belirlenmesine karşılık, yine istatistiksel olarak en düşük DHG aktivitesi saptanmıştır. Organik materyal uygulamalarının ilerleyen mineralizasyon düzeylerine karşı düşük DHG aktivite cevabı, alternatif bir elektron alıcısı olarak işlev gören nitratların girişiminden kaynaklanabilir (Casida vd., 1964, Mastro vd., 2006).

Çizelge 5. Bağımsız değişkenlerin azot mineralizasyonu (N_{min}) üzerine etkileri (µg NH₄-N g⁻¹ h⁻¹)

Uygulama Konuları	2018-2019 üretim yılı		2019-2020 üretim yılı		Ort.
	1. Dönem ^a	2. Dönem ^b	3. Dönem ^c	4. Dönem ^d	
SAÇ ^e	0.453 ^a b C (±0.02) ^f	0.694 c B (±0.01)	0.751 c B (±0.03)	0.829 a A (±0.06)	0.68 B
TGK ^h	0.337 c B (±0.02)	0.527 de A (±0.01)	0.381 de B (±0.02)	0.548 c A (±0.04)	0.45 D
AGK ⁱ	0.336 c B (±0.04)	0.423 f B (±0.04)	0.378 de B (±0.07)	0.567 c A (±0.05)	0.43 DE
SAÇ+F ^j	0.387 c B (±0.03)	0.792 b A (±0.08)	0.848 b A (±0.04)	0.849 a A (±0.07)	0.72 B
TGK+F ^k	0.505 b A (±0.05)	0.554 d A (±0.01)	0.443 d A (±0.13)	0.580 c A (±0.06)	0.52 C
AGK+F ^l	0.325 c B (±0.03)	0.459 ef A (±0.03)	0.351 e B (±0.06)	0.538 c A (±0.05)	0.42 DE
SAÇ+B ^m	0.637 a D (±0.08)	1.150 a A (±0.07)	1.005 a B (±0.03)	0.792 ab C (±0.09)	0.90 A
TGK+B ⁿ	0.383 c C (±0.02)	0.519 de B (±0.03)	0.359 de C (±0.07)	0.716 b A (±0.06)	0.49 C
AGK+B ^o	0.451 b B (±0.02)	0.651 c A (±0.09)	0.336 e C (±0.03)	0.534 c B (±0.03)	0.49 C
K ^p	0.326 c C (±0.01)	0.423 f B (±0.03)	0.338 e C (±0.04)	0.572 c A (±0.01)	0.42 DE
NPK ^r	0.318 c B (±0.02)	0.309 g B (±0.02)	0.292 e B (±0.07)	0.601 c A (±0.09)	0.38 E
Ort.	0.41 D	0.59 B	0.50 C	0.65 A	

a: 1. Dönem, 7 Ocak 2019 tarihli toprak örnekleme dönemi; b: 2. Dönem, 6 Mayıs 2019 tarihli toprak örnekleme dönemi; c: 3. Dönem, 24 Şubat 2020 tarihli toprak örnekleme dönemi; d: 4. Dönem, 13 Mayıs 2020 tarihli toprak örnekleme dönemi; e: Tüm değerler üç tekerrürün ortalaması olarak kuru madde bazında verilmiştir; f: Standart sapma; g: SAÇ, stabilize arıtma çamuru uygulaması; h: TGK, tavuk gübresi kompostu uygulaması; i: AGK, ahır gübresi kompostu uygulaması; j: SAÇ+F, stabilize arıtma çamuru + fiğ uygulaması; k: TGK+F, tavuk gübresi kompostu + fiğ uygulaması; l: AGK+F, ahır gübresi kompostu + fiğ uygulaması; m: SAÇ+B, stabilize arıtma çamuru + bezelye uygulaması; n: TGK+B, tavuk gübresi kompostu + bezelye uygulaması; o: AGK+B, ahır gübresi kompostu + bezelye uygulaması; p: K, kontrol uygulaması; r: NPK, kimyasal gübre uygulaması. * Aynı harfle gösterilen ortalamalar Duncan testine göre birbirinden istatistiksel olarak farklı değildir (P<0.05). Küçük harfler aynı dönem içindeki farklı UYGULAMALARIN, büyük harfler ise aynı uygulamanın farklı DÖNEMLER içindeki karşılaştırmasını vermektedir. SATIR ORTALAMASI, aynı uygulamaya ait dönemler ortalamasını; SÜTUN ORTALAMASI, ise aynı döneme ait uygulamaların ortalamasını vermektedir.

Çizelge 6. Bağımsız değişkenlerin dehidrogenaz aktivitesi (DHG) üzerine etkileri ($\mu\text{g TPF g}^{-1}$)

Uygulama Konuları	2018-2019 üretim yılı		2019-2020 üretim yılı		Ort.
	1. Dönem ^a	2. Dönem ^b	3. Dönem ^c	4. Dönem ^d	
SAÇ ^e	103.92 ^c ab C (± 11.0) ^f	191.89 a-d B (± 22.1)	248.41 a A (± 31.5)	207.33 a B (± 15.8)	188 A
TGK ^g	63.72 d B (± 9.56)	182.51 b-c A (± 68.7)	134.51 d-g AB (± 33.9)	145.50 b A (± 15.4)	132 DE
AGK ⁱ	79.26 cd C (± 4.02)	185.36 b-c A (± 23.8)	159.22 c-f AB (± 43.6)	136.44 b B (± 22.0)	140 CD
SAÇ+F ^h	83.53 b-d B (± 0.87)	151.75 c-e AB (± 7.39)	209.67 ab A (± 85.7)	137.16 b AB (± 10.4)	146 CD
TGK+F ^h	113.62 a C (± 7.42)	211.85 a-c A (± 6.57)	172.88 b-e B (± 36.5)	145.62 b BC (± 20.0)	161 BC
AGK+F ⁱ	63.37 d B (± 12.1)	157.29 c-e A (± 29.9)	121.47 fg A (± 3.24)	129.05 bc A (± 18.8)	118 EF
SAÇ+B ^m	110.85 a B (± 19.1)	175.20 b-c A (± 14.7)	206.14 a-c A (± 36.0)	212.47 a A (± 19.9)	176 AB
TGK+B ⁿ	90.64 a-c C (± 25.7)	245.50 a A (± 35.3)	179.59 b-d AB (± 40.6)	159.21 b BC (± 10.2)	169 AB
AGK+B ⁿ	83.66 b-d C (± 3.21)	221.26 ab A (± 48.8)	126.63 e-g BC (± 11.5)	133.29 b B (± 13.3)	141 CD
K ^o	71.62 cd C (± 9.74)	137.12 de A (± 11.3)	111.38 fg AB (± 19.8)	99.84 cd B (± 15.8)	105 FG
NKP ^p	71.13 cd B (± 10.1)	110.69 e A (± 6.09)	101.17 g A (± 11.2)	95.81 d A (± 15.7)	94.7 G
Ort.	85.0 D	179 A	161 B	146 C	

^a: 1. Dönem, 7 Ocak 2019 tarihli toprak örnekleme dönemi; ^b: 2. Dönem, 6 Mayıs 2019 tarihli toprak örnekleme dönemi; ^c: 3. Dönem, 24 Şubat 2020 tarihli toprak örnekleme dönemi; ^d: 4. Dönem, 13 Mayıs 2020 tarihli toprak örnekleme dönemi; ^e: Tüm değerler üç tekerrürün ortalaması olarak kuru madde bazında verilmiştir; ^f: Standart sapma; ^g: SAÇ, stabilize artıma çamuru uygulaması; ^h: TGK, tavuk gübresi kompostu uygulaması; ⁱ: AGK, ahır gübresi kompostu uygulaması; ^j: SAÇ+F, stabilize artıma çamuru + fiğ uygulaması; ^k: TGK+F, tavuk gübresi kompostu + fiğ uygulaması; ^l: AGK+F, ahır gübresi kompostu + fiğ uygulaması; ^m: SAÇ+B, stabilize artıma çamuru + bezelye uygulaması; ⁿ: TGK+B, tavuk gübresi kompostu + bezelye uygulaması; ^o: AGK+B, ahır gübresi kompostu + bezelye uygulaması; ^p: K, kontrol uygulaması; ^q: NPK, kimyasal gübre uygulaması. * Aynı harfle gösterilen ortalamalar Duncan testine göre birbirinden istatistiksel olarak farklı değildir (P<0.05). Küçük harfler aynı dönem içindeki farklı UYGULAMALARIN, büyük harfler ise aynı uygulamanın farklı DÖNEMLER içerisindeki karşılaştırmasını vermektedir. SATIR ORTALAMASI, aynı uygulamaya ait dönemler ortalamasını; SÜTUN ORTALAMASI, ise aynı döneme ait uygulamaların ortalamasını vermektedir.

3.1.4. Alkalin fosfataz aktivitesi (ALKPA) üzerine etkileri

Çalışma kapsamında aktivitesi analiz edilen iki hidrolitik enzimden birisi ALKPA olmuştur. Araştırma topraklarında saptanan ALKPA değeri üzerine toprak örnekleme dönemi (DÖNEM), organik gübreleme uygulama konularının (KONU) ve DÖNEM x KONU interaksiyonunun birlikte etkisi P<0.01 düzeyinde önemli bulunmuştur. Çoğu toprakta, organik olarak bağlı P-fraksiyonu inorganik olan fraksiyondan daha yüksektir. Organik fosforik asit esterleri arasında, topraktaki en büyük fraksiyon fitik asit veya fitindir (Speir ve Ross, 1978). Bitkiler tarafından fosfor alımı, organik P bileşeninin fosfatlarla ortofosfata mineralizasyonu sonucu gerçekleşir (Speir ve Ross, 1978; Malcolm, 1983). Fosfatazlar, ağırlıklı olarak düşük fosfor mevcudiyeti koşulları altında üretilen indüklenebilen (tetiklenebilen) enzimlerdir. Fosfatazlar bitki kökleri ve mikroorganizmalar tarafından salgılanır ancak topraklarda mikrobiyal fosfatazlar daha fazla düzeydedir. “Fosfataz” adı, esterleri ve fosforik asidin anhidritlerini hidrolize eden bir grup enzimi açıklamaktadır. Fosfomonoesterazlar (fosfatazlar olarak adlandırılır) substrat seçicilikleri ve optimum pH'larında farklılık gösterir. Böylece topraktaki asit ve alkalin fosfatazlar arasında ayırım yapılabilir. Asit fosfomonoesterazın aksine, alkalin fosfomonoesteraz bitki dokuları tarafından salgılanmaz (Juma ve Tabatabai, 1988). ALKPA aktivitesi, bu nedenle, toprak mikroorganizmaları (Eivazi ve Tabatabai, 1977) ve toprak faunası (Pang ve Kolenko, 1986) aktiviteleri ile sınırlıdır ve topraktaki P-döngüsü içinde yer alan flora ve faunal canlıların popülasyon büyüklükleri ve aktiviteleri hakkında net bilgiler

sağlar (Hoffmann, 1968). Asit topraklarında ALKPA aktivitesi çok düşüktür. Bu enzim aktivitesi bu nedenle sadece alkalın ve nötr topraklarda araştırılmalıdır. Bu çalışmamızdaki deneme toprağının pH değeri 7.77 (hafif alkalın) olduğu için ALKPA aktivitesinin düzeyiyle ilgili bilgi edinmek istenmiştir (Çizelge 2).

İlk dönem toprak örneklerinde, proje kapsamında analiz edilen bağımlı mikrobiyal değişkenler üzerinde topraklara uygulanan organik gübrelerin fizikokimyasal özelliklerinin etkili olduğu söylenebilir. Bu bağlamda 1. Dönem örneklerinde ALKPA aktivitesi, kullanılan organik materyallerden en yüksek fosfor içeriğine sahip TGK tarafından en çok arttırılmıştır. TGK+F uygulaması ile sağlanan $556.53 \mu\text{g p-NP g}^{-1} \text{h}^{-1}$ düzeyindeki ALKPA aktivitesi, diğer uygulamaların sağladığı değişikliklerle kıyaslandığında istatistiksel olarak da önemli düzeyde bulunmuştur (Çizelge 7).

1. Dönem toprak örneklemeinden 2. Dönem toprak örneklemesine kadar geçen 120 günlük sürede, organik materyallerin kolay ayrıştırılabilir kısımlarının öncelikli olmak üzere ayrışabilirliklerini gerçekleştirmeleri, yeşil gübrelemenin yapılması ve havaların ısınması ile ALKPA aktivitesi açısından uygulamalar aralarında anlamlı bir fark oluşmamasına neden olmuş olabilir. Ancak yine de kontrol ve NPK uygulamalarıyla kıyaslandığında organik materyal uygulamalarının ALKPA aktivitesi üzerinde oluşturduğu değişiklikler istatistiksel olarak da önemli bulunmuştur. 2. yıl organik gübreleme sonucu SAÇ uygulamasının ALKPA aktivitesini önemli düzeyde en çok arttıran uygulama olduğu görülmektedir. Genel olarak 3. Dönem örnekleri, 1. Dönem ortalama ALKPA aktivitesinin gerisinde kalmıştır. Hava sıcaklığı düşüklüğünün hidrolitik enzimlerin aktivitesi üzerindeki baskılayıcı etkisi bilinmektedir (Kayıkcioglu vd., 2019).

Bir hidrolitik enzim olan ALKPA aktivitesinde ortaya çıkan en göze çarpan sonuçlardan birisi de son dönem örneklerinde şimdiye kadar incelenen mikrobiyal parametrelerin aktivitelerinde bir azalma gözlenirken, ALKPA aktivitesinde artışın gözlenmesidir. Ekstraselüler enzim olarak hücre dışında fonksiyon gören ALKPA, diğer mikrobiyal parametrelere göre mikrobiyal hücrelerden salgılandıktan sonra popülasyondan bağımsız olarak topraklarda fonksiyon göstermeye devam edebilmektedir. Toprak enzim analizleri, topraklardaki biyokimyasal süreçleri araştırmak ve toprakların biyolojik durumunu yansıtmak için toprak kalitesinin olası bütüncül bir ölçüsü olarak kullanılmıştır (Bandick ve Dick, 1999, Ndiaye vd., 2000, Vepsäläinen vd., 2001). Enzim analizleri, aktif mikroorganizmalara ve toprak matrisinde stabilize edilmiş enzimlere bağlı bir toprak örneğinin toplam aktivitesini ölçer. Bu durum özellikle topraktaki bozulmamış enzimleri bulunduğu ortamdan ekstrakte etmek zor

olduğundan kütle yerine aktivite ölçülme yolu tercih edilmektedir (Knight ve Dick, 2004). Küçük miktarlarda hücre dışı enzimler toprak kolloidleri üzerinde stabilize edilir ve aktivitelerini uzun süre koruyabilir (Burns, 1982, Nannipieri vd., 1996). Bu, bir mikrobiyal hücre tarafından alınamayacak kadar büyük veya çözünmeyen substratları ayrıştırmak ve/veya bu enzimleri sentezlemek zorunda kalmadan yarar sağlayabilecek bazı toprak organizmalarına ekolojik bir avantaj sağlayabilir. Ek olarak, bu stabilize edilmiş enzimlerin hem proteolitik enzimler hem de ısı ile denatürasyona karşı korunduğu görülmektedir (Nannipieri vd, 1996, Rao vd., 2000). Dolayısıyla, 4. Dönem toprak örneklerinin ALKPA aktivitesi ve diğer mikrobiyal parametrelerinin aynı dönemde göstermiş olduğu aktivite büyüklüğü birlikte incelendiğinde, ortam koşullarının canlı mikrobiyal popülasyon aktivitesini sınırladığı durumlarda kolloidal fraksiyon tarafından adsorbe edilmiş hidrolitik bir enzim olan ALKPA'nın etkinliğine devam edebildiği anlaşılmaktadır.

Tüm uygulamaların dönem ortalamaları incelendiğinde, ALKPA aktivitesinin istatistiki olarak önemli düzeyde en yüksek olduğu dönemlerin 4. ve 2. Dönem olarak saptanması, hem yeşil gübrelemenin hem de hava sıcaklığının ayrı ayrı veya ortaklaşa etkisiyle açıklanabilmektedir. Uygulamalara göre dört dönemde gerçekleşen ALKPA aktivitesinin ortama değerleri incelendiğinde ise, en etkili uygulamanın kontrole göre sağladığı %98 artışla SAÇ uygulaması olduğu görülmektedir ($P<0.05$). En düşük ALKPA aktivitesi ise kontrol ve NPK uygulamasında gerçekleşmiştir.

Çizelge 10'deki korelasyon çizelgesi incelendiğinde, ALKPA ile incelenen diğer tüm mikrobiyal parametrelerin pozitif bir ilişki gösterdiği görülmektedir. Organik ve yeşil gübreleme ile topraktaki mineral azot formlarının artışı aynı zamanda ALKPA aktivitesini de stimüle ettiği belirlenmiştir. ALKPA, N_{min} ile güçlü pozitif bir ilişki gösterirken ($r=0.668$, $P<0.01$), NO_3-N ile orta düzeyde ($r=0.515$, $P<0.01$) ve NH_4-N ile zayıf düzeyde ($r=0.250$, $P<0.05$) ilişki göstermiştir. ALKPA özellikle mikroorganizmalar tarafından topraklara salınabildiği için, hem BSR değeriyle ve hem de DHG parametresiyle güçlü pozitif korelasyonu ($r=0.185$) gösterdiği düşünülmektedir ($P<0.01$). BSR gibi topraktaki C-döngüsüyle ilişkili bir diğer parametre olan GLU değişkeni ile ALKPA arasında benzer şekilde güçlü bir ilişki ($r=0.649$) ortaya çıkmıştır ($P<0.01$). Alkali bir çözelti tarafından tamponlanarak belirlenen ALKPA aktivitesi ile toprak pH'sı arasında beklenebilecek negatif korelasyonun zayıf kuvvette de olsa saptanmış olması ($r=-0.257$) ayrıca güzel bir sonuç olarak değerlendirilmiştir. Elbette ki bu ilişki üzerinde toprakların tamponlama kapasitesinin de bir etkisinin olduğu söylenebilir.

3.1.5 B-Glukozidaz aktivitesi (GLU) üzerine etkileri

Proje kapsamında incelenen ikinci hidrolitik enzim olan GLU, aynı zamanda son mikrobiyal parametredir. B-Glukozidazlar, karbonhidratları, β -D-glikozu ayırarak bir β -D-glikozit bağı ile hidrolize eder. B-Glukozidazlar, selülozun glikoza toplam bozulmasında önemli bir rol oynar. Endo- ve ekzo- β , 4-glukazlar selülozu, bu işlemi rekabetçi bir şekilde inhibe eden selobiyozu hidrolize eder. B-glukozidaz ise selobiyoz ve diğer suda çözünür selodekstrinler gibi indirgeyici olmayan şekerleri hidrolize eder ve böylece glikoz oluşturulur (Deng ve Popova, 2011). Böylece selülozun bozulması teşvik edilir ve organizmalar aynı anda önemli bir enerji kaynağı ile beslenir. Daha sonra glikoz, glikoliz ve sitrik asit döngüsü (Nannipieri vd., 2012) vasıtasıyla CO₂'ye oksitlenir ve aktivitesi C'nin yanı sıra NH₄⁺ substratı tarafından uyarılabilir (Geisseler ve Horwath, 2009). Doğada, β -glukozidazlar bakteri, mayalar (Barnett vd., 1956), funguslar (Jermyn, 1958), bitkiler ve hayvanlarda yaygındır ve topraklarda sıklıkla bulunmaktadır (Skujins, 1976). Ancak GLU ağırlıklı olarak toprak mikrobiyal heterotroflarından, özellikle de Actinomucor veya Mortierella gibi Zygomycetes fungal üyelerinden salgılanmaktadır (Hayano ve Tubaki, 1985).

Çizelge 7. Bağımsız değişkenlerin alkanin fosfataz aktivitesi (ALKPA) üzerine etkileri ($\mu\text{g p-NP g}^{-1} \text{h}^{-1}$)

Uygulama Konuları	2018-2019 üretim yılı		2019-2020 üretim yılı		Ort.
	1. Dönem ^a	2. Dönem ^b	3. Dönem ^c	4. Dönem ^d	
SAÇ ^e	401.50 ^e bc D (± 19.4) ^f	523.79 a C (± 42.2)	624.21 a B (± 44.5)	740.63 a A (± 50.9)	573 A
TGK ^g	433.40 b B (± 10.3)	513.82 a A (± 78.9)	249.99 e C (± 11.4)	494.40 c-e AB (± 35.7)	423 DE
AGK ^h	412.63 bc AB (± 45.3)	482.24 a A (± 42.3)	362.57 cd B (± 51.3)	412.49 d-f AB (± 42.9)	418 DE
SAÇ+F ⁱ	429.46 b A (± 21.5)	473.76 ab A (± 16.5)	514.82 b A (± 19.2)	634.30 b A (± 15.6)	513 B
TGK+F ^j	556.53 a A (± 13.1)	522.62 a AB (± 30.0)	288.74 de C (± 11.5)	466.52 c-e B (± 45.1)	459 CD
AGK+F ^k	382.06 c B (± 3.00)	480.61 a A (± 60.1)	266.64 de C (± 43.9)	502.47 cd A (± 3.25)	408 DE
SAÇ+B ^l	421.70 bc C (± 19.6)	499.61 a B (± 19.6)	472.58 b BC (± 33.7)	615.37 b A (± 13.1)	502 BC
TGK+B ^m	387.81 bc C (± 6.72)	554.97 a A (± 6.88)	416.48 bc B (± 15.4)	536.41 bc A (± 22.1)	474 BC
AGK+B ⁿ	395.47 bc AB (± 26.0)	534.98 a A (± 20.3)	242.35 e B (± 38.2)	387.50 e-g AB (± 37.0)	390 E
K ^o	316.77 d AB (± 14.7)	339.11 b A (± 7.67)	199.35 e C (± 13.4)	300.56 g B (± 28.9)	289 F
NKP ^p	310.76 d AB (± 37.8)	340.77 b A (± 28.9)	265.96 de B (± 5.02)	355.39 fg A (± 11.2)	318 F
Ort.	404 B	479 A	355 C	495 A	

^a: 1. Dönem, 7 Ocak 2019 tarihli toprak örnekleme dönemi; ^b: 2. Dönem, 6 Mayıs 2019 tarihli toprak örnekleme dönemi; ^c: 3. Dönem, 24 Şubat 2020 tarihli toprak örnekleme dönemi; ^d: 4. Dönem, 13 Mayıs 2020 tarihli toprak örnekleme dönemi; ^e: Tüm değerler üç tekerrürün ortalaması olarak kuru madde bazında verilmiştir; ^f: Standart sapma; ^g: SAÇ, stabilize artıma çamuru uygulaması; ^h: TGK, tavuk gübresi kompostu uygulaması; ⁱ: AGK, ahır gübresi kompostu uygulaması; ^j: SAÇ+F, stabilize artıma çamuru + fiğ uygulaması; ^k: TGK+F, tavuk gübresi kompostu + fiğ uygulaması; ^l: AGK+F, ahır gübresi kompostu + fiğ uygulaması; ^m: SAÇ+B, stabilize artıma çamuru + bezelye uygulaması; ⁿ: TGK+B, tavuk gübresi kompostu + bezelye uygulaması; ^o: AGK+B, ahır gübresi kompostu + bezelye uygulaması; ^p: K, kontrol uygulaması; ^q: NPK, kimyasal gübre uygulaması. * Aynı harfle gösterilen ortalamalar Duncan testine göre birbirinden istatistiksel olarak farklı değildir (P<0.05). Küçük harfler aynı dönem içindeki farklı UYGULAMALARIN, büyük harfler ise aynı uygulamanın farklı DÖNEMLER içerisindeki karşılaştırmasını vermektedir. SATIR ORTALAMASI, aynı uygulamaya ait dönemler ortalamasını; SÜTÜN ORTALAMASI, ise aynı döneme ait uygulamaların ortalamasını vermektedir.

Araştırma topraklarında saptanan GLU değeri üzerine toprak örnekleme dönemi (DÖNEM), yeşil gübreleme uygulama konularının (KONU) ve DÖNEM x KONU interaksiyonunun birlikte etkisi $P<0.01$ düzeyinde önemli bulunmuştur. Çizelge 8'den de görüleceği üzere, araştırma topraklarının GLU aktivitesi $114.12-239.87 \mu\text{g Saligenin g}^{-1} 3\text{h}^{-1}$ arasında değişim göstermiştir.

Topraklara ilave edilen organik materyaller, toprakların fiziksel, kimyasal ve biyolojik özelliklerine farklı düzeyde etki ederlerken, GLU aktivitesi ile bu etki düzeyleri ortaya koyulabilmektedir. Uygulamalara bağlı olarak 1. Dönem örneklerinde GLU aktivitesi kontrole göre %29-82 arasında değişen düzeylerde daha yüksek olarak belirlenmiştir ($P<0.05$) (Çizelge 8). B-Glukozidaz aktivitesinin toprak yönetimine duyarlı olduğu bulunmuş (Bandick ve Dick, 1999, Madejón vd., 2001) ve toprak kalitesinin bir göstergesi olarak önerilmiştir (Ndiaye vd., 2000). Diğer toprak analizleriyle birlikte kullanılacak potansiyel bir toprak kalitesi göstergesi olarak çeşitli nedenlerden dolayı caziptir. İlk olarak, selüloz bileşiklerinin biyodegradasyonundaki son adımı ve daha sonra glikozun mikroorganizmalara salınmasını katalize eder (Esen, 1993). Bu nedenle, büyük ölçekte C-döngüsünün yanı sıra mikroorganizmalar için kolay ayrıştırılabilir bir C-enerji kaynağının serbest bırakılması nedeniyle küçük ölçekli süreçlerde de hayati bir rol oynar. İkinci olarak abiyotik form (adsorbe), toplam aktivitenin önemli bir miktarına katkıda bulunur (Hayano ve Tubaki, 1985, Hope ve Burns, 1987). Bu durum, hem geçmiş biyolojik aktivitenin hem de toprağın enzimleri stabilize etme ve koruma kabiliyetinin bütünleyici bir yansıması olarak toprak kalitesi göstergesi için yararlı bir özellik olarak değerlendirilebilir. Bu da, toprağın toprak organik maddesini stabilize etme kabiliyeti ile ilişkili olabilir. Ayrıca, daha önceki araştırmalar, bu enzimin hava ile kurutulmuş topraklar üzerindeki toprak yönetim etkilerini tespit edebildiğini ve toprak kalitesini test etmek için rutin ticari benimseme için bu analizi büyük ölçüde kolaylaştırdığını göstermiştir (Bandick ve Dick, 1999).

1. Dönem örneklerinde organik uygulamalar birbirlerine yakın GLU aktivitesi sergilemişlerdir. Bu anlamda ahır gübresi kompostunun düşük GLU aktivitesi gösterdiği belirtilebilir ($P<0.05$). SAÇ ve TGK temelli organik uygulamaları ise GLU aktivitesini en fazla arttıran uygulamalar olarak belirlenmiştir. Yeşil gübreleme ile birlikte uygulamaların sağladığı GLU aktivitesinde bir artış belirlense de bu fark istatistiksel olarak önemli bulunmamıştır. Ancak uygulamaların ortalama değerleriyle ortaya çıkan dönem ortalama GLU değeri $208 \mu\text{g Saligenin g}^{-1} 3\text{h}^{-1}$ olarak belirlenmiş olup, bu değer dönem ortalamaları arasındaki en yüksek değerdir ($P<0.05$). Bu dönemde de uygulamalar arasında belirgin bir farklılığın oluşmamasına rağmen, kontrol ve

NPK uygulamasına göre tüm uygulamalar istatistiksel olarak yüksek düzeyde GLU aktivitesi göstermişlerdir.

B-Glukozidaz aktivitesi, toprak yönetimindeki değişiklikleri nispeten kısa sürelerde (1-3 yıl) tespit edebilir ve mevsimlere göre nispeten karardır (Bandick ve Dick, 1999, Ndiaye vd., 2000). Bu özelliğinin bir sonucu olarak, kısa dönemlerde büyük ölçüde değişebilen, kalibrasyon ve yorumlamayı zorlaştıran çoğu diğer biyolojik ölçümler kıyaslandığında bir toprak kalitesi göstergesi olarak avantajlıdır. Bununla birlikte, toprak kalitesini tam olarak değerlendirmek için diğer biyolojik, kimyasal veya fiziksel özelliklerin ölçülmesi gerektiği unutulmamalıdır.

İkinci yıl organik materyal uygulamalarıyla ilk yıla göre GLU aktivitesinde bir azalışın görülmesi ilgi çekicidir ($P<0.05$). Burada kullanılan organik materyallerin özellikleriyle ilişkili ileri analizlerin yapılması önerilmektedir. Ancak ALKPA dışındaki diğer mikrobiyal parametrelerin aktivitesinin düştüğü 4. Dönem örneklerinde aynı ALKPA aktivitesinde olduğu gibi GLU aktivitesinin de yükseliş göstermesi ($P<0.05$), hidrolitik enzimlerin koloidal fraksiyon tarafından stabilizasyonunun sağlandığının bir diğer göstergesi olabilmektedir.

Dört örnekleme döneminin ortalama sonuçları dikkate alındığında kontrole göre GLU aktivitesini %58 düzeyinde artıran SAÇ uygulamasının ön plana çıktığı ve bu uygulamayı SAÇ+F, SAÇ+B ve TGK+F uygulamalarının takip ettiği görülmektedir ($P<0.05$).

BSR değeri gibi korelasyon analizine tabi tutulan tüm değişkenlerle ilişki gösteren bir diğer parametre ise GLU aktivitesidir (Çizelge 10). Topraktaki C-döngüsünde görev alan β -glukozidaz, özellikle topraklara organik materyal ilavelerinde dikkate alınması gerekli bir hidrolitik enzimdir. GLU ile BSR arasında çok güçlü olumlu bir ilişkinin ($r=0.855$, $P<0.01$) belirlenmesi güzel bir sonuçtur. Bununla birlikte GLU ile N_{min} ($r=0.374$) ve DHG ($r=0.381$) arasında zayıf düzeyde pozitif ilişki belirlenirken ($P<0.01$), NH_4-N ($r=0.521$) ve NO_3-N ($r=0.456$) ile arasında orta, ALKPA ($r=0.649$) ile arasında ise güçlü ve olumlu bir ilişki belirlenmiştir ($P<0.01$). Topraktaki nem düzeyi ile GLU aktivitesi arasında aynı yönde ve orta düzeyde kuvvete sahip bir ilişki ortaya çıkmıştır ($P<0.01$).

Çizelge 8. Bağımsız değişkenlerin β -glukozidaz aktivitesi (GLU) üzerine etkileri (μg Saligenin g^{-1} 3h^{-1})

Uygulama Konuları	2018-2019 üretim yılı		2019-2020 üretim yılı		Ort.
	1. Dönem ^a	2. Dönem ^b	3. Dönem ^c	4. Dönem ^d	
SAÇ ^e	218.39 ^f ab A (± 26.7) ^f	222.54 a A (± 30.6)	202.19 a A (± 19.8)	197.04 ab A (± 4.08)	210 A
TGK ^h	214.64 ab A (± 6.13)	222.36 a A (± 8.73)	137.64 d-f C (± 12.1)	183.85 a-c B (± 15.8)	190 C
AGK ⁱ	170.15 c A (± 22.7)	184.14 bc A (± 16.6)	173.56 bc A (± 6.13)	168.60 bc A (± 8.85)	174 D
SAÇ+F ^g	219.00 ab AB (± 19.3)	231.68 a A (± 24.5)	184.58 ab B (± 13.7)	183.63 a-c B (± 39.8)	205 AB
TGK+F ^h	239.87 a A (± 8.12)	238.22 a A (± 5.51)	154.25 c-e C (± 16.6)	194.55 ab B (± 9.73)	207 AB
AGK+F ⁱ	203.28 b AB (± 17.3)	221.91 a A (± 18.9)	138.59 d-f C (± 24.4)	170.92 bc BC (± 9.60)	184 CD
SAÇ+B ^m	218.02 ab A (± 24.7)	221.66 a A (± 20.0)	176.17 a-c B (± 15.3)	208.35 a A (± 9.87)	206 AB
TGK+B ⁿ	208.48 ab A (± 3.95)	222.48 a A (± 19.1)	162.29 b-d B (± 12.2)	176.81 a-c B (± 14.0)	193 BC
AGK+B ^o	206.42 ab A (± 25.1)	207.83 ab A (± 15.0)	159.03 b-d B (± 14.0)	152.96 cd B (± 4.89)	182 CD
K ^r	131.63 d A (± 13.2)	149.92 d A (± 12.4)	126.31 ef A (± 14.4)	125.83 de A (± 14.3)	133 E
NKP ^s	149.37 cd AB (± 29.1)	162.04 cd A (± 24.6)	114.12 f B (± 13.3)	119.95 e AB (± 21.0)	136 E
Ort.	198 B	208 A	157 D	171 C	

^a: 1. Dönem, 7 Ocak 2019 tarihli toprak örnekleme dönemi; ^b: 2. Dönem, 6 Mayıs 2019 tarihli toprak örnekleme dönemi; ^c: 3. Dönem, 24 Şubat 2020 tarihli toprak örnekleme dönemi; ^d: 4. Dönem, 13 Mayıs 2020 tarihli toprak örnekleme dönemi; ^e: Tüm değerler üç tekerrürün ortalaması olarak kuru madde bazında verilmiştir; ^f: Standart sapma; ^g: SAÇ, stabilize artıma çamuru uygulaması; ^h: TGK, tavuk gübresi kompostu uygulaması; ⁱ: AGK, ahır gübresi kompostu uygulaması; ^j: SAÇ+F, stabilize artıma çamuru + fiğ uygulaması; ^k: TGK+F, tavuk gübresi kompostu + fiğ uygulaması; ^l: AGK+F, ahır gübresi kompostu + fiğ uygulaması; ^m: SAÇ+B, stabilize artıma çamuru + bezelye uygulaması; ⁿ: TGK+B, tavuk gübresi kompostu + bezelye uygulaması; ^o: AGK+B, ahır gübresi kompostu + bezelye uygulaması; ^p: K, kontrol uygulaması; ^q: NPK, kimyasal gübre uygulaması. * Aynı harfle gösterilen ortalamalar Duncan testine göre birbirinden istatistiksel olarak farklı değildir (P<0.05). Küçük harfler aynı dönem içindeki farklı UYGULAMALARIN, büyük harfler ise aynı uygulamanın farklı DÖNEMLER içerisindeki karşılaştırmasını vermektedir. SATIR ORTALAMASI, aynı uygulamaya ait dönemler ortalamasını; SÜTUN ORTALAMASI, ise aynı döneme ait uygulamaların ortalamasını vermektedir.

3.2. Bağımsız Değişkenlerin Zeytin Verimi Üzerine Etkisi

Denemede organik gübre uygulamalarının 2019 ve 2020 yıllarında yapılan hasat ile belirlenen zeytin bitkisinin verimi üzerine olan etkisi Çizelge 9'de gösterilmiştir. Varyans analizine göre verim parametresi üzerine konuların etkinliği %1 düzeyinde önemli bulunmuştur.

Çizelge 4. Bağımsız değişkenlerin zeytin bitkisi verimi üzerine etkileri (kg zeytin ağaç⁻¹)

Uygulama Konuları	2018-2019 üretim yılı	2019-2020 üretim yılı	Ort.
SAÇ ^c	18.33 ^a b (± 0.94) ^b	23.83 a (± 2.72)	21.08 AB
TGK ^d	14.67 d (± 0.94)	16.33 c (± 1.25)	15.50 CD
AGK ^e	11.45 e (± 0.32)	16.00 c (± 0.82)	13.73 DE
SAÇ+F ^f	16.87 c (± 0.84)	20.27 b (± 0.38)	18.57 BC
TGK+F ^g	14.78 d (± 0.71)	16.00 c (± 1.08)	15.38 CD
AGK+F ^h	12.30 e (± 0.79)	20.33 b (± 1.25)	16.32 CD
SAÇ+B ⁱ	20.33 a (± 1.20)	25.67 a (± 0.94)	23.00 A
TGK+B ^j	15.42 d (± 0.47)	16.67 c (± 0.24)	16.04 CD
AGK+B ^k	15.30 d (± 0.65)	19.83 b (± 1.55)	17.57 C
K ^l	7.67 f (± 0.53)	7.23 e (± 0.21)	7.45 F
NKP ^m	11.28 e (± 1.18)	12.83 d (± 0.24)	12.06 E

^a: Tüm değerler üç tekrerrün ortalaması olarak kuru madde bazında verilmiştir; ^b: Standart sapma; ^c: SAÇ, stabilize arıtma çamuru uygulaması; ^d: TGK, tavuk gübresi kompostu uygulaması; ^e: AGK, ahır gübresi kompostu uygulaması; ^f: SAÇ+F, stabilize arıtma çamuru + fiğ uygulaması; ^g: TGK+F, tavuk gübresi kompostu + fiğ uygulaması; ^h: AGK+F, ahır gübresi kompostu + fiğ uygulaması; ⁱ: SAÇ+B, stabilize arıtma çamuru + bezelye uygulaması; ^j: TGK+B, tavuk gübresi kompostu + bezelye uygulaması; ^k: AGK+B, ahır gübresi kompostu + bezelye uygulaması; ^l: K, kontrol uygulaması; ^m: NPK, kimyasal gübre uygulaması.

* Aynı harfle gösterilen ortalamalar Duncan testine göre birbirinden istatistiksel olarak farklı değildir (P<0.05). Küçük harfler aynı dönem içindeki farklı UYGULAMALARIN karşılaştırmasını vermektedir. SATIR ORTALAMASI, aynı uygulamaya ait yılların ortalamasını vermektedir.

İlk yıl verim değerleri incelendiğinde, yapılan tüm uygulamaların kontrole göre zeytin verimini %49-165 arasında ortalama olarak %102 düzeyinde artırdığı görülmektedir. Zeytin verimini en çok artıran uygulama %165 ile SAÇ+B uygulaması olmuştur (P<0.05). İkinci yılda ise uygulamaların verim üzerindeki etkisi daha belirgin olmuştur. Uygulamaların zeytin verimini %121-255 arasında ortalama olarak ise %169 düzeyinde arttırdığı saptanmıştır. Yine ilk yıl eğilimine benzer şekilde bu dönemde de SAÇ+B uygulaması istatistiki olarak en yüksek verimi 25.67 kg ağaç⁻¹ değeri ile sağlamıştır (P<0.05). SAÇ uygulaması ise 23.83 kg ağaç⁻¹ verim değeri ile SAÇ+B ile aynı istatistiki gruplandırma içinde yer almıştır. Her ne kadar da çok yıllık ağaçlarda yapılan uygulamaların olası olumsuz etkinliği kısa süreli incelemeler ile ortaya çıkamayabilse de, iki yıllık organik gübre uygulamalarının zeytin ağaçlarında herhangi bir fitotoksite göstermemesi ve bunun yanında verim değerlerini bir önceki yıla arttırmış olması kayda değer bir gelişme olarak değerlendirilmiştir. İki yıllık ortalama değerleri dikkate alındığında, SAÇ+B uygulamasının 23.00 kg ağaç⁻¹ ve SAÇ uygulamasının 21.08 kg ağaç⁻¹ değerleri ile kontrole göre ortalama %196 ve kimyasal gübre uygulamasına göre ise %83

düzeyinde artış sağlayarak diğer uygulamalardan önemli düzeyde farklılık gösterdikleri söylenebilir ($P>0.05$).

Çizelge 10. Farklı organik materyaller ile çeşitlendirilmiş yeşil gübreleme kombinasyonlarının uygulamalarının sonucu topraktaki mikrobiyal ve kimyasal parametreler ile verim arasında ortaya çıkan Pearson korelasyon katsayıları

	ALKPA	NH ₂ -N	NO ₂ -N	N _{tot}	BSR	DHG	GLU	pH	EC	OM	N	P	K	Ca	Mg	Na	Fe	Cu	Zn	Mn	Verim	Nem	
ALKPA	1																						
NH ₂ -N	0.250*	1																					
NO ₂ -N	0.515**	0.810**	1																				
N _{tot}	0.668**	0.516**	0.760**	1																			
BSR	0.669**	0.496**	0.423**	0.371**	1																		
DHG	0.787**	0.075	0.405**	0.675**	0.359**	1																	
GLU	0.649**	0.521**	0.456**	0.374**	0.855**	0.381**	1																
pH	-0.257*	-0.246*	-0.560**	-0.611**	0.100	-0.360**	0.051	1															
EC	0.282*	-0.160	0.241	0.495**	-0.306*	0.493**	-0.294*	-0.727**	1														
OM	0.023	-0.309**	0.018	0.305*	-0.563**	0.289*	-0.452**	-0.495**	0.743**	1													
N	0.070	-0.304*	0.043	0.326**	-0.535**	0.371**	-0.453**	-0.532**	0.839**	0.938**	1												
P	0.233	-0.255**	0.146	0.434**	-0.416**	0.460**	-0.334**	-0.606**	0.883**	0.895**	0.942**	1											
K	-0.194	-0.061	-0.275*	-0.305*	0.014	-0.212	0.002	0.414**	-0.316**	-0.214	-0.276*	-0.286*	1										
Ca	-0.043	-0.186	-0.068	-0.025	-0.222	-0.015	-0.206	0.034	0.198	0.261*	0.312*	0.340**	0.092	1									
Mg	0.020	-0.333**	-0.013	0.290*	-0.567**	0.296*	-0.476**	-0.588**	0.840**	0.871**	0.903**	0.907**	-0.245*	0.350**	1								
Na	0.390**	0.223	0.201	0.128	0.503**	0.081	0.462**	0.139	-0.225	-0.400**	-0.435**	-0.296*	0.277*	0.074	-0.345**	1							
Fe	0.285*	-0.212	0.139	0.462**	-0.313*	0.513**	-0.198	-0.633**	0.820**	0.741**	0.787**	0.872**	-0.243*	0.095	0.772**	-0.248*	1						
Cu	-0.081	-0.357**	-0.084	0.217	-0.621**	0.271*	-0.512**	-0.451**	0.721**	0.863**	0.893**	0.836**	-0.346**	0.232	0.897**	-0.628**	0.716**	1					
Zn	0.396**	-0.155	0.253*	0.512**	-0.227	0.506**	-0.126	-0.600**	0.773**	0.772**	0.813**	0.928**	-0.360**	0.345**	0.762**	-0.122	0.811**	0.675**	1				
Mn	0.119	-0.296**	0.053	0.375**	-0.462**	0.400**	-0.368**	-0.669**	0.869**	0.803**	0.850**	0.862**	-0.353**	0.130	0.880**	-0.449**	0.900**	0.855**	0.738**	1			
Verim	0.583**	0.321**	0.580**	0.724**	0.263*	0.637**	0.325**	-0.611**	0.511**	0.369**	0.408**	0.461**	-0.394**	-0.135	0.349**	-0.154	0.499**	0.333**	0.470**	0.467**	1		
Nem	0.291*	0.349**	0.285*	0.037	0.614**	0.033	0.544**	0.190	-0.395**	-0.602**	-0.630**	-0.517**	0.114	-0.188	-0.577**	0.465**	-0.399**	-0.657**	-0.407**	-0.503**	-0.064	1	

** : Korelasyon 0.01 düzeyinde anlamlıdır ($P<0.01$); * : Korelasyon 0.05 düzeyinde anlamlıdır ($P<0.05$). Renklendirme pozitif yönde mavi renk ile negatif yönde ise kırmızı renk ile yapılmıştır. Renk tonları, Evans (1996) tarafından yapılan korelasyon faktörü için mutlak değer sınıflandırılması olan; çok zayıf (0.000-0.199), zayıf (0.200-0.399), orta (0.400-0.599), güçlü (0.600-0.799) ve çok güçlü (0.800-1.000) olarak yapılmıştır. |

4. SONUÇ ve ÖNERİLER

Sürdürülebilir toprak verimliliğinin tesisinde en önemli parametreler arasında yer alan toprağın organik maddesi, Akdeniz biyodegradasyonu koşulları altındaki tarım topraklarımızda %1 in altında olduğu görülmektedir. Bununla birlikte gün geçtikçe verimsizleşen topraklarımızda daha fazla kimyasal gübre kullanımıyla birlikte üretim yapılmaya çalışılmaktadır. Organik ve yeşil gübreleme, özellikle nadasa bırakılan tarım arazilerinde ve organik tarım yapılan topraklarda başta olmak üzere, konvansiyonel tarım alanlarında da sürdürülebilir toprak verimliliğinin sağlanması bakımından önde gelen kültürel işlemlerden birisidir. Yapılan bu çalışma ile iyi bir toprak düzenleyicisi ve bitki besin elementi kaynağı olan ahır gübresi, tavuk gübresi ve arıtma çamurunun, yeşil gübreleme kombinasyonu ile toprağa ilave edilmesiyle biyolojik ve kimyasal toprak özelliklerinde meydana gelecek değişikliklerin saptanması, uygulanacak kimyasal gübre ile kıyaslanmanın yapılması ve Ayvalık çeşidi zeytinin verimine etkilerinin belirlenmesi gerçekleştirilmiştir. Ayrıca yapılan bu çalışma ile özellikle monokültür tarım sistemlerinde toprak yorgunluğunu önleyebilmek ve toprak sağlığını tesis edebilmek amacıyla meyve ağaçlarının altına örtücü/kapatici bitki olarak yeşil gübre bitkilerinin yetiştiriciliğinin etkileri de belirlenmeye çalışılmıştır.

Organik gübreleme incelenen tüm mikrobiyal parametreleri istatistiksel olarak önemli düzeyde arttırdığı belirlenmiştir. Ortalama olarak mikrobiyal parametreler kontrole göre ortalama %1-

116 arasında deęişen düzeylerde artış göstermiştir. Bu durumun kullanılan organik materyallerin sahip oldukları fiziksel ve kimyasal özellikleri nedeniyle topraklardaki mikrobiyal aktiviteyi teşvik ettiği ve bu etkinin materyalin özelliklerine baęlı olarak deęişken düzeylerde olduğu belirtilebilir. Baęımsız deęişkenlere baęlı olarak BSR, %52-90 arasında ortalama %72, N_{min} %1-116 arasında ortalama %37, DHG %12-79 arasında ortalama %45, ALKPA %35-98 arasında ortalama %60 ve GLU %30-57 arasında ortalama %46 düzeyinde artış göstermiştir. Amonifikasyon ve nitrifikasyon sonucu topraklarda oluşan NH_4-N , %7-126 arasında ortalama %46 ve NO_3-N 'u %23-546 arasında ortalama %212 düzeylerinde artmıştır. İlâveten, organik gübre uygulamaları NPK, mineral gübre uygulamasına göre de incelenen bu parametreleri %43-125 arasında deęişen oranlarda artırmıştır.

Dört dönem halinde gerçekleştirilen örnek alma periyotları incelenen baęımlı mikrobiyal deęişkenler açısından da farklı etkilere sahip olmuştur. Nitrifikasyon süreci ile oluşan NO_3-N konsantrasyonu 1. Dönem örneklerinde en yüksek konsantrasyonda analiz edilirken, N_{min} deęerinin de aynı dönemde en düşük belirlenmesi birbirini doğrulayan iki önemli sonuç olarak ifade edilebilir. Organik atıkların ilk yıl uygulanmasıyla birlikte topraktaki N-mineralizasyon süreçleri hızlanmış ancak ilerleyen dönemlerde aynı hıza ulaşamamıştır. Yine benzer şekilde potansiyel mineralize olabilecek azot miktarının (N_{min}) istatistiksel olarak önemli düzeyde yüksek belirlendięi 4. Dönemde, istatistiksel olarak anlamlı en düşük NO_3-N konsantrasyonunun belirlenmesi de benzer şekilde birbirlerini konfirme eden sonuçlardır. 4. Dönemde belirlenen bu düşüklüğün nedeni olarak örnek alma dönemlerinden önce gerçekleşen yoğun yağışlardan sonra canlı mikrobiyal aktivitenin rehabilitasyon sürecini tamamlayamaması olarak düşünülmektedir. Dięer mikrobiyal parametreler olan BSR, DHG, GLU, ALKPA ve amonifikasyon sonucu oluşan NH_4-N konsantrasyonu parametreleri 2. Dönem örneklerinde istatistiksel olarak anlamlı bir farklılık oluşturarak en yüksek düzeyde saptanmışlardır. Yeşil gübreleme uygulamalarının özellikle bu hususta etkili olduęu düşünülmektedir. İki yıl üst üste SAÇ, TGK ve AGK uygulamaların baęlı olarak 3. Dönemde belirlenen DHG ve BSR ile NH_4-N parametrelerinde önemli düzeyde bir artışın olması, organik materyal kaynaklarının iki yıl üst üste kullanılması sonucu toprakların toplam canlı mikrobiyal popülasyon büyüklüğü ile C- ve N-mineralizasyon süreçlerinin olumlu etkilendięi şeklinde yorumlanabilir.

Uygulamalara yeşil gübrelemenin ilave edilmesiyle incelenen mikrobiyal parametrelerde anlamlı farklılıklarının olduğu belirlenmiştir. ALKPA dışındaki tüm mikrobiyal parametreler yeşil gübre uygulamalarına baęlı olarak artış göstermiştir. GLU aktivitesi ile inorganik azot konsantrasyonları fiğ yeşil gübrelemesi ile daha çok teşvik edilirken, potansiyel mineralize

olabilir azot miktarı, BSR ve DHG parametreleri ise bezelye yeşil gübrelemesine çok olumlu yanıtlar vermiştir. Genel çerçevede bezelye yeşil gübrelemesinin daha fazla sayıda parametreyi olumlu teşvik ettiği, buna karşılık fiğ yeşil gübrelemesinin ise olumlu etkilediği mikrobiyal parametrelerin miktarını daha fazla yükselttiği saptanmıştır. Yeşil gübrelemesiz uygulamalara göre fiğ yeşil gübrelemesi ortalama %10.4 düzeyinde bir artış sağlarken, bu oran bezelye yeşil gübrelemesi için %8.6 olarak gerçekleşmiştir. Stabilize arıtma çamuru uygulaması, proje kapsamında incelenen mikrobiyal parametreleri diğer organik gübre uygulamalarından çok daha fazla ve önemli düzeyde arttırmıştır. SAÇ uygulamasının fiğ ve bezelye ile yeşil gübre kombinasyonlu uygulama konuları da en etkili gübreleme yöntemi olarak ortaya çıkmıştır. Bu bağlamda SAÇ+B uygulamasının SAÇ+F uygulamasına göre daha fazla sayıda mikrobiyal parametre üzerinde etkili olduğu belirtilebilir. Çalışma kapsamında elde edilen önemli bir sonuç ise kolloidal fraksiyon tarafından stabilize edilmiş hidrolitik enzimler ile ilgilidir. İncelenen mikrobiyal parametreler (N-mineralizasyonu, toprak solunumu, dehidrogenaz aktivitesi, amonifikasyon ve nitrifikasyon süreçleri sonunda oluşan NH_4 ve NO_3 konsantrasyonu) toprak örneği alma dönemleri öncesi gerçekleşen yoğun yağışlardan etkilenirken, topraklarda adsorbe edilmiş GLU ve ALKPA hidrolitik enzimlerinin ise aktivitelerine devam edebildikleri belirlenmiştir.

Çalışmadan elde edilen bir başka sonuç ise nitrifikasyonun toprağın nem durumuyla yakından ilişkili olduğu düşünülmektedir. Toprak nemi % 8'ler düzeylerinde olduğunda ortamda substratı olsa bile NO_3 oluşumu gerçekleşmezken, toprak nemi % 16 düzeylerine çıktığında nitrat oluşumunun arttığı belirlenmiştir. Toprakların proje kapsamında incelenen tüm kimyasal özellikler üzerinde organik madde kaynaklarının ve yeşil gübre kombinasyonlarının belirgin bir etkisi saptanamamıştır. Bunların arasından pH, EC, P ve Fe ön plana çıkan parametreler olmuştur. SAÇ uygulamalarına bağlı olarak toprak pH değeri %6-7 arasında değişen düzeylerde azalış göstermiştir ($P<0.05$). SAÇ+B uygulaması ile EC değerinde kontrole göre %81 düzeyinde bir artış sağlanırken, SAÇ ve SAÇ+F uygulamalarıyla %125 düzeyinde toprak tuzluluğunda artış belirlenmiştir ($P<0.05$). Ancak bu pH düşmesinin ve tuzluluk artışının, bitkisel üretimi ve topraklardaki mikrobiyal aktiviteyi sekteye uğratabilecek seviyelerde olmadığı belirtilebilir. Alınabilir fosfor konsantrasyonunu kontrole göre en fazla arttıran uygulama SAÇ olmuştur. %83 düzeyindeki artış istatistiksel olarak da %5 düzeyinde önemli bulunmuştur. Bunun dışında %53 düzeyindeki artış ile SAÇ+F uygulaması ve %56 düzeyindeki artışla SAÇ+B uygulaması kontrole göre alınabilir fosforu önemli düzeyde arttıran diğer uygulamalar olmuşturlardır. Miktarında oluşturduğu farklılığın önemli olarak belirlendiği bir diğer parametre

ise alınabilir Fe olmuştur. Alınabilir Fe miktarını istatistiki olarak %40 düzeyinde en çok arttıran uygulama yine SAÇ+B uygulaması olmuştur ($P<0.05$). Zeytin verimini her iki yılda en fazla arttıran organik madde kaynağı stabilize arıtma çamuru olurken, en fazla arttıran uygulamalar olarak SAÇ+B 23.00 kg ağaç⁻¹ ve SAÇ 21.08 kg ağaç⁻¹ değerleri ile kontrole göre ortalama %196 ve kimyasal gübre uygulamasına göre ise ortalama %83 düzeyinde artış sağlayarak diğer uygulamalardan önemli düzeyde farklılık göstermişlerdir ($P>0.05$).

İki yıllık çalışma sonuçları dikkate alındığında Akdeniz iklim koşulları altında toprak sağlığını arttırabilmek ve sürdürülebilir hale getirmek için sofralık/yemlik bezelye bitkili yeşil gübreleme ile birlikte kombinasyon halinde stabilize arıtma çamuru uygulaması (60 kg SAÇ ağaç⁻¹ + 200 g bezelye ağaç⁻¹) önerilmektedir. Bu sayede hem atık vasfındaki organik madde kaynağının toprakların özelliklerini iyileştirmek için kullanılması sağlanacak hem de ürün veriminde de artışlar sağlanabilecektir.

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YAPRAK GÜBRESİ VE *Trichoderma harzianum* UYGULAMASININ HIYARDA FİDE KALİTESİ ÜZERİNE ETKİLERİ

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Özet

Bu çalışmada tohum ekim ortamına eklenen *Trichoderma harzianum* (*Th*) mantarı ile birlikte fide aşamasında yaprak gübresi uygulamasının hıyar fidelerinde fide gelişimi ve kalitesine olan etkilerini belirlemek amaçlanmıştır. Sera domatesi rizosferinden izole edilen *Th* suşu, 20:20:20 yaprak gübresi ile birlikte test edilmiştir. Deneme *Th* suşu ilaveli ve ilavesiz tohum ekim ortamları ve fideler çıktıktan sonra yaprak gübresi uygulamalı ve uygulamaz konulardan oluşmuştur. *Th* suşu ilgili konu için sıvılaştırılarak yetiştirme ortamına (torf) uygulanmış ve bulaşık torf viyollere doldurulup, Opal F₁ hıyar çeşidine ait tohumlar ekilmiştir. Kontrol uygulamasında *Th* ilavesiz torf kullanılmıştır. Viyoller çimlendirme odasında 3 gün tutulduktan sonra, fideler dikim büyüklüğüne gelene kadar fide serasında tutulmuştur. Bu süre içerisinde *Th*+gübreli ve kontrol uygulamasındaki fidelere su rampası ile üstten günde 1 kez yaprak gübresi; *Th*+gübresiz uygulamasına ise sadece su verilmiştir. Deneme sonuçları, fide kalite indeksinin *Th*+gübreli ve kontrol uygulamasında yüksek çıktığını; *Th*+gübreli uygulamasının özellikle fide biyokütlesini, yaprak klorofil ve yeşil renk değerlerini arttırdığını göstermiştir. *Th* uygulaması yaprak gübresi ile birlikte kullanıldığında yaprak gübresinin etkinliğini arttırdığı, yaprak gübresi uygulanmadan *Th* uygulamasının neredeyse ölçülen tüm parametrelerde kontrol uygulamasının altında kaldığı belirlenmiştir. Elde edilen veriler birlikte değerlendirildiğinde, fide biyokütlesi ve kalite indeksine olan olumlu etkileri nedeni ile *Th*'un hıyar fidesi kalitesini arttırmada tohum ekim ortamına uygulanabileceği ve fide aşamasında yaprak gübresi ile kombine edildiğinde fide kalitesi üzerine daha da olumlu etkiler yaptığı ortaya konmuştur.

Anahtar Kelimeler: *Cucumis sativus*, mantar, suş, yaprak gübresi, biyokütle, kalite indeksi

EFFECTS OF LEAF FERTILIZER and *Trichoderma harzianum* APPLICATION ON CUCUMBER SEEDLING QUALITY

Abstract

This study aimed to determine the effects of leaf fertilizer application during the seedling stage, in conjunction with the addition of *Trichoderma harzianum* (*Th*) fungus to the seed sowing medium, on the seedling development and quality of cucumber seedlings. The *Th* strain isolated from the rhizosphere of greenhouse tomatoes was tested in combination with a 20:20:20 leaf fertilizer. The treatment consisted of seed sowing mediums with and without the addition of the *Th* strain, and after the seedlings emerged, treatments included applications of with and without leaf fertilizer. *Th* strain was liquefied and applied to the growing medium (peat) and the contaminated peat was filled into seedling trays and the seeds of the cucumber cv. Opal F₁ were sown. Trays were kept in the germination room for 3 days and then in the seedling greenhouse until the seedlings reached planting size. During this period, foliar fertilizer was applied once a day from the top with a boom system for *Th*+with fertilizer and control seedlings; *Th*+without fertilizer treatment was irrigated only water. The results of the experiment showed that the seedling quality index was higher in the *Th*+fertilizer and control, and the *Th*+fertilizer application especially increased the seedling biomass, leaf chlorophyll, and green color (a) values. It was determined that *Th* application increased the effectiveness of foliar fertilizer when used together with *Th*, and *Th*+without fertilizer treatment was generally inferior to the control treatment in almost all measured parameters. When the obtained data were collectively evaluated, it was revealed that *Th* could be applied to the seed sowing medium to enhance cucumber seedling quality, and when combined with leaf fertilizer during the seedling stage, it had even more positive effects on seedling quality.

Keywords: *Cucumis sativus*, fungus, strain, foliar fertilizer, biomass, quality index

Giriş

Çevreye duyarlı üretim sistemlerinde gübreleme ve ilaçlama programlarında kullanılan alternatif uygulamalardan birisi de “faydalı mikroorganizmalar”ın kullanımudur. Rizosferde çok sayıda faydalı mikroorganizma (bakteri, fungus, alg ve protozoa) bulunmaktadır. Ancak bu gruplar içerisinde bakteriler büyük çoğunluğu oluşturmaktadır (İmriz ve ark., 2014). Bu faydalı bakteriler Kloepper et al. (1980) tarafından “Bitki Gelişimini Teşvik Eden Rizobakteriler (Plant Growth Promoting Rhizobacteria: PGPR)” olarak adlandırılmıştır. *Pseudomonas*, *Azospirillum*, *Azotobacter*, *Klebsiella*, *Enterobacter*, *Alcaligenes*, *Arthrobacter*, *Burkholderia*, *Bacillus* ve *Serratia* türleri PGPR olarak sayılmaktadır (Saharan and Nehra, 2011). PGPR'lar ile yapılan çalışmalar, bu bakterilerin tarımsal üretimi sınırlayan biyotik (Şevik, 2010; Yıldız et al., 2012) ve abiyotik (Mayak et al., 2004; Çakmakçı, 2009; Ram et al., 2013) faktörlere karşı toleransı arttırdığını; atmosferdeki serbest azotu bağladığını, fosforun çözünürlüğünü ve organik artıkların ayrışmasını arttırdığını, enzim ve fitohormon üretimini arttırdığını, tüm bunlara bağlı olarak da toprak yapısı ve verimliliğini iyileştirdiğini, bitkinin kök gelişimini ve besin elementi alınımını arttırdığını, yer-besin yarışı ve ürettiği bazı sekonder metabolitler ile patojen gelişimini baskıladığını, sonuçta bitki gelişimi ve verimini arttırdığını (Glick, 1995; Çakmakçı, 2005 & 2009; Saharan and Nehra, 2011; Ram et al., 2013; İmriz ve ark., 2014) ortaya koymuştur.

Bitki gelişimini teşvik eden bakteriler gibi *Trichoderma* mantarların da sera ve tarla koşullarında PGPRlar gibi etkiler sergilediği görülmüştür (Inbar et al., 1994; Küçük ve Kıvanç, 2001; Harman, 2006). Bakterilerin de işin içerisine dahil olması ile birlikte bu tür mikroorganizmaları tanımlamak için genel bir ifade ile “faydalı/yararlı mikroorganizmalar” terimi kullanılmaya başlanmıştır. Faydalı mikroorganizmalar, etki özelliklerine göre biyofertilizer (besin elementlerinin bitki kullanımına hazır hale getirenler), bitki stimülatörü (bitki gelişimini teşvik edenler), biyopestisit (bitki koruyucular) ve rizoremediator (organik kirleticileri parçalayarak indirgeyenler) olarak ruhsatlandırılabilir (Somers et al., 2004).

Köklerde serbest yaşayan bir toprak mantarı cinsi olarak kabul edilen *Trichoderma* (Samuels, 2006) yeşile yakın renklerde gözlenmekte ve hızlı çoğalma kabiliyetindedirler (Aydın, 2015). *Trichoderma* genusun tarım açısından önemi sera ve tarla koşullarında toprak kaynaklı hastalıkları kontrol etmede biyolojik mücadele ajanı olma potansiyellerinden kaynaklanmaktadır (Singh et al., 2007; Jangir et al., 2017). Bu amaçla çoğunlukla *T. harzianum* ve *T. viride* türleri kullanılmaktadır (Harman, 2006). Bitki patojenlerine karşı iyi bir antagonistik yeteneğe sahip olan bu mantar türleri, antifungal metabolitlerin üretimi, besin ve

yer için yarışma ve mikoparazitlik gibi farklı mekanizmalar ile etkilerini göstermektedirler (Cook and Baker, 1983; Kredics et al., 2003). Ayrıca *Trichoderma spp.*'nin sürgün ve kök gelişimini teşvik ettiği; fotosentezi, verimi ve abiyotik stres koşullarına dayanıklılığı arttırdığı, besin kullanımını teşvik ettiği bilinmektedir (Inbar et al., 1994; Yedidia et al., 2001; Harman, 2006). Bilinen bir diğer özellikleri de toprakta bulunan fosfor, mangan, bakır, demir gibi elementlerin çözünürlüğünü arttırarak bitkinin element alımı ve dolayısıyla büyüme hızı artmaktadır (Harman and Kubicek, 1998).

Fide bitkisel üretimin başlangıç materyali olduğu için, üretime sağlıklı ve kaliteli bir fide ile başlamak oldukça önemlidir. Kaliteli fide eldesi için koruma amaçlı ve bulaşma durumunda aşırı pestisit uygulaması, fide pişkinleştirmede ve kalite düzenlemesinde fide gelişimini arttırıcı/durdurucu kimyasalların uygulaması pratikte fazlaca yapılan uygulamalardandır. Ancak söz konusu bu uygulamalardaki aşırıya kaçmalar fide kalitesinde olumsuzluklara (bodurlaşma, sararma, aşırı uzama, cılız kalma vs) yol açabilmektedir. Uygulanacak *Trichoderma spp.* gibi faydalı mikroorganizmaların kullanımı ile ekolojik denge korunarak da kaliteli fide elde etmek mümkündür. Nitekim farklı fide türlerinde yapılan çalışmalar *T. harzianum* uygulamasının kontrole göre tohumlarının çıkış ve çimlenme oranını (Yedidia et al., 2001; Pöldma et al., 2008), fidelerde kök ve sürgün yaş ve kuru ağırlığını (Inbar et al., 1994, Yedidia et al., 2001; Ozbay and Newman, 2004; Bal ve Altıntaş, 2006; İkiz ve ark., 2022), fide boyu ve yaprak alanı (Inbar et al., 1994; Yedidia et al., 2001), yaprak sayısı (Pöldma et al., 2008), kök uzunluğunu (Yedidia et al., 2001), kök ve yeşil aksamda bazı makro ve mikro element içeriğini (Yedidia et al., 2001) arttırdığını, hastalık kontrolü sağladığını (Inbar et al., 1994) ortaya koymuştur. Yürütülen bu araştırmada, tohum ekim ortamına ilave edilen *Trichoderma harzianum*'un hıyarda fide kalitesine etkisinin belirlenmesi ve *T.harzianum*'un mevcut etkisini arttırmada yapraktan yapılan gübrelemenin bir etkisinin olup olmayacağı fide gelişimi, kalitesi ve besin elementi içeriği değerleri ile test edilmeye çalışılmıştır.

MATERYAL ve METHOD

Bu çalışma, 2018 yılının ilkbahar yetiştirme döneminde Ege Üniversitesi Ziraat Fakültesi Bahçe Bitkileri Bölümü'nde yürütülmüştür. Denemede bitkisel materyal olarak "Opal F1" hıyar çeşidi (Smyrna Tohumculuk, İzmir) kullanılmıştır. Test edilen *T. harzianum* suşu "Organik Bitkisel Üretimde Değerlendirilmek Üzere Girdi Üretim Yöntemlerinin Geliştirilmesi" isimli TÜBİTAK 111G055 numaralı proje kapsamında geliştirilmiş formülasyonlar olup, yapılan denemelerde en umutvar olan suş (İkiz ve ark., 2022) bu

çalışmada kullanılmıştır. Söz konusu suş, Adana Biyolojik Araştırma İstasyonu'nda (Ceyhan/Adana) sera domates bitkisi rizosferinden izole edilmiştir. 1×10^6 cfu/bitki mikroorganizma sayısına sahip olan suş, sıvı halde kullanılmıştır. Yaprak gübresi olarak ise ticari fide firmalarında en çok kullanılan 20-20-20+TE kompoze gübre (Agroleaf Power, 300 g/da) denemeye alınmıştır.

Deneme (1) tohum ekim ortamına *Th* uygulaması (*Th*+gübresiz), (2) tohum ekim ortamına *Th* uygulamadan fidelere yaprak gübresi uygulaması (kontrol-gübreli) ve (3) tohum ekim ortamına *Th* uygulaması ve fidelere yaprak gübresi uygulaması (*Th*+gübreli) konularından oluşmuştur.

Konusuna göre bitki sayıları üzerinden hesaplanmış *Th* suşu ithal torf (Klassman TS1, Almanya) ortamına karıştırılmış, torf iyice harmanlanmış ve nemlendirilmiş, 72'lik viyollere (66.5 x 33.5 x 4.9 cm) doldurulmuş ve her göze 1 tohum gelecek şekilde 07.05.2018 tarihinde tohum ekimi yapılmıştır. Denemede her konu için 2 viyol hazırlanmış; her viyol (n:36/tekerrür) bir tekerrür olarak kabul edilmiştir. Tohum ekiminden sonra ortamlar tekrar nemlendirilip viyoller streç film ile kaplanmış ve çimlendirme odasına konulmuştur. Viyoller çimlendirme odasında (karanlık, gece/gündüz 24°C, %80 nem) 3 gün tutulduktan sonra; fide adaptasyon serasına alınıp, dikim büyüklüğüne gelene kadar burada tutulmuştur. Bu süre içerisinde yetiştirme ortamına *Th* uygulanan fideler gübreli ve gübresiz olarak yetiştirilmiş; *Th*+gübreli ve kontrol uygulamasındaki fidelere su rampası ile üstten günde 1 kez yaprak gübresi; *Th*+gübresiz uygulamasına ise sadece su verilmiştir. Fideler tohum ekiminden 24 gün sonra dikim büyüklüğüne gelmiş; ölçüm ve analizler yapılmıştır. Uygulamaların çıkış üzerine etkilerini ortaya koymak amacıyla, tohum ekiminden itibaren %50'sinin çimlenmesine kadar geçen süre çıkış süresi (gün), ekimi yapılan tohum miktarı ile elde edilen fide sayısının oranı çıkış oranı (%) olarak belirlenmiştir. Dikim büyüklüğüne gelen fidelere hasat günü sabah erken saatlerde her tekerrürden 20 adet fide seçilerek yaprak uç bölgesinden mikrometre (Mitutoyo, Japonya) yardımı ile yaprak kalınlığı (mm) ve klorofil metre (SPAD-502 Plus, Konica Minolta, Japonya) yardımı ile klorofil indeksi (SPAD) ölçülmüştür. Fidelerin yaprak rengi (L, a*, b*) renk ölçer (CR-300 Chroma Meter, Konica Minolta, Japonya) ile laboratuvarında ölçülmüştür. Renk okuması her tekerrürde tam açmış 3. veya 4. gerçek yaprakta 10 adet yapılmıştır. Seçilen 10 adet fide viyollerden sökülerek kök başlangıcından büyüme ucuna kadar olan uzunluk şerit metre ile ölçülerek fide boyu (cm), kök boğazından kök uç noktasına kadar olan kısım şerit metre ile ölçülerek kök boyu/kök derinliği (cm) ve hipokotilin orta kısmından dijital kumpas (Mitutoyo, Japonya) ile gövde çapı (mm) ölçülmüştür. Fidelerin kök ve vejetatif

aksamı (yaprak+gövde) ayrılarak temizlenmiş ve hassas terazide kök ve vejetatif aksam yaş ağırlıkları (g) tartılmıştır. Etüvde 65°C’de sabit ağırlığa gelinceye kadar bekletilen bitki kısımları hassas terazide tartılıp kuru ağırlıkları (g) ve kuru madde içerikleri (%) belirlemiştir. Fidelerin Dickson kalite indeksi (DQI) kuru ağırlık, boy ve çap üzerinden Dickson ve ark. (1960)’nın kullandığı formüle göre belirlenmiştir. Denemelere ait kurutulmuş üst aksam (yaprak ve gövde) örnekleri, öğütücü yardımı ile toz haline getirilmiş ve yaş yakma yöntemi ile yakılarak makro (N, P, K, Ca, Mg, Na) ve mikro (Fe, Zn, Mn, Cu) besin elementleri belirlenmiştir. Yaş yakılan örneklerde P Vanadomolibdofosforik sarı renk yöntemi ile kolorimetrik olarak; K ve Ca alev fotometresinde; Mg, Na ve Fe atomik absorpsiyon spektrofotometresinde; Zn, Mn ve Cu spektrofotometrede okunmuştur. Toplam N ise modifiye Kjeldahl yöntemiyle tespit edilmiştir. Sonuçlar kuru maddede % ve mg/kg olarak hesaplanmıştır.

Tesadüf parselleri deneme desenine göre tek faktörlü ve 3 tekrarlı olarak kurulan her iki denemeden elde edilen verilere, bilgisayarda JMP (sürüm 5.0) istatistik paket programı uygulanmıştır ve ortalamalar arasındaki fark TUKEY testine göre belirlenmiştir.

BULGULAR

Çimlenme Performansı

Hıyar tohumları *Th* uygulanmış ve uygulanmamış torfta 4 günde çimlenmiş, uygulama konularının çimlenme süresi üzerine etkisi istatistiksel anlamda önemsiz bulunmuştur. Çimlenme oranı ise %98.6 ile 100.0 arasında değişmiş, uygulamaların çimlenme oranı üzerine de etkisi önemsiz bulunmuştur (Çizelge 1).

Çizelge 1. Uygulamaların tohum çimlenme süresi ve oranına etkileri

Uygulamalar	Çimlenme Süresi (gün)	Çimlenme Oranı (%)
<i>Th</i> +Gübreli	4	98.6
<i>Th</i> +Gübresiz	4	98.6
Kontrol (Gübreli)	4	100.0
<i>P</i>	0.9496	0.6495

Fide Morfolojisi ve Biyokütle

Uygulamaların fide boyu, kök boyu ve yaprak kalınlığı üzerine etkisi istatistiki açıdan önemli bulunmuştur. Hıyar fidelerinde 11.8 cm boy ile *Th*+gübreli ve kontrol grubu aynı istatistiksel grupta yer almış, *Th* suşu uygulanmış ancak gübre verilmemiş fideler 9.93 cm ile en kısa boya sahip olmuştur. Gübre uygulamasının fide boyunu arttırdığı görülmüştür. En uzun kök boyu 13.41 cm ile *Th*+gübresiz fidelerden elde edilirken, gübreli ve kontrol grubu fidelerinin kök boyları arasında fark görülmemiş ve sırası ile kök boyları 11.12 ve 11.52 cm olmuştur. Gövde kalınlığı 4.60 mm ile 3.97 mm arasında değişmiş, gübresiz uygulamada en düşük olmuştur. En kalın yapraklar *Th* uygulanmış ancak yaprak gübresi verilmemiş (*Th*+gübresiz) fidelerden elde edilirken, *Th* uygulanmış ve gübre verilmiş (*Th*+gübreli) fidelerde yaprak kalınlığı azalmıştır (Çizelge 2).

Çizelge 2. Uygulamaların fide morfolojisine etkisi

Uygulamalar	Fide Boyu (cm)	Kök Boyu (cm)	Gövde Kalınlığı (mm)	Yaprak Kalınlığı (mm)
<i>Th</i> + Gübreli	11.80 a	11.12 b	4.60	0.273 b
<i>Th</i> +Gübresiz	9.93 b	13.41 a	3.97	0.315 a
Kontrol (Gübreli)	11.78 a	11.52 b	4.12	0.312 ab
<i>P</i>	0.0409	0.0006	0.2294	0.0275

Vejetatif aksam (yaprak+gövde) yaş ağırlıkları üzerine uygulamaların etkisi önemli bulunmuştur. *Th*+gübreli uygulamasındaki fideler 4.39 g/bitki ile en yüksek vejetatif aksam ağırlığına sahip olmuşlardır. Söz konusu uygulamayı kontrol grubu fideler izlemiştir. *Th*+gübresiz uygulamadaki fideler en düşük vejetatif aksam yaş ağırlığına sahip olmuşlardır. Fidelerinin vejetatif aksam kuru ağırlıkları ve kuru madde içeriği uygulamalardan etkilenmemiştir. Ancak en yüksek vejetatif aksam kuru ağırlık değerlerinin *Th*+gübreli uygulamalardan elde edildiği, en yüksek kuru madde içeriğinin ise *Th*+gübresiz uygulamadan elde edildiği görülmüştür. Bunu uygulamaları kontrol grubu fideler izlemiştir. Fide kök yaş ve kuru ağırlıkları ile kuru madde içeriği üzerine uygulamaların etkisi önemsiz bulunmuştur (Çizelge3).

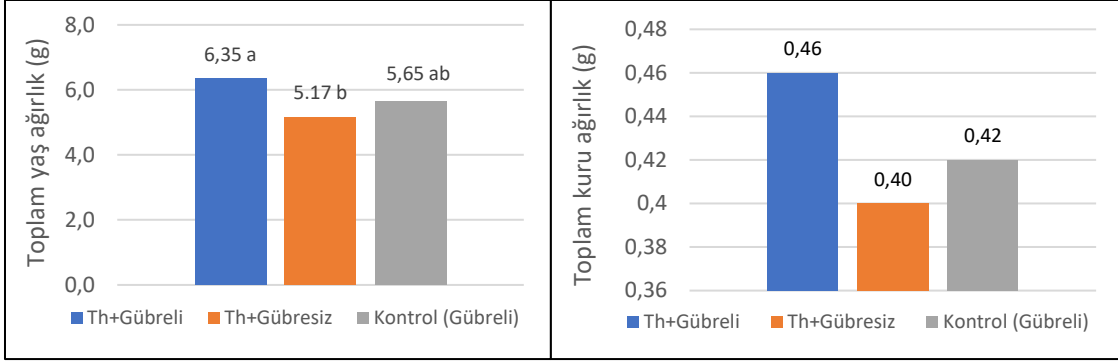
Çizelge 3. Uygulamaların fide vejetatif aksam (yaprak+gövde) ve kök yaş ve kuru ağırlıkları ile kuru madde içeriğine etkisi

Uygulamalar	Vejetatif Aksam			Kök		
	YA (g)	KA (g)	KM (%)	YA (g)	KA (g)	KM (%)
<i>Th</i> + Gübreli	4.39 a	0.378	8.61	1.97	0.090	4.57
<i>Th</i> +Gübresiz	3.40 c	0.325	9.62	1.78	0.083	4.67
Kontrol (Gübreli)	3.81 b	0.343	8.85	1.84	0.084	4.56
<i>P</i>	0.0003	0.6204	0.6204	0.1307	0.3696	0.8823

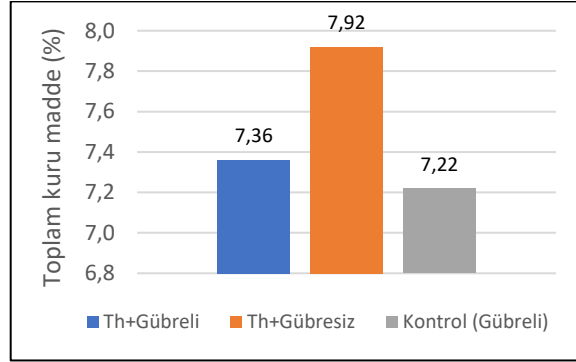
YA: yaş ağırlık, KA: kuru ağırlık, KM: kuru madde

Uygulamaların fide toplam yaş ağırlığı üzerine etkisi istatistiksel olarak önemli bulunurken, kuru ağırlık uygulamalardan etkilenmemiştir. Toplam yaş ağırlık 5.17-6.35 g arasında, toplam kuru ağırlık 0.41 – 0.47 g arasında değişmiştir. En yüksek toplam yaş ve kuru ağırlık *Th*+gübreli uygulamasından elde edilirken, en düşük *Th*+gübresiz uygulamasından elde

edilmiştir (Şekil 1). Toplam kuru madde miktarı da uygulamalardan önemli düzeyde etkilenmemiş ve %7.22-7.96 arasında değişim göstermiştir. Kuru ağırlığın aksine Th+gübreli uygulamada kuru madde oranı daha yüksek bulunmuştur (Şekil 2).



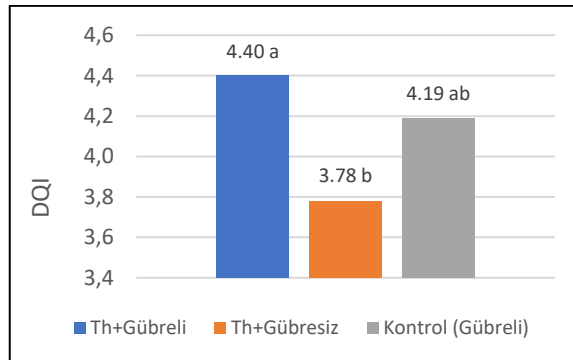
Şekil 1. Uygulamaların toplam fide yaş ve kuru ağırlıkları üzerine etkileri



Şekil 2. Uygulamaların toplam kuru madde üzerine etkileri

Dickson Kalite İndeksi (DQI)

Dickson kalite indeksi (DQI) üzerine uygulamaların etkisi önemli bulunmuş ve 3.78-4.40 arasında değişmiştir. En kaliteli fideler Th+gübreli uygulamasından elde edilmiştir. Kontrol grubu ile Th+gübreli uygulaması aynı istatistiksel grupta yer almıştır. En düşük kalite indeksi gübre uygulanmayan ancak Th uygulanmış fidelerden elde edilmiştir (Şekil 3).



Şekil 3. Uygulamaların fide kalite indeksi üzerine etkisi

Klorofil İndeksi ve Renk Değerleri

Klorofil indeksi üzerine uygulamaların etkisi önemli bulunmuştur. Klorofil indeks değeri 30.67 (*Th*+gübresiz) ile 35.11 (kontrol) arasında değişmiştir. Gübre uygulanmayan *Th* uygulaması en düşük klorofil indeks değerini vermiştir. Yaprak a^* renk değeri uygulamalardan etkilenmiş ve en yüksek a^* değeri *Th*+gübreli fidelerde (-14.88), en düşük *Th*+gübresiz fidelerden (-18.22) elde edilmiştir. Rengin açıklık ve koyuluğunu gösteren L değeri ile yeşil renk oranını belirleyen a^*/b^* oranı üzerine uygulamaların etkisi önemsiz bulunmuştur (Çizelge 4).

Çizelge 0. Uygulamaların klorofil indeksi (SPAD)ve yaprak renk değerleri üzerimne etkisi

Uygulamalar	Klorofil İndeksi (SPAD)		Renk Değerleri		
		L	a^*	b^*	a^*/b^*
<i>Th</i> + Gübreli	34.68 ab	47.85	-14.88 a	30.18 b	-0.49
<i>Th</i> +Gübresiz	30.67 b	50.52	-18.22 b	36.23 a	-0.51
Kontrol (Gübreli)	35.11 a	47.69	-16.39 ab	32.51 a	-0.50
<i>P</i>	0.0801	0.3703	0.0320	0.0011	0.9266

Yaprak Element İçerikleri

Hıyar fidesi yapraklarında N %3.82-4.07, P % 0.26-0.39, K % 1.10-1.98, Ca %2.99-3.39, Mg %0.65-0.68 ve Na 2642.8-3459.6 mg/kg olarak değişmiştir. P, K, Ca ve Na element içeriğinin uygulamalardan istatistiksel olarak etkilendiği görülmüştür. En yüksek P içeriği kontrol uygulamasından elde edilirken, K ve Na içeriğinde kontrol ve *Th*+gübresiz uygulamasının aynı istatistiksel grupta yer alarak en yüksek içeriğe sahip olmuştur. *Th*+gübreli uygulaması en yüksek Ca içeriğini vermiştir (Çizelge 5).

Hıyarfidesi yapraklarında Fe 46.61-78.44 mg/kg, Mn 26.46-30.98 mg/kg, Cu 1.83-1.88 mg/kg ve Zn 67.08-77.57 mg/kg arasında değişim göstermiştir. Uygulamaların hıyarda yaprak Fe ve Zn içeriği üzerine etkisi istatistiksel olarak önemli bulunmuş; *Th*+gübreli uygulamasının hıyarda yaprak Fe ve Zn içeriğini azalttığı saptanmıştır (Çizelge 5).

Çizelge 5. Uygulamaların hıyar fidelerinde yaprak makro ve mikro element içeriği üzerine etkileri

Uygulamalar	Makro Elementler						Mikro Elementler			
	N (%)	P (%)	K (%)	Ca (%)	Mg (%)	Na (mg/kg)	Fe (mg/kg)	Mn (mg/kg)	Cu (mg/kg)	Zn (mg/kg)
<i>Th</i> + Gübreli	4.07	0.26 c	1.10 b	3.39 a	0.68	2642.8 b	46.61 b	30.98	1.83	67.08 b
<i>Th</i> +Gübresiz	3.82	0.36 b	1.98 a	3.09 b	0.66	3315.5 a	75.77 a	26.46	1.87	73.67 ab
Kontrol (Gübreli)	3.98	0.39 a	1.98 a	2.99 b	0.65	3459.6 a	78.44 a	26.95	1.88	77.57 a
<i>P</i>	0.3965	0.0007	0.0016	0.0213	0.8473	0.0504	0.0275	0.5572	0.9490	0.0398

TARTIŞMA ve SONUÇ

Yürütülen bu araştırmada, tohum çimlenme ve çıkışının tohum ekim ortamına ilave edilen *T. harzianum* bakterisinden etkilenmediği görülmüştür. *Trichoderma* uygulanan tohumların çimlenme ve çıkış performansları bitki türlerine göre değişebilmekte; erkencilik sağlanabildiği

gibi Mastouri et al., 2010; Özbay ve ark., 2015) herhangi bir etkilenme de olmayabilmektedir (Uslu, 2009; Azarmi et al., 2011). Nitekim Bayyurt (2009) tohumlarının çimlenmesi üzerine yaptığı çalışmasında *T. harzianum* uygulaması ile domates, biber ve börülce tohumların çimlenme güçlerini kontrollerine oranla yüksek bulunurken, araştırma sonucumuzla uyumlu şekilde hıyarda fark olmadığını saptamıştır.

Fide morfolojisinin tohum ekim ortamına ilave edilen *T. harzianum* uygulaması ile beraber fidelere uygulana yaprak gübresi uygulamasından genellikle olumlu etkilendiği görülmüştür. Fide morfolojisinde özellikle fide vejetatif aksam ve kök biyokütlesinin *Th*+gübreli uygulamada kontrole göre sırası ile %15.2 ve %7.1 oranında artış gösterdiği saptanmıştır. Yürürülen önceki çalışmalarda da *T. harzianum* uygulaması ile fidelerde kök ve sürgün yaş ve kuru ağırlığında (Inbar et al., 1994, Yedidia et al., 2001; Ozbay and Newman, 2004; İkiz ve ark., 2022) artış rapor edilmiştir. *Th*+gübreli uygulaması ile fide boyu ve gövde kalınlığı artış göstermiş, kök boyu ve yaprak kalınlığı azalış göstermiştir. Bu sonuçlar önceki çalışmalarla uyumlu görülmüştür. Çünkü literatürde *T. harzianum* uygulamasının fide morfolojisini etkilemediğine dair de çalışma sonuçları bulunmaktadır. Mastouri et al., (2010) *T. harzianum* suş T22'nin fide performansı üzerinde önemli bir etkiye sahip olmadığını saptanmıştır. Aksi olarak, Yedidia et al. (2001), *T. harzianum* uygulanmış toprakta hıyar fidelerinin kontrol bitkilerine kıyasla kök alanında, kümülatif kök uzunluğunda, kuru ağırlığında, sürgün uzunluğunda, yaprak alanında, kök kuru ağırlığında ve sürgün kuru ağırlığında önemli artışlar meydana geldiğini belirtmiştir. Azarmi et al. (2011) *T. harzianum* izolat T969, *T. harzianum* izolat T447'nin domates fidelerinde fide boyunu arttırdığını tespit etmiştir. Bu noktada fide morfolojisi ve kalitesini üzerine kullanılan *T. harzianum* suşlarının etkilerinin farklılık gösterebileceği unutulmamalıdır (İkiz ve Öztekin, 2022). Nitekim, Azarmi et al. (2011) tarafından domates fidelerinde fide kalitesi üzerine farklı *T. harzianum* izolatlarının ve uygulama yerinin etkilerinin araştırıldığı bir çalışmada fide kalitesi üzerine izolatların etkilerinin farklı olduğu belirtilmiştir.

Fide kalitesini belirlemede önemli bir kriter olan kalite indeksi *Th*+gübreli uygulamasında en yüksek değerde olmuştur. Fide kalitesi fidelerin fizyolojik ve morfolojik özelliklerine göre değişebilmektedir. En doğru ölçüm ikisinin birlikte değerlendirmesi olsa da morfolojik ölçümler fide fizyolojisinden daha kolay ölçülebilir ve pratik olması nedeni ile tercih edilmektedir. Fide kalitesini belirlemede morfolojik özelliklere dayalı ölçümlerde fide boyu, gövde çapı, kök uzunluğu, yaş ve kuru ağırlık, sürgün-kök oranı ve yaprak sayısı vs parametreleri kullanılmaktadır. Morfolojik derecelendirmeleri iyi olan fideler, daha sonra asıl

yerlerine dikildiklerinde tutunma ve hayatta kalmada olumlu bir tavır sergilemektedirler. Dickson et al. (1960) tarafından fidanlar için geliştirilen kalite indeksi (DQI), fide kalitesi bazı morfolojik özelliklere dayandırılan entegre bir indekstir. Bu nedenle fidelerde de kullanılmıştır. Hesaplamasında toplam kuru ağırlık, fide boyu, gövde çapı, üst aksam kuru ağırlığı ile kök kuru ağırlığı kullanılmıştır. Yürütülen çalışmada elde edilen tüm fidelerin kalitesi DOI sınıflarına göre iyi sınıfta yer almış; ancak en kaliteli fideler Th+gübreli uygulamasından elde edilmiş, bunu gübreli kontrol uygulaması izlemiştir. Th+gübresiz fideleri en düşük kalitede kalmıştır. Bu durum fide kalitesini arttırmada bakteri uygulamasından çok, yaprak gübresi uygulamasının etkili olduğu düşündürmüştür.

Klorofil indeksi (SPAD) ve yeşil rengi nitelendiren a değeri *T. harzianum* kontrol uygulaması ile aralarında istatistiksel bir fark olmamakla beraber kısmen azalmıştır. *T. harzianum* uygulanmış fideler kontrol gurubu fidelere göre biraz daha açık renkli olmuştur. Ancak gözle görülebilir bir renk açılması olmamıştır. Renk indeksi olan a^*/b^* değeri uygulamalara göre önemi bir farklılık göstermemiştir. Elde ettiğimiz bu sonuç *T. harzianum* uygulaması ile klorofil içeriğinin arttığını belirten önceki çalışmalardan (Inbar et al.,1994; Azarmi et al., 2011; Mei et al., 2018; Zhang et al., 2019) farklı olmuştur. Ancak çalışmamızı destekler nitelikte Çubuklu (2011) aşılı domateslerde ve Öztekin ve İkiz (2022) marulda yürüttükleri çalışmalarında *T.harzianum* uygulamasının yaprak toplam klorofil içeriğine etkisini önemli bulmamışlardır.

Yararlı mikroorganizmaların bitkide element içeriğini arttırdığı belirtilmiştir (Yedidia et al., 2001; Türkmen ve ark., 2004; Azarmi et al., 2011; İkiz ve ark., 2022). Bu etki *Trichoderma*'nın toprakta elementleri çözünen bir forma dönüştürmesi ve dolaylı olarak bitki tarafından alınımını arttırmasından kaynaklanmaktadır (Harman and Kubicek, 1998). Ancak yetiştirme koşulları, bitki türü, bakteri suşuna göre bu etkiler değişebilmektedir (İkiz ve ark., 2022). Yürütülen çalışmada uygulamalardan etkilenen element bazında farklılık göstermiştir. Yaprak P, K,Ca, Na, Fe ve Zn element içeriği element içerikleri uygulamalardan etkilenmiştir. *T. harzianum* ve yaprak gübresi uygulaması ile kontrole göre N, Mg ve Mn (istatistiksel anlamda önemsiz) ve Ca (istatistiksel anlamda önemli) içeriği artış; yaprak P, K, Na, Fe ve Zn içeriği ise istatistiksel anlamda azalış göstermiştir.

Çalışmada elde edilen fidelerin tamamı kaliteli fide görünümüne sahip olmuştur. Th+gübresiz uygulaması ölçülen parametrelerin neredeyse tamamında en düşük değerlere sahip olsa da kalitesiz fide oluşturdu anlamına gelmemelidir. Th+gübresiz uygulamasındaki fideler

yapraktan gübrelili uygulamalara göre daha düşük kalitede ve biyokütlerde kalmıştır. Bu durum yapraktan gübrelemenin fide kalitesini arttırmada önemini ortaya koymuştur. 20:20:20+TE gübresi bir kimyasal olduğu için, kimyasal kullanılmadan yapılan yetiştiricilikte *T. harzianum* uygulaması tercih edilebilir bir uygulamadır. Ayrıca *T. harzianum* uygulamasının fide kalitesini önemli derecede arttırdığı önceki çalışmalarda, kontrol uygulaması olarak hiçbir uygulamanın yapılmadığı fidelerle *T. harzianum* uygulanmış bitkilerin kıyaslandığı, yürütülen çalışmada *T. harzianum*'un 20:20:20+TE gübresi ile karşılaştırıldığı göz ardı edilmemelidir.

Yürütülen bu çalışma sonucunda hıyar fidesi üretiminde fide biyokütlesi ve özellikle kalite indeksine olan olumlu etkileri nedeni ile tohum ekim ortamına ilave edilen *T. harzianum* mantarı yanında fidelerin yapraktan gübrenmesi (*Th*+gübreli uygulaması) önerilmektedir. *Th*+gübresiz uygulaması ölçülen parametrelerin neredeyse tamamında en düşük değerlere sahip olmuş, fide kalitesi yapraktan gübreleme uygulamalarına göre düşük olmuştur. Kimyasal bir uygulama olan 20:20:20+TE içerikli yaprak gübresi uygulaması fide gelişimi ve kalitesini arttırmıştır. 20:20:20+TE yaprak gübrenmesi tohum ekim ortamına eklenen *T. harzianum*'un fide kalitesindeki etkinliğini de arttırmıştır. Ancak sonuçların farklı üretim şekillerine, çevre koşullarına, farklı türlere, farklı *T. harzianum* suşlarına/izolatlarına göre değişebileceği unutulmamalıdır.

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BAHÇE BİTKİLERİ ALANINDA İNOVASYON SÜRECİNİN DEĞERLENDİRİLMESİ

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Özet

Bu çalışmada kamu araştırma kurumlarında ve üniversitelerde bahçe bitkileri alanında çalışan araştırmacıların inovasyon süreçlerinin değerlendirilmesi hedeflenmiştir. On araştırma enstitüsü ve dört üniversitenin ziraat fakültelerinde görev yapmakta olan, bahçe bitkileri bölümünden mezun olmuş 108 kişiden anket yoluyla toplanan veriler araştırmanın ana materyalini oluşturmuştur. Çalışmada araştırmacıların bazı kişisel özellikleri, inovasyon süreçleri, inovasyon sisteminde karşılaştıkları sorunlar ve inovasyonu engelleyen faktörler gibi konularda sorulan anket sorularına verdikleri cevaplara yer verilmiştir. Elde edilen bulgulara göre, çalışmaya katılan araştırmacıların yaş ortalaması 39.4 olup, %42.1'i kadınlardan oluşmuştur. Ortalama 14.3 yıllık deneyime sahip araştırmacıların %73.1'i kamu kurumlarında, %26.9'u üniversitelerde çalışmaktadır. Araştırmacılar mesailerinin %47.4'ünü araştırma etkinliklerine ayırmaktadır. İnovasyon süreci kapsamında araştırmacılara fikirden çiftçi tarlasına uzanan sürecin aşamaları sorulmuştur. İnovasyon sürecinin ortalama 9.7 yılda tamamlandığı, tarımsal inovasyonu engelleyen en önemli faktörlerin sırası ile finansman yetersizliği, inovasyonun yüksek maliyeti, girdi yetersizliği ve nitelikli eleman yokluğu olduğu belirtilmiştir.

Anahtar Kelimeler: Tarımsal inovasyon, AR-GE, inovasyonu engelleyen faktörler, anket

EVALUATION OF THE INNOVATION PROCESS IN THE FIELD OF HORTICULTURE

Abstract

The purpose of this study was to assess the innovation processes of horticultural specialists working in universities and public research organizations. The primary source of data for the study was information gathered via questionnaires from 108 individuals who have completed postgraduate studies or graduated from horticulture departments and are employed by four universities' agricultural faculties and ten research institutes. The responses of researchers to survey questions regarding some personal characteristics, innovation processes, challenges faced in the innovation system, and factors hindering innovation are presented in the study. According to the obtained data, the average age of the researchers who took part in the study was 39.4 years, and 42.1% of them were female. With an average of 14.3 years of experience, 73.1% of them work in public institutions and 26.9% in universities. 47.4% of the time they spend at work are dedicated to research activities. In the scope of the innovation process, researchers were asked about the stages of the process, extending from ideation to the farmer's field. The innovation process is reported to be completed in an average of 9.7 years, with the most significant factors hindering agricultural innovation listed as insufficient financing, the high cost of innovation, input scarcity, and a lack of qualified personnel in order.

Keywords: Agricultural innovation, R&D, factors hindering innovation, questionnaire

Giriş

Ülke kalkınmasında ve uluslararası rekabette araştırma-geliştirme (AR-GE) ve inovasyon önemli bir unsurdur. Kalkınmada lokomotif işlev gören inovasyon sosyal değişim için de vazgeçilmez faktördür (Spielman, 1999; Ramaswamy ve Özcan, 2015). AR-GE çalışmaları bilgi ve teknoloji üretilmesinde önemli olup, ekonomik ve sosyal faydası bulgularının uygulamaya aktarılması ile mümkündür. Diğer bir ifade ile firmalar/ülkeler AR-GE için para harcarken, inovasyonla para kazanmaktadır. İnovasyonda AR-GE sürecinin piyasalarla bütünleşmesi söz konusudur. AR-GE gündeminin oluşturulmasından bulgularının kırsal kesime aktarılmasına kadar geçen süreçte farklı aktörlerle iş birlikleri ve/veya ağ yapılar yer almaktadır (Markard and Truffer, 2006; Grayand Malla, 2007). Sürecin hızlı işletilmesi ülkenin veya firmanın rekabet yanında sorun çözme becerilerini de geliştirmektedir. Dünya ticaretinde ve tarımında lider olan ülkeler incelendiğinde inovasyon sistemlerinin güçlü olduğu görülmektedir. Bilgi ve inovasyon ülkelerde zenginliğin yaygınlaşmasına da yardımcı olmaktadır.

Bu çalışma ile Türkiye tarımında sosyo-ekonomik açıdan önemli yere sahip bahçe bitkileri alanındaki AR-GE ve inovasyon sürecinin incelenmesi amaçlanmıştır. Bilindiği üzere bahçe bitkileri tarımın önemli bir kolunu oluşturmaktadır. 2021 yılı itibari ile Türkiye’de bahçe bitkileri ürünlerinin yetiştirme alanı toplam tarım alanlarının (238.639.481,1 ha) %18.4’ü(43.947.616,1 ha) kaplamaktadır. Önemli bir bitkisel üretim bölgesi olan Ege Bölgesi ise 28.786.378,4 ha ile ülke tarım alanlarının %12.1’ine; 9.763.139,4 ha ile ülke bahçe bitkileri alanının %22.2’sine sahiptir (TÜİK, 2023a). Bahçe bitkileri ürünleri ihracatı ise 235.3 milyar ABD doları ile toplam ülke ihracatının yaklaşık %2’sini oluşturmaktadır. Bahçe bitkilerinin üretim değeri 2021 yılı itibariyle 172.560.825.756 TL ile toplam bitkisel üretim değerinin yaklaşık %56’sını oluşturmaktadır (TÜİK, 2023b). Bu denli önemli bir tarım kolunda AR-GE ve inovasyon süreci de önem arza etmektedir.

Yürütülen araştırmada Türkiye’de Ege Bölgesi’ndeki ve bölgeye yönelik faaliyetleri olan Tarım ve Orman Bakanlığı bünyesindeki araştırma enstitüleri ve ziraat fakültelerinin bahçe bitkileri bölümlerindeki AR-GE çalışmaları, işleyiş, iş birlikleri ve inovasyon süreçleri incelenmiştir. Çalışmada ayrıca, kamu ve üniversitedeki araştırmacıların etkinlikleri de karşılaştırılmıştır. Çalışmada pilot bölge olarak Türkiye tarımında üretim ve ekonomi açısından oldukça önemli bir yere sahip Ege Bölgesi incelenmiş olup, sonuçların ülke geneline rehberlik etmesi de beklenmektedir.

MATERYAL VE YÖNTEM

Bu çalışma TÜBİTAK tarafından desteklenen 112O208 nolu ve “*Tarımsal İnovasyon Sisteminin Geliştirilmesi Üzerine Bir Araştırma: Ege Bölgesi Örneği*” başlıklı projenin (Boyacı, 2016) verilerinden yararlanılarak hazırlanmıştır. Belirtilen projede Ege Bölgesi’nde bulunan ve/veya bölge tarımına katkı yapan farklı araştırma kurumlarında faaliyet gösteren 512 araştırmacıdan veriler derlenmiştir. Anılan projede bilgileri derlenen bahçe bitkileri mezunu ve uzmanı 108 araştırmacıya (popülasyonun %21’i) ait veriler bu çalışmada kullanılmıştır. Çalışmadaki araştırmacıların %73.1’i Tarım ve Orman Bakanlığı bünyesindeki 10 farklı araştırma enstitülerinde (kamu olarak anılacaktır); %26.9’u da 4 farklı üniversitenin bahçe bitkileri bölümleri ve meslek yüksekokullarında ilgili alanda görev yapmaktadır. Çizelge 1’de çalışmada verileri değerlendirilen kamu kurumları ve üniversiteler ile araştırmacı sayıları verilmiştir.

Çalışmada araştırmacıların bazı kişisel özellikleri, çalışma konuları, mesai harcadıkları etkinlikler, öncelikli hedefler, araştırma tipleri, AR-GE ve inovasyon süreci aşamaları ve süreleri, bazı inovatif kurumsal değerler, olanaklar, iş birliklerini engelleyen faktörler gibi konular anket soruları ile toplanmış ve incelenmiştir.

Verilerin yorumlanması ve karşılaştırılmasında yüzdeler, ortalamalar, t-testi ve lojistik regresyon analizi kullanılmıştır. İfadelerin yorumlanmasında beşli Likert ölçeğinden (1:hiç, 2:nadir, 3:kısmen, 4: genellikle, 5: daima) yararlanılmıştır (Malhotra, 2010).

Çizelge 1. Çalışmaya katılan araştırmacıların sayısı ve kurumlara göre dağılımları

Statü	Sayı	Payı (%)	Kurumlar	Sayı	Pay (%)
Kamu	79	73.1	Batı Akdeniz Tarımsal Araştırma Ens.	23	21.3
			Meyvecilik Araştırma Ens.	14	13.0
			Atatürk Bahçe Kültürleri Merkez Araştırma Ens.	13	12.0
			Manisa Bağcılık Araştırma Ens.	8	7.4
			Zeytincilik Araştırma Ens.	6	5.6
			Erbeyli İncir Araştırma Ens.	5	4.6
			Uluslararası Tarımsal Araştırma ve Eğitim M.	3	2.8
			Ege Tarımsal Araştırma Ens.	3	2.8
			Eskişehir Geçit Kuşağı Tarımsal Araştırma Ens.	2	1.9
			Zirai Mücadele Araştırma Ens.	2	1.9
Üniversite	29	26.9	Ege Üniv. Ziraat Fak. Bahçe Bitkileri Böl.	9	8.3
			Ege Üniv. Bergama, Bayındır ve Ödemiş MO	6	5.6
			Süleyman Demirel Üniv. Ziraat Fak. Bahçe Bitkileri Böl.	6	5.6
			Adnan Menderes Üniv. Ziraat Fak. Bahçe Bitkileri Böl.	5	4.6
			Uşak Üniv. Doğa Bilimleri Fak. Bahçe Bitkileri Böl.	3	2.8
Toplam			108	100.0	

BULGULAR

Bazı Kişisel Özellikler

Araştırmacılar ortalama olarak 39.4 yaşında ve 14.3 yıllık mesleki deneyime sahiptirler. Kurumların mevcut insan kaynağı deneyim ve beceri açısından oldukça iyi durumdadır. Araştırmacıların %42.1'i kadındır. Beşli Likert ölçeğine göre araştırmacılar işlerinden ekonomik yönden orta (3.23) düzeyde, mesleki yönden ise nispeten daha çok (3.69) memnundurlar (Çizelge 2). Araştırmacılardan alınan ekstra bilgilere göre %45.2'si çiftçilik deneyimine sahiptirler. Araştırmacıların %86.1'i yüksek lisans, %74.1'i de doktora yapmış/yapmaktadır. Yüksek lisans yapanların %3.9'u yurtdışı eğitimlidir. Üniversitedeki araştırmacıların yaş ve deneyim ortalaması daha yüksektir. Kamuda ise araştırmacıların ekonomik memnuniyet düzeyleri daha yüksektir.

Çizelge 2. Kuruluşlara göre araştırmacıların bazı kişisel özelliklerinin karşılaştırılması (T testi)

Kişisel özellikler	Kurum	Sayı	Ortalama	T değeri	Serbestlik derecesi	P değeri
Yaş	Kamu	59	37.4	-3,07***	32,92	0,00
	Üniversite	26	43.7			
Mesleki deneyim süresi (yıl)	Kamu	76	12.9	-2,70**	39,50	0,01
	Üniversite	29	18.1			
İşinden ekonomik memnuniyet	Kamu	79	3.4	3,12***	106,00	0,00
	Üniversite	29	2.8			

Önem düzeyi: *** $\alpha < 0,01$; ** $\alpha < 0,05$

Araştırmacıların Çalıştıkları Konular

Araştırmacılar ağırlıklı olarak meyve ve sebze üretimi ile ilgilenirken, süs bitkileri yetiştiriciliği ile de ilgilenmektedirler. Çalışma konuları daha çok tohum ve ıslah üzerinde yoğunlaşmıştır. Çevre, doğal kaynaklar ve hasat sonrası konuları araştırma gündeminde daha az yer almaktadır (Çizelge 3).

Kamu araştırmacıları tohum/ıslah çalışmalarına daha fazla yer vermektedir. Üniversitede ise araştırmacıların sebze, genel yetiştiricilik, çevre ve doğal kaynakların korunması ile ilgili konulara daha fazla odaklandığı görülmektedir (Çizelge 4).

Çizelge 3. Çalışılan ürün grupları ve genel çalışma konuları*

Ağırlıklı çalışılan ürün grupları	Sayı	Ortalama	Std sapma
Meyve	85	3.91	1.601
Sebze	66	3.14	1.805
Süs bitkileri	47	1.51	1.019
Ana çalışma konuları			
Tohum/ Islah vb.	74	4.08	1.269
Genel yetiştiricilik	87	3.83	1.259
Çevre, doğal kaynaklar ve korunması	51	2.37	1.496
Hasat sonrası (depolama, işleme vb.)	54	2.20	1.419

* Beşli Likert ölçeği: 1:hiç, 2: nadir, 3: kısmen, 4: genellikle, 5: daima

Çizelge 4. Kuruluşlara göre çalışılan konuların karşılaştırılması (T testi)

Çalışma konuları	Kurum	Sayı	Ortalama	Tdeğeri	Serbestlik derecesi	Pdeğeri
Sebze	Kamu	46	2.8	-2.71**	43.58	0.01
	Üniversite	20	4.0			
Tohum/ ıslah vb.	Kamu	57	4.3	2.08*	20.42	0.05
	Üniversite	17	3.4			
Genel Yetiştiricilik konuları	Kamu	62	3.7	-1.77*	85.00	0.08
	Üniversite	25	4.2			
Çevre, doğal kaynaklar ve korunması	Kamu	38	2.1	-2.03*	49.00	0.05
	Üniversite	13	3.1			
Hasat sonrası (depolama, işleme vb.)	Kamu	41	2.0	-1.92*	52.00	0.06
	Üniversite	13	2.9			

Önem düzeyi: ** $\alpha < 0,05$; * $\alpha < 0,1$

Mesai Harcanan Konular

Araştırmacılar zamanlarının %47.4'ünü araştırmalara, %15.0'ini kendilerini geliştirmeye, %10.4'ünü seminer/bilimsel etkinliklere, %10.0'ünü da bürokratik işlere ayırmaktadır. AR-GE gündeminin belirlenmesi ve sonuçlarının uygulamaya aktarılmasında yayım ve çiftçilerle iletişimin payı düşüktür (Çizelge 5). Akademisyenlerin öğrenci eğitimi etkinlikleri kapsam dışında tutulmuştur. Kamu araştırma kuruluşlarındaki araştırmacıların mesailerinde araştırma etkinliklerine ve yeni ürün/uygulama geliştirme hedefine ayırdıkları zaman üniversitelerdeki araştırmacılara göre daha fazla olmuştur (Çizelge 6).

Çizelge 5. Araştırmacıların mesailerini harcadıkları konular ve payları (%)

Mesaideki payları	Sayı	Ortalama	Std sapma
Araştırma etkinlikleri	105	47.4	19.838
Kendini geliştirme	105	15.0	12.452
Seminer, bilimsel yayın, vb. etkinlikler	105	10.4	7.266
Bürokratik işler	105	10.0	10.920
Çiftçilerle iletişim (yayım; çiftçi eğitimi)	105	7.8	6.633
Yayımcılarla iletişim (eğitim, ortak çalışma vb.)	105	6.5	8.004
Diğer konular	105	2.9	11.883

Çizelge 6. Kuruluşlara göre mesaide araştırmanın payı ve yeni ürün/uygulama geliştirme hedefi (T testi)

	Kurum	Sayı	Ortalama	T değeri	Serbestlik derecesi	P değeri
Araştırma etkinliklerinin mesaideki payı (%)	Kamu	77	50.4	2.58**	103.00	0.01
	Üniversite	28	39.4			
Yeni ürün/uygulama geliştirmek inovasyondaki hedef	Kamu	79	4.1	1.94*	38.38	0.06
	Üniversite	29	3.7			

Önem düzeyi: ** $\alpha < 0,05$; * $\alpha < 0,1$

Yürütülen Araştırma Tipleri ve Yürütüldükleri Yerler

Bahçe bitkileri alanında en çok uygulamalı araştırmalar (yeni teknoloji üretmek ve bilginin uygulanması) daha sonra sırasıyla stratejik (özel bir problemi çözmek amacıyla yürütülen araştırmalar), temel araştırma (yeni bilgi üretmek sözgelimi; fotosentezin bitki gelişimine etkisi gibi) ve adaptasyon çalışmaları (bir yeniliği belli koşullara uyarlamak)

yürütülmektedir. Araştırmalar ağırlıklı olarak araştırma kurumlarının arazileri ve laboratuvarlarında yürütülmektedir. Araştırmacılar çalışmalarının %18.7'si çiftçi tarlasında ve/veya kırsal kesimde yürütmektedirler (Çizelge 7).

Çizelge 7. Araştırma tipleri ve yürütüldükleri yerler

Yürüttüğünüz araştırmaların tipi ve payları (%)	Sayı	Ortalama	Std sapma
Uygulamalı araştırma	105	32.0	20.762
Stratejik araştırma	105	26.0	22.621
Temel araştırma	105	21.5	21.339
Adaptasyon çalışması	105	20.5	15.880
Araştırmalarınızı yürüttüğünüz yerler ve payları (%)	Sayı	Ortalama	Std sapma
Araştırma enstitüsü; üniversite tarlası/bahçesi/serası/bağı vb.	108	54.8	29.140
Laboratuvar	108	26.5	21.222
Çiftçi tarlası, kırsal kesim	108	18.7	27.158

Araştırmalarda ve İnovasyon Sürecinde Öncelikli Hedefler

Araştırmacıların AR-GE çalışmalarında öncelikli olarak ürün kalitesini iyileştirmek ve verimlilik artışına odaklandığı görülmektedir. Takiben, yeni ürün ve uygulamalar ile uyarlama çalışmaları da öncelikli ele alınan konulardandır. Bölgede çiftçilerle yapılan karşılıklı görüşmelerde işgücü, girdi, enerji gibi maliyetler birincil öncelikli konular olarak belirlenirken, araştırmacılar da bu konu önemli olmakla birlikte öncelik düzeyinin son sırada olduğu görülmüştür (Çizelge 8).

Çizelge 8. İnovasyon sürecindeki öncelikli hedef konular*

İnovasyon içeriği ve hedefi	Sayı	Ortalama	Std sapma
Ürün kalitesini iyileştirmek	107	4.16	0.881
Verimlilik artışı	106	4.11	0.865
Yeni ürün/uygulama geliştirmek	108	3.98	0.917
Mevcut ürünü/uygulamayı iyileştirmek	106	3.88	0.813
Mevcut ürün/uygulamayı yeni koşullara uyarlamak	104	3.84	0.849
İşçi ve tüketici sağlığı güvenilir gıda öncelikli hedefi	102	3.60	1.180
Tarımsal uygulamaların çevre zararını azaltmak	102	3.54	1.132
Girdi işgücü enerji maliyetlerini düşürmek öncelikli hedefi	102	3.41	0.999

* Beşli Likert ölçeği: 1:hiç öncelikli değil, 2: düşük öncelikli, 3: kısmen öncelikli, 4: öncelikli,5: kesinlikle öncelikli

İnovasyon Sürecinde Aşamalar ve Harcanan Süre

Bahçe bitkileri alanında inovasyon sürecinde bir fikrin oluşumundan çiftçi tarlasına/bahçesine ulaşıncaya kadar geçen süre ortalama 9.7 yıl olarak belirlenmiştir (Çizelge9). Buna çiftçilerin kullanımına aktarılması ve çiftçilerin %20 kadarının benimsemiş olması da eklenirse süre 15 yıla ulaşmaktadır. Araştırma çalışmaları ortalama 3.5 yıl sürmekte ancak, fikir geliştirme ve bulguların uygulamaya aktarılması dadikkate alındığında süreç araştırma süresinin üç katı zamanakadar uzamaktadır (Çizelge 9). Araştırmacılara göre AR-GE bulguların çiftçiler tarafından benimsenme oranı %41.7'dir. Elde edilen bulguların/yeniliklerin %41 kadarı kırsal kesimde benimsenmektedir.

Çizelge 9. Bahçe bitkileri alanında inovasyon sürecinde aşamalar ve süresi (yıl)

İnovasyon sürecinin aşamaları ve geçen süre (yıl)	Sayı	Ortalama	Std sapma
Fikrin oluşumu ve projelendirme	98	1.39	1.090
Destek bulma (fon)	94	1.32	0.675
Araştırmanın yürütülmesi (proje)	98	3.53	1.922
Sonuçların denenmesi / uyarlanması	96	1.95	1.605
Yayım önerisine dönüşmesi	91	1.54	1.448

Araştırma ve İnovasyonla İlgili Bazı Faktörlerin Yeterlilikleri

AR-GE ve inovasyon süreçlerinde önemli olan yayım, kırsal kesim, politika yapıcılar, uluslararası gibi farklı kesimlerle ilişkiler, araştırma süreçlerinin yönetilmesi, insan kaynağı, altyapı ve ekonomik olanakları gibi faktörlerin yeterlilik düzeyleri Çizelge 10'da görülmektedir. Buna göre faktörlerin yeterlilik düzeylerinin genelde düşük olduğu (2.33-3.15 arasında) söylenebilir. Diğer yandan kamu ve üniversiteler karşılaştırıldığında olanakların yeterlilik düzeylerinin farklılık gösterdiği, kamu kuruluşlarının olanaklarının üniversitelere göre daha yeterli olduğu görülmektedir (Çizelge 11).

Çizelge 10. Araştırma ve inovasyonla ilgili bazı faktörlerin yeterlilik düzeyleri*

Araştırma ve inovasyonla ilgili faktörler	Sayı	Ortalama	Std sapma
Öneri veya bulguların uygulamaya geçirilmesi	104	3.15	0.879
Araştırma kaynaklarının iyi yönetilmesi	106	2.99	1.028
Kütüphane olanakları	107	2.99	1.112
Araştırmalarda plan ve önceliklerin doğru saptanması	105	2.96	0.950
Arazi ve laboratuvar çalışmaları için sağlanan fonlar	107	2.78	1.049
Eleman varlığı (sayı ve niteliği)	108	2.71	0.796
Çiftçilerden geri-beslemenin sağlanması	105	2.68	1.033
Bütçe olanakları	107	2.66	1.055
Çiftçilerden öneri gelmesi ve ilişkiler	107	2.62	0.774
Uluslararası ilişkiler	106	2.41	1.040
Yayımcılardan öneri gelmesi ve ilişkiler	105	2.36	0.900
Politika yapıcılarla iletişim	105	2.33	0.967

* Beşli Likert ölçeği: 1:hiç yeterli değil, 2: oldukça sınırlı, 3: kısmen yeterli, 4: yeterli, 5: kesinlikle yeterli

Çizelge 11. Kuruluşlara göre AR-GE ve inovasyon olanaklarının karşılaştırılması (T testi)

AR-GE ve inovasyon olanakları	Kurum	Sayı	Ortalama	T değeri	Serbestlik derecesi	P değeri
Arazi ve laboratuvar çalışmaları için sağlanan fonlar yeterliliği	Kamu	79	2.9	2.29**	105.00	0.02
	Üniversite	28	2.4			
Araştırma kaynaklarının iyi yönetilmesi yeterliliği	Kamu	79	3.1	1.92*	104.00	0.06
	Üniversite	27	2.7			
İstihdam edilen teknik ve yardımcı personel sayısı yeterliliği	Kamu	79	2.5	1.82*	105.00	0.07
	Üniversite	28	2.1			
Bütçe olanakları	Kamu	78	2.8	2.59**	105.00	0.01
	Üniversite	29	2.2			
Büro ve laboratuvar olanakları	Kamu	78	3.4	3.27***	41.36	0.00
	Üniversite	29	2.6			
Yayımcılardan öneri gelmesi	Kamu	78	2.5	2.22**	103.00	0.03
	Üniversite	27	2.0			
Çiftçilerden öneri gelmesi	Kamu	78	2.8	2.09**	103.00	0.04
	Üniversite	27	2.3			

Önem düzeyi: *** $\alpha < 0,01$; ** $\alpha < 0,05$; * $\alpha < 0,1$

Araştırmacıların Farklı Kesimlerle İş Birliği Yapmama Nedenleri

Araştırmacıların AR-GE ve inovasyon sürecinde farklı aktörlerle iş birlikleri yapmalarının nedenleri aşağıda verilmiştir (Çizelge 12). İş birliğini engelleyen unsurların kısmen (3) ve etkili (4) aralığında olup, sosyo-psikolojik nitelikte olduğu belirlenmiştir. Araştırmacılar iş birliği yapmama nedenlerini; ekip ruhunun yeterince gelişmemesi, birbirinden öğrenme isteğinin düşüklüğü, aktörlerin önceliklerinin farklılığı, birbirinin görüşlerine kapalılık ve güvensizlik olarak sıralamışlardır.

Çizelge 12. İş birliği yapmama nedenleri*

İşbirliği yapılamamasındaki nedenler	Sayı	Ortalama	Std sapma
Ekip ruhunun yeterince gelişmemiş olması	106	3.92	1.066
Birbirinden öğrenme isteğinin zayıf olması	106	3.85	1.049
Aktörlerin önceliklerinin farklı oluşu	106	3.81	0.917
Birbirlerinin görüşlerine kapalı olmak	106	3.65	1.024
Karşılıklı güvensizlik	105	3.64	0.992
Kurumlar ve disiplinler arasındaki hiyerarşi	105	3.62	0.965
Başarısızlıkları gizleme isteği	104	3.51	1.033
Birbirlerinin bilgi ve becerilerine yeterince inanmamak	105	3.46	0.961
Katı bir bürokratik yapının varlığı	105	3.39	1.079
Sınırlı çalışma alanı	104	3.20	0.896

* Beşli Likert ölçeği: 1:hiç etkili değil, 2: etkisi düşük, 3: kısmen etkili, 4: etkili, 5: oldukça etkili

İnovasyonu Engelleyen Faktörler

Araştırmacılar inovasyonu engelleyen faktörlerin başına ekonomik yetersizlikleri koymuştur. Takiben sırasıyla eleman eksikliği ve teknolojik yetersizlikler yanında çiftçilerin ilgisizliği, kurumdaki katı bürokrasi ve piyasa bilgisinin yokluğunu belirtmişlerdir (Çizelge 13).

Çizelge 13. İnovasyonu engelleyen faktörler*

İnovasyonu engelleyen faktörler	Sayı	Ortalama	Std.sapma
Ekonomik yetersizlikler	106	3.42	0.826
Yeterli sayı ve nitelikteki elemanın yokluğu	105	3.31	1.050
Teknolojik yetersizlikler	106	3.24	1.010
Çiftçilerin tepkisizliği/ilgisizliği	106	3.09	0.981
Kurumsal katılık/bürokrasi	104	2.94	1.022
Piyasa bilgisinin yokluğu	105	2.93	0.891

* Beşli Likert ölçeği: 1:hiç etkili değil, 2: etkisi düşük, 3: kısmen etkili, 4: etkili, 5: oldukça etkili

Kuruluşlarda Bazı Değerlerin Varlık Düzeyi

Kurum kültüründe ele alınan değerler Çizelge 15’de belirtildiği gibi olmuştur. Genel olarak bu değerlerin kurumlarda içselleştirilmesinin yeterli olmadığı; özellikle proje değerlendirme sürecinin yavaşlığı (2.94) ve ekip kültürünün yeterince gelişmediği (2.94) görülmektedir (Çizelge 14).

Çizelge 14. Kuruluşlarda bazı değerlerin varlık düzeyi *

Bazı kurumsal değerler	Sayı	Ortalama	Std.sapma
Kurumun politika, süreç, değer ve hedeflerin net tanımlanması	108	3.17	1.072
Kurumda düşüncelerin tartışılması ve paylaşılması teşvik edilir	108	3.14	1.139
Çalışmaların sonuçları düzenli izlenir ve değerlendirilir	105	3.10	1.091
Projelerin başarı göstergeleri net tanımlanır	103	3.00	0.907
Proje destekleri hızlı sonuçlandırılır	108	2.94	1.070
Kurumda ekip kültürü için ortam uygundur	107	2.94	1.148

* Beşli Likertölçeği: 1:hiç yeterli değil, 2: oldukça sınırlı, 3: kısmen yeterli, 4: yeterli, 5: kesinlikle yeterli

Araştırma projelerinin yürütülmesi ile ilgili beceriler ve düzenlemelerin varlığı kurumlara göre farklıdır. Bu becerilerin kamu araştırma kuruluşlarında üniversitelere göre daha yüksek olduğu görülmektedir (Çizelge 15). Düşüncelerin paylaşılması, politikaların net tanımlanması, projelerin hızlı desteklenmesi, proje hedeflerinin net tanımlanması, izleme ve değerlendirme süreçleri, ekip kültürü gibi değerlerin varlık düzeyleri kamu araştırma kuruluşlarında üniversitelere göre daha yüksek çıkmıştır (Çizelge 16).

Çizelge 15. Kurumlara göre araştırma yönetim becerileri düzeyi (T Testi)

Bazı beceri ve değerler	Kurum	Sayı	Ortalama	T değeri	Serbestlik derecesi	P değeri
Araştırmaların yürütülmesi	Kamu	79	3.1	1.72*	104.00	0.09
	Üniversite	27	2.7			

Önem düzeyi: *** $\alpha < 0,01$; * $\alpha < 0,1$

Çizelge 16. Kuruluşlara göre bazı kurumsal değerlerin düzeyinin karşılaştırılması (T testi)

Kurumsal yapı ve olanaklar	Kurum	Sayı	Ortalama	T değeri	Serbestlik derecesi	P değeri
Kurumda düşüncelerin tartışılması ve paylaşılması teşvik edilir	Kamu	79	3.4	3.11***	42.82	0.00
	Üniversite	29	2.6			
Kurumun politika, süreç, değer ve hedefleri net tanımlanmıştır	Kamu	79	3.4	3.36***	106.00	0.00
	Üniversite	29	2.6			
Proje destekleri hızlı sonuçlandırılıp, fırsatlar kaçırılmaz	Kamu	79	3.1	1.90*	42.56	0.06
	Üniversite	29	2.6			
Çalışmalarımızın sonuçları düzenli olarak izlenir ve değerlendirilir	Kamu	79	3.3	3.42***	103.00	0.00
	Üniversite	26	2.5			
Kurumda yaratıcı ekip kültürü için uygun ortam vardır	Kamu	79	3.1	3.07***	105.00	0.00
	Üniversite	28	2.4			

Önem düzeyi: *** $\alpha < 0,01$; * $\alpha < 0,1$

Araştırmacılar memnuniyet düzeylerine göre yüksek ve düşük düzeyde memnun olanlar şeklinde iki gruba ayrılmışlar ve bağımlı değişkeni oluşturmuşlardır. Lojistik Regresyon analizine göre araştırma çalışmalarında eleman varlığı ve niteliği arttıkça araştırmacılarda mesleki memnuniyet eğilimleri de artmaktadır. Buna karşın, AR-GE’de altyapı olanaklarındaki yetersizlikler ile bürokratik iş yüklerindeki artışlar araştırmacıların mesleki memnuniyetlerini azaltmaktadır (Çizelge 17).

Çizelge 17. Araştırmacıların mesleki memnuniyetlerine etki eden faktörler (Lojistik Regresyon Analizi)

	B	S.E.	Wald	Df	Sig.	Exp(B)
Constant	-1.644	0.265	38.513	1	0	0.19
	B	S.E.	Wald	Df	Sig.	Exp(B)
Constant	-1.138	1.217	0.874	1	0.350	0.32
Eleman varlığı ve niteliği	1.099	0.469	5.492	1	0.019	3.00
Altyapı olanaklarının yetersizliği	-1.023	0.400	6.547	1	0.011	0.36
Bürokratik iş yükü	-0.084	0.043	3.711	1	0.045	0.92
Loglikelihood	77.897	Cox&Snell R Square	0.134	Nagelkerke R Square		0.23

TARTIŞMA VE SONUÇ

İnovasyon süreci; fikrin doğuşundan inovasyonun geliştirilip, kullanımına kadarki aşamaları belirtmektedir. Bir başka deyişle AR-GE çalışmalarının planlanmasından, hedef grupların bulguları/inovasyonu kullanmalarına kadar olan işlemleri kapsamaktadır. AR-GE bulguları uygulamaya aktarılmadığı sürece inovasyona (yeniliğe) dönüşemez. İnovasyonun ortaya çıkması için de bulguların mutlaka sosyal ve/veya ekonomik fayda sağlaması gerekmektedir. Yürütülen çalışmadan elde edilen sonuçlar, sistemde inovasyon sürecini yaklaşık 10 yıl, bir AR-GE çalışmasının çiftçinin kullanımına aktarım süresini (toplumsal ve ekonomik faydaya dönüşüm süresi) 15 yıl olarak ortaya koymuştur. Neredeyse bir araştırmacının meslek yaşamını kapsayabilecek uzunluktaki bu süre araştırmacıları inovasyon sürecinden soğutmakta; AR-GE bulguların çiftçiler tarafından benimsenme oranının istenen düzeyin altında tutmaktadır.

Yeniliklerin benimsenmesi sistemin başarısının göstergesidir (Rogers, 1983). Ancak araştırma bulguları yeniliklerin/araştırma bulgularının uygulamaya aktarılamadığını ve/veya çiftçiler tarafından yeterince benimsenmediği göstermektedir. AR-GE bulguların çiftçiler tarafından benimsenme oranı %41.7 olarak belirlenmiştir. Bu durum araştırmacının kendisi, kurumu ve ülkesi açısından da oldukça büyük bir kayıptır. Mevcut durumda Ege bölgesinde yapılan bahçe bitkileri araştırmalarının toplumsal faydası sınırlı kalmaktadır. İnovasyon sistemleri gelişmiş ülkelerde (Hollanda, İsrail vb.) araştırmaların toplumsal faydası %100'dür (Boyacı, 1996; 2001). Araştırma bulgularının çiftçiler tarafından benimsenme oranının az %80 olması (Saidin and Idris, 1995) durumunda ülkede tarımsal AR-GE'nin ve yayım çalışmalarının ekonomik ve toplumsal faydalarında tatmin edici artış sağlamaktadır.

Memnuniyet, çalışanların motivasyonunu ve üretkenliğini etkileyerek olumlu katkılar yapmaktadır (Yılmaz ve Dilmaç, 2011). Anket sonucu araştırmacıların işlerinden orta düzeyde memnun olduğunu gösterse de AR-GE ve inovasyon sisteminde memnuniyetin artırılması gerekmektedir. İnovasyon sürecinde memnuniyet düzeyleri yükseldikçe performans ve

toplumsal katkı artacaktır. Memnuniyetsizliklerin kurum altyapı olanakları ile de ilgili olduğu görülmektedir. Yürütülen çalışmada kamu olanaklarının üniversitelerden daha iyi olduğu, üniversitelerin teknolojik yetersizlikler ile teknik ve yardımcı personel yetersizliklerinin kamu kurumlarından daha fazla olduğu ve bu durumda çalışanlarda memnuniyetsizlik yarattığı ve AR-GE çalışmalarına engel teşkil ettiği görülmüştür.

İnovasyon süreci ağ yapılara gerek duymaktadır ve bu nedenle de farklı aktörlerle iş birlikleri temel yaklaşımdır. Yürütülen çalışmada süreç içerisinde sistemdeki aktörler arasındaki uyumun nispeten düşük olduğu görülmektedir. Çalışmalarda kırsal kesim ve çiftçi temsilcileri dâhil farklı aktörlerle iş birliği yapılması etkinliği arttıracaktır.

Kamu ve üniversitelerde AR-GE çalışmalarında öncelikli hedefin bölgede özellikle ihracat nedeniyle “kalite” konusunda olduğu, geleneksel araştırma ve yayım yaklaşımlarındaki üretim ve verimlilik artışları arayışının AR-GE gündemini etkilediği; buna karşın, çiftçilerin öncelikli beklentilerinin geri plana attığı görülmüştür.

Bilimsel araştırmaların yaklaşık %19’u çiftçi tarlasında yürütülmektedir. Araştırmaların çiftçi koşullarında yürütülebilmesi hem yerel koşullara uygun çalışma sonuçlarının üretilmesine hem de araştırmaların kırsal kesimde görünürlüğüne katkı sağlamaktadır. Çiftçi koşullarında yapılan çalışmaların artırılması yeniliklerin benimsenmesini de kolaylaştıracaktır.

Araştırmacılara göre ekonomik yetersizlikler inovasyonun önündeki en önemli engeldir. Ayrıca, araştırma projelerinin yürütülmesi ile ilgili kapasite ve becerilerin kamu araştırma kuruluşlarında üniversitelere göre daha yüksek olması dikkati çekmektedir. Özellikle üniversitelerde ekonomik sınırlılıklara dışında eğitim ve araştırma etkinlikleri için idari ve yardımcı personelin yeterli sayı ve nitelikte olmaması ile bürokratik iş yükünün fazlalığı sonuçta etkilidir. AR-GE ve inovasyon süreçlerinin kullanıcı ve piyasa beklentilerini dikkate alan talep yönlendirmeli, etkileşimli, güçlü ağ yapılar ve işbirlikleri içermesi sistemin etkinliğini, ekonomik ve sosyal faydasını arttıracaktır.

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**DETERMINATION OF VARIABILITY IN AMBIENT CONDITIONS DURING
COLD STORAGE OF ARONIA FRUITS**

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Abstract

In this research, temperature and relative humidity were investigated during one-month cold storage of Aronia melanocarpa Nero fruits in a cold store with an evaporative cooling system. Ambient temperature and relative humidity were measured by sensors at 36 points from top, medium and base levels. The research was carried out in accordance with the randomized plot design at +3°C for 1 month. The results were evaluated by using variance analyses. In addition, spatial variability maps were created. Variation of the temperature was determined between 3.40°C and 5.32°C for the top level, 3.80°C and 5.49°C for the middle level and 3.92°C and 5.51°C for the base level at 3°C storage temperature. Coefficient of variations was determined as 11.47% for top level, 11.48% for middle level and 7.10% for bottom level for temperature. The relative humidity values were changed between 74.00% and 88.09%. Mean coefficient of variation of the relative humidity varied between 3.22% and 4.43%. According to the results; distributions of the temperature and relative humidity for different levels were not uniform. The reason of high variability between measurement of the temperature and the relative humidity for different levels in the cold store was the distribution of the cold air. The cold air was ventilated by an evaporator and distributed according to the design of the cold store and placement of fruit cases. Different storage conditions were determined at different levels in the cold store during storage. In addition, there is generally one temperature/relative humidity sensor located back of the door inside the cold store used to control the cooling system. Measurement of the temperature and relative humidity from one point in a cold store is not enough to give an idea about the ambient conditions of the cold store. When storing agricultural products, the use of more temperature/relative humidity sensors in the cold store will enable the actual situation of the temperature and relative humidity values to be considered to control the operation of the cooling system. Additional cold air distribution systems such as ventilators, air curtains and placement of fruit cases may help to improve air distribution and decrease the spatial variability of the storage conditions in the cold store.

Keywords: Aronia, Cold storage, Evaporative cooling, Ambient factors, Spatial distribution

Introduction

Cold storage conditions affect directly quality and quantity of stored products. There are different cooling systems such as evaporative cooling systems and chiller cooling system. The cooling system determines distribution of the temperature and relative humidity in the cold stores. Type, size and placement of the storage cases determine distribution of the ambient factors such as air velocity, temperature and relative humidity in a cold store. Another factor is cold stored product for creating effect on the distribution of the storage factors in a cold store. The design of the cold store, type of the cooling system, cold storage boxes/cases and stored products have effect on storage conditions. Because of all these factors is important for cold storage. In this research, ambient temperature and relative humidity of a cold store were investigated during the cold storage of *Aronia melanocarpa* Nero variety fruits.

Black chokeberry (*Aronia melanocarpa* (Michx.) Elliott) belongs to the Rosaceae family, subfamily Maloideae, and is a deciduous shrub originating from the eastern part of North America (Persson et al., 2004; Ochmian et al., 2012). *Aronia* is a berry species. It consists of with its high antioxidant capacity and anthocyanin content (Karadal et al., 2019). *Aronia melanocarpa* is a source of bioactive compounds. Fresh chokeberry fruits are generally used for juices, nectars, syrups, jams, preserves, wines, tinctures, fruit desserts, jellies, fruit teas and dietary supplements (Sidor and Gramza-Michałowska, 2019). The composition and properties of aronia berries also depend on their cultivar. “Nero,” “Galicjanka,” “Viking,” “Fertodi,” “Hugin,” and “Aron” are popular varieties in Europe (Borowska and Brzoska, 2016). *Aronia* berries and leaves are rich in total polyphenol and flavonoid content that enables the plant to register higher antioxidant activity in comparison to many other culinary herbs and medicinal plants in use (Shahin et al., 2019). Berries can be processed into many values added products giving a boost to the local economy. Possible usage of black chokeberry for protection against unfavourable health effects of substances was evaluated. According to the evaluations; fruit and the leaves of *Aronia melanocarpa* and their products may be effective for prevention and treatment of the effects of toxic action of some xenobiotics in humans (Borowska and Brzoska, 2016). The influence of storage temperature and period on the phytochemical content and antioxidant activity of aronia was investigated in a research. The total polyphenol and flavonoid contents of aronia extract were found to be 308.48 µg gallic acid equivalent/g dry weight and 5.33 µg quercetin equivalent/g dry weight, respectively. Long-term storage of *Aronia* at 4°C reduced the levels of health promoting compounds (Hwang and Yeom, 2019). *Aronia* fruits can both be processed and consumed freshly, and sold at quite good prices, the interest for *Aronia*

production keeps growing. It shows high resistance to frost, mechanized harvesting, damage during transportation and cold storage. Due to these advantages, popularity of chokeberry has increased recently (Wawer, 2006).

Aronia industry is considered to grow with the increase of its production in Turkey (Engin et al., 2016; Engin and Boz, 2019). Aronia berry (*Aronia melanocarpa*) is native to North America. Aronia is being cultivated commercially in Europe. First studies began in Atatürk Horticultural Central Research Institute in 2012 in Turkey. Commercial cultivation began in 2017 with the establishment of larger orchards particularly in Marmara and Black Sea Regions in Turkey. The optimum harvest dates were determined for 'Nero' and 'Viking' Aronia cultivars. The second week of September was determined as optimum harvest time for 'Nero' and 'Viking' Aronia cultivars (Engin and Mert, 2020).

Temperature variation in cold store can be minimized with adequate air circulation. Most stores are designed to provide an airflow of $0.3\text{m}^3\text{min}^{-1}$ per ton of stored product. This is needed to cool product to storage temperature and also may be needed if the product has a high respiration rate (Arkema et al., 1999). Air velocity should be 0.2ms^{-1} . Its mean is equivalent velocity to change empty volume of cold store for 25-30 times per hour (Cemeroğlu et al., 2001). An improved internal structure was proposed to improve the distribution of cooling capacity in refrigerated container in a research. The velocity and temperature of the previous refrigerated container and the improved refrigerated container were obtained and compared. The cold airflow distribution in the improved refrigerated container was more uniform. The cooling performance of the two refrigerated containers were also obtained. The variation of temperature distribution was within $\pm 1^\circ\text{C}$ and the cooling time was also reduced by at least 22.9% in the improved refrigerated container (Jiang et al., 2020). A Computational fluid dynamics (CFD) model was developed, validated and used to analyse cooling characteristics of two different package designs used for postharvest handling of pomegranate fruit. The model incorporated geometries of fruits, packaging box, tray and plastic liner. The accuracy of the model to predict airflow and temperature distributions were validated against experimental data. The model predicted airflow through the stacks and cooling rates within experimental error. Stack design markedly affected the airflow profile, rate and uniformity of cooling. Profile of high and low temperature regions depended considerably on packaging box design (Ambaw et al., 2017). Temperature and relative humidity distribution in an experimental cold store fully loaded with apples were investigated with experimental and numerical methods. An unsteady three-dimensional computational fluid dynamics model was developed to assess the distribution of

temperature and relative humidity in a cold store fully loaded with apples. Relative error of the model was calculated 13% for temperature and 1.43% for relative humidity (Akdemir and Bartzanas, 2015). Computational Fluid Dynamic (CFD) method was also used to estimate ambient conditions of tractor cabin. (Akdemir et al., 2016). Spatial variability of ambient temperature, relative humidity and air velocity in an empty cold store were determined by using management zone analysis methods. The measured data were analysed by MZA software which performed fuzzy clustering to delineate the full cold storage, half full cold storage and empty cold storage. In addition, Surfer mapping software was utilized to create the maps of the measured parameters. The results indicated that there was significant spatial variation of the basic storage parameters such as ambient temperature, relative humidity and air velocity in the cold storage, which denotes the significance of management zones delineation in these facilities so as to maximize the storage (Akdemir and Tagarakis, 2014).

In this research; Aronia melanocarpa Nero variety fruits were stored in a cold store has an evaporative cooling system. Temperature and relative humidity in the cold store were measured for different levels during storage. Temperature and relative humidity were measured by Testo 177H1 sensor. Measurements were realized for top, medium and base level of the cold store. The spatial variability maps of the temperature and relative humidity were created for when Aronia fruits stored. In addition, statistical analyses were applied to compare spatial distribution of different levels.

2. MATERIALS AND METHODS

2.1. Cold store

The cold store has an evaporative cold store. The evaporative cooling system consists of compressor, condenser and evaporator. Cold air was ventilated in the cold store by evaporator. Its volume was 392 m³ (11.85 x 7.75 x 4.27 m) (Figure 1).

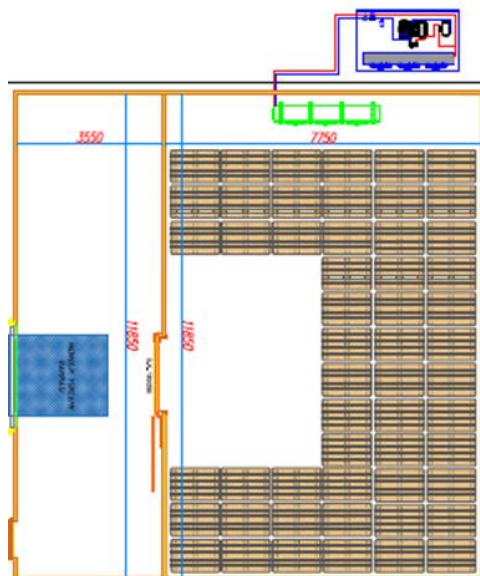


Figure 1. General view and dimensions of the cold store

2.2. Aronia

Chokeberry (black chokeberry) is a species with lower cultivation requirements within Rosaceae family. It is cultivated also in East European countries and Germany (Kulling and Rawel, 2008). In this research; Aronia melanocarpa Nero variety chokeberry was cold stored (Figure 2).



Figure 2. Aronia melanocarpa (Anonymous, 2021)

2.3. Sensors

The temperature and relative humidity were measured during cold storage of the Aronia melanocarpa. Testo 177 H1 data loggers were used to measure temperature and relative humidity. Measurement limits of sensors were -20°C and $+100^{\circ}\text{C}$ for temperature, 0 - 100% RH for relative humidity.

2.4. Experimental design

Aronia Melanocarpa Nero variety was stored for 5 weeks (14th September 2021 and 17th October 2021). Temperature was set as 4°C for cold storage. Humidification was not applied during cold storage. Aronia melanocarpa fruits were cold stored in plastic cases and carton boxes. Total

amount of the cold stored Aronia melanocarpa was 21000 kg.

2.5. Ambient temperature and relative humidity measurements

Temperature and relative humidity were measured from cold store and in the plastic cases for 3 different levels (bottom, middle and top level). Measurements were realized from 12 points (4 in length and 3 points in width of the cold store) for each level and for 3 levels as top, middle and base level. Temperature and relative humidity were measured from 36 points (Figure 3) (Akdemir and Bal., 2014). The distances between measurements were 2m in width, 2.5 m in length and 0.5 m in height of the cold storage boxes.

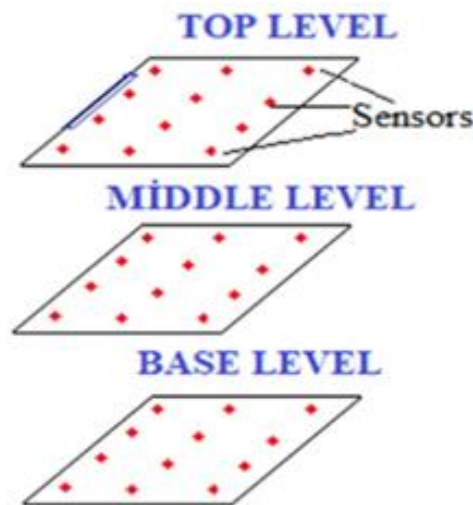


Figure 3. Measurements points and sensors in the cold store

The measured data of the ambient temperature and relative humidity were evaluated by using descriptive statistics such as mean, minimum, maximum, standard deviation (SD) and coefficient of variation (CV%). In addition, the results were compared by statistically. The experiment was designed as 3 factor factorial design in 4 replications and variance analysis and F test were used to compare differences between factors and their interactions. According to the F test, Duncan grouping test was used for grouping of the significant factors and interactions. SPSS statistical software was used for variance analysis and MSTAT software for grouping of the significant factors and interactions. If the effect of the main and interactions of ambient temperature and relative humidity were found statistically significant, the Duncan grouping test was used. Standard error of means for main factor and their interactions were also given for Duncan grouping tests (Soysal, 2000, Soysal and Gurcan, 2012).

2.6. Producing of Spatial Variability Maps

Spatial variability maps of the temperature and relative humidity for storage of the Aronia melanocarpa Nero fruits in the cold store with the evaporative cooling system. Surfer Graphic Programme was used to create maps. Measured data is arranged in a file to use by the Surfer

Programme. Surfer Programme created grid data files. The grid data files were used to create contour maps. The maps were investigated to determine changing of the temperature, air velocity and relative humidity in the cold store (Akdemir and Blackmore, 2004).

3. RESULTS AND DISCUSSION

3.1. Ambient temperature

Measured temperatures values for different levels and descriptive statistics were given in Table 1.

Table 1. Descriptive Statistics of Measured Temperatures For Different Levels (°C)

	Top Level				Medium Level				Base Level			
	Width			Mean	Width			Mean	Width			Mean
Length	1	2	3		1	2	3		1	2	3	
Mean	4.32	4.37	4.55	4.41	4.58	4.30	4.10	4.33	4.89	4.89	5.14	4.97
Min.	3.60	3.86	3.40	-	3.80	3.92	3.92	-	4.10	3.92	5.03	-
Max.	5.32	5.28	5.27	-	5.49	5.23	5.23	-	5.51	5.23	5.23	-
SD	0.50	0.43	0.59	0.51	0.66	0.53	0.31	0.50	0.46	0.51	0.08	0.35
CV(%)	11.60	9.91	12.89	11.47	14.48	12.44	7.52	11.48	9.49	10.32	1.50	7.10

Variation of the temperature of the cold store at 3°C storage temperature changed between 3.40°C and 5.32°C for top level, 3.80°C and 5.49°C for middle level and 3.92°C and 5.51°C for base level. Mean Coefficient of variations of top, middle and bottom level at the cold store were determined as 11.47%, 11.48 % and 7.10%, respectively.

Spatial distribution maps of the ambient temperature were given in Figure 5 for top, middle and base level of the cold storage boxes.

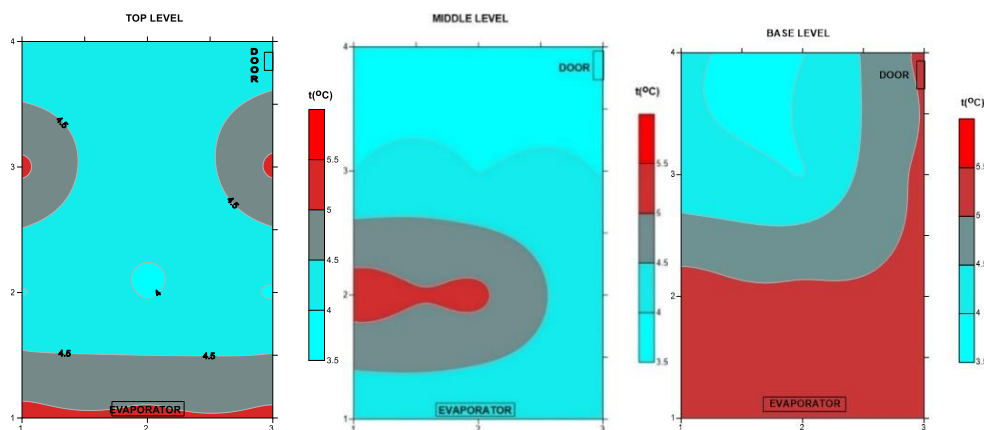


Figure 4. Spatial distribution maps of the ambient temperatures

Variation of the ambient temperature of the cold store at 3°C storage temperature changed between 3.5°C and 5.0°C for top level, 3.5°C and 5.5°C for middle level and base level. There were 3 or 4 different cold zone for the stored fruits. There were important heterogeneities of the spatial distribution of ambient temperature for different levels. There were different storage conditions

for cold-stored Aronia fruits located at different levels of cold storage. The spatial variability was also an indicator of the unevenness of cold air distribution affected by the cooling system, cold store construction (size, geometry, materials), storage boxes and cold stored product.

3.2. Relative humidity

Measured relative humidity values for different levels and descriptive statistics were given in Table 2. Variation of the relative humidity changed between 75.73% and 88.09% for the top level, 74.00% and 86.70% for the middle level and 74.13% and 85.64% for the base level. The mean Coefficient of variations of top, middle and bottom levels at the cold store was determined at 4.43%, 4.02 % and 3.22%, respectively. The ambient relative humidity of the cold store was not controlled by the cooling system, automatically or manually because of the cold stored Aronia *Melanocarpa Nero* fruits requirement.

Table 2. Descriptive Statistics of Measured Relative Humidity For Different Levels (%)

	Top Level				Medium Level				Base Level			
	X Axis				X Axis				X Axis			
Y Axis	1	2	3	Mean	1	2	3	Mean	1	2	3	Mean
Mean	82.93	84.13	80.73	82.59	80.01	81.84	83.39	81.74	77.93	78.73	77.17	77.94
Min.	76.10	76.76	75.73	-	74.00	75.73	75.73	-	74.13	75.73	75.73	-
Max.	88.09	87.62	87.20	-	86.70	85.64	85.64	-	84.29	85.64	79.00	-
SD	4.37	3.21	3.40	3.66	3.95	3.35	2.51	3.27	3.09	3.09	1.37	2.52
CV(%)	5.27	3.81	4.21	4.43	4.93	4.09	3.03	4.02	3.96	3.94	1.77	3.22

Spatial distribution maps of the relative humidity were given in Figure 5 for top, middle and base level of the cold storage boxes.

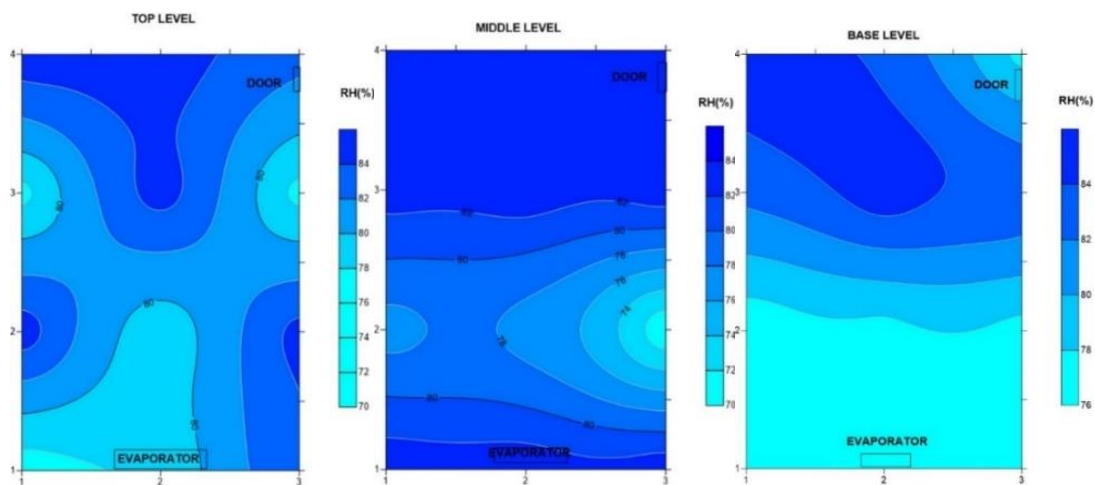


Figure 5. Spatial distribution maps of the relative humidity (RH %)

Variation of the relative humidity of the cold store was changed between 70% and 84% for top level, middle level and base level. There were 3 or 4 different cold zone for the stored fruits. There were important heterogeneities of the spatial distribution of relative humidity for different levels.

4. Conclusions

Homogeneity of the ambient temperature and relative humidity is important to protect agricultural product in a cold store. There are different cooling systems that used in cold stores. In this research a cold store with evaporative cooling system was used to determine spatial distribution of ambient temperature and relative humidity for Aronia melanocarpa Nero variety. Temperature and relative humidity sensors used in this cooling system located at one point of the cold store. The ambient temperatures and relative humidity were determined at top, middle and floor level in the cold store for storage temperatures as 3°C. Mapping software and descriptive statistics (mean, maximum, minimum, standard deviation and coefficient of variation) were used to evaluate data. Ambient temperature varied between 3.40°C and 5.32°C for top level, 3.80°C and 5.49°C for middle level and 3.92 °C and 5.51 °C for base level at 3°C storage temperature. Relative humidity changed between 74.00% and 88.09%.

The results showed that distribution of the ambient temperature and the relative humidity was not uniform for this system. Maximum differences were observed near the walls of the cold store. A more homogeneous distribution was achieved in the middle of the cold store both for air temperature and relative humidity. Reason of bad spatial distribution of ambient temperature was bad spatial distribution of air velocity generated by evaporator fan. There were different storage conditions for cold stored Aronia fruits located at different levels of cold store. The spatial variability is also an indicator of unevenness of cold air distribution affected by cooling system, cold store construction (size, geometry, materials), storage boxes and cold stored product. In addition, there is generally one temperature and relative humidity sensor to measure the ambient temperature and the relative humidity in the cold store to control cooling system. These sensors measure from one point of cold store. Using more sensor to get data from different levels of the cold store will help to decrease spatial variability in the cold store.

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**ŞANLIURFA KOŞULLARINDA BAZI MISIR ÇEŞİTLERİNİN VERİM
ÖZELLİKLERİNİN KARŞILAŞTIRILMASI**

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Özet

Bu çalışma, 2016 yılında Şanlıurfa koşullarında ikinci ürün olarak yetiştirilen bazı mısır çeşitlerinin verim özelliklerini belirlemek amacıyla yürütülmüştür. Çalışma tesadüf blokları deneme desenine göre üç tekrarlamalı olarak kurulmuştur. Çalışmada 5 çeşit (32T83, Dkc 6101, Agm 1644, Agm 1690 ve Dkc 6120) kullanılmıştır. Çeşitler arasındaki farklılıklar tüm özellikler için önemli bulunmuştur. Çalışmada bitki sayısı, nem içeriği, hektolitre ağırlığı ve verim özellikleri analiz edilmiştir. Çalışmada incelenen özelliklerden elde edilen ortalama sonuçlara göre, bitki sayısı 8200 (bitki/da) ile 8800 (bitki/da) arasında, nem içeriği %22,1 ile %25 arasında, hektolitre ağırlığı 65 kg/hl ile 68 kg/hl arasında ve tane verimi 1044 kg/da ile 1412 kg/da arasında değişmiştir. Tane verimi açısından Agm1690 önde gelen çeşit olmuştur.

Anahtar Kelimeler: Mısır, Çeşit, Verim, Kalite

**COMPARISON OF YIELD CHARACTERISTICS OF SOME MAIZE VARIETIES
UNDER ŞANLIURFA CONDITIONS**

Abstract

This study was conducted to determine the yield characteristics of some maize varieties as second crop in Sanliurfa conditions in 2016. The study was established according to the randomized block design with three replications. In the study, 5 varieties (32T83, Dkc 6101, Agm 1644, Agm 1690 and Dkc 6120) were used. Differences between varieties were found to be significant for all traits. In the study, plant number, moisture content, hectoliter weight and yield characteristics were analyzed. According to the average results obtained from the traits examined in the study, the number of plants varied between 8200 (plants/da) and 8800 (plants/da), grain moisture content between 22,1% and 25%, hectoliter weight between 65 kg/hl and 68 kg/hl and grain yield between 1044 kg/da and 1412 kg/da. Agm1690 was the leading variety in terms of grain yield.

Keywords: Maize, Genotype, yield, quality

Giriş

Dünyada tarımına yaklaşık olarak 4000 yıl önce başlanan (Bisognin, 2002) mısır (*Zea mays* L.) bitkisi; buğdaygiller (*Poaceae*) familyasından olup, dünya nüfusunun beslenmesinde buğday ve çeltikten sonra üretimi en çok yapılan sıcak iklim kültür bitkisidir (Babaoğlu ve ark., 2001).

Mısır, içinde bulundurduğu zengin besin maddesi nedeniyle insan ve hayvan beslenmesinde büyük değer taşımaktadır. Dünyada üretilen mısırın yaklaşık %27'si insan beslenmesinde, %73'ü ise hayvan yemi olarak tüketilmektedir. Gelişmekte olan ülkelerde üretilen mısırın %45.9'u hayvan, %54.1'i insan beslenmesinde kullanılırken mısırın hayvan yemindeki payı %88.9'a ulaşmaktadır (Anonim, 2003). Dünyada silaj yapımı amacıyla yetiştirilen ve hayvan beslemesinde kullanılan bitkilerin basında mısır gelmektedir. Mısırı sorgum, sudan otu ve sorgum-sudan otu melezleri izlemektedir (Kuşaksız ve Kuşaksız, 2005). Ülkemizde mısır daha çok tane üretim amacıyla yetiştirilmekle birlikte son yıllarda, özellikle süt hayvancılığının gelişmekte olduğu bölgelerde silaj bitkisi olarak önemi giderek artmaktadır (Orak ve İptaş, 1999).

Son yıllarda özellikle ülkemizin Güneydoğu Anadolu Bölgesinde ve Araştırmanın yürütüldüğü Şanlıurfa ilinde mısır üretim miktarları yıldan yıla tırmanışta olduğu görülmektedir. Mısır tarımının her aşamasında teknolojik mekanizasyonun kullanılması, ürünün alım garantisinin olması ve bölgenin bazı bölgelerinin sulamaya açılması üretimde ki artışın en önemli nedenlerindedir. Her ne kadar bölgede yoğun mısır tarımı yapılsa da bölge iklim koşulları açısından mısır yetiştirme sezonunda yüksek sıcaklıkların ve düşük nisbi nem oranlarının hakim olduğu bir bölgedir. Mısır bitkisinin dünyada yetişme sınırlarını belirleyen en önemli faktörler sıcaklık ile yetişme periyodudur (Turgut, 2001).

Bu çalışma; bazı mısır çeşitlerinin karşılaştırılması amacıyla yürütülmüştür. Özellikle bölge üreticileri için uygun çeşitlerin tespiti amacıyla yürütülecek çalışmalara katkı sağlanması da bu çalışmanın amaçları arasında yer almaktadır.

MATERYAL VE METOD

Bu çalışma 2016 yılında Karpuzlu Köy/Haliye/ Şanlıurfa'da çiftçi arazisinde yürütülmüştür. Denemede materyal olarak 5 adet mısır çeşidi kullanılmıştır.

Arratia Tesadüf Blokları Deneme Deseni'ne göre üç tekerrürlü olarak yürütülmüştür.

Tablo 1. Şanlıurfa 2016-2017 uzun yıllar meteorolojik durumu

Aylar	Ort. Sıcaklık . (°C)			Yağış (kg m ²)		Bağıl Nem (%)			
	2016	2017	Uzun Yıllar	2016	2017	Uzun Yıllar	2016	2017	Uzun Yıllar
Ocak	4.7	5.4	5.7	95.6	9.0	85.7	70.3	61.9	70.3
Şubat	11.6	7.7	7.0	17.1	1.8	71.4	61.8	45.3	66.9
Mart	13.6	12.7	11.0	13.0	55.2	64.1	50.3	57.1	60.4
Nisan	20.6	16.6	16.2	27.1	79.2	46.8	36.1	50.2	56.2
Mayıs	23.2	22.9	22.3	12.3	7.2	28.1	38.3	39.0	44.9
Haziran	29.8	29.7	28.2	0.6	0.0	3.6	28.0	27.0	32.8
Temmuz	33.0	34.2	31.9	0.2	0.0	0.6	25.4	22.9	30.0
Ağustos	33.2	32.2	31.2	0.0	0.0	0.8	30.6	35.7	33.1
Eylül	26.4	29.6	26.8	0.0	0.0	3.3	32.1	28.8	35.8
Ekim	22.1	20.5	20.2	22.0	17.1	27.4	35.9	36.9	46.4
Kasım	12.6	13.4	12.7	23.3	17.4	46.0	42.9	56.0	59.9
Aralık	5.4	10.3	7.5	101.1	9.5	77.4	70.1	60.2	69.9
Mean	19.7	19.6	18.4	26.0	16.4	37.9	43.5	43.4	50.6

Araştırmanın yürütüldüğü yıllara ait iklim verilerine bakıldığında, en yüksek sıcaklık Temmuz ve Ağustos aylarında ortalama 33-33.2 °C olarak görülmüştür (Tablo 1).

Denemede parseller 2.8 m x 5.0 m= 14 m²'dir. Her parselde 2 sırası parsel kenar tesiri (1 sıra sağda, bir sıra solda) olmak üzere 6 sıra olacak şekilde tertiplenmiştir. Bir deneme çeşitlerin dane verimi belirlemek sıra arası 70 cm, sıra üzeri 18 cm olarak düzenlenmiştir. Ekim tarihihi 07.07.2016. Dekara 40 kg olarak 20.20.0 gübre ve 40 kg Üre gübresi verilmiştir.

Ekimden sonra deneme alanları yağmurlama sistemiyle sulanmış devamında ilki boğaz doldurmadan sonra olmak üzere ihtiyaca göre karıklara salma sulama ile toplamda 10 adet sulama yapılmıştır. Mısır bitkileri toprak üzerine çıktıktan on beş gün sonra beş-altı yapraklı iken birinci çapa ile teklenmiş, bitkiler 30-40 cm olduğunda ikinci çapa ile birlikte boğaz doldurma işlemi yapılmıştır.

Hasat her parselde, hasat zamanında parsel ortasındaki iki sırada elle yapılmıştır. Ölçümler ise 10 adet bitkide yapılmıştır. Hasat 27.10.2016 tarihinde yapılmıştır. olup analiz numuneleri ise ölçümü yapılan bitkilerden seçilerek hazırlanmıştır.

Araştırma sonucunda elde edilen veriler, tesadüf parselleri deneme deseninde faktöriyel düzene göre 3 tekerrürlü olarak JUMP istatistiki paket programıyla analiz edilmiştir.

BULGULAR ve TARTIŞMA

Şanlıurfa koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bulgular Çizelge 1’de belirtilmiştir.

Çizelge 1. Araştırma sonucunda elde edilen bulgular

Çeşitler	Bitki Sayısı (adet/da)	Tane Nemi (%)	Hektolitire Ağırlığı (kg/hl)	Tane Verimi (kg/da)
32T83	8200 d	24 c	68 b	1320 b
Dkc 6101	8800 a	20 e	66 c	1044 e
Agm 1644	8700 b	24,4 b	69 a	1313 d
Agm 1690	8500 c	25 a	66 c	1412 a
Dkc 6120	8200 d	22,1 d	65 d	1316 c
lsd	180	0,65	1,4	98

Bitki Sayısı (adet/da)

Şanlıurfa koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bitki sayısına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında bitki sayısı bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek bitki sayısı Dkc 6101 çeşidinde 8800 (adet/da) olarak belirlenirken, en düşük bitki sayısı ise 32T83 ve Dkc 6120 çeşitlerinde belirlenmiştir (8200 adet/da). Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir.

Tane Nemi (%)

Şanlıurfa koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen tane nem oranına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında tane nem oranı bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek nem oranı Agm 1690 çeşidinde %25 olarak belirlenirken, en düşük tane nem oranı ise Dkc 6101 çeşidinde %20 olarak belirlenmiştir.

Hektolitre Ağırlığı (kg/hl)

Şanlıurfa koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen hektolitre ağırlıklarına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında hektolitre ağırlığı bakımından istatistiksel olarak önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek hektolitre ağırlığı Agm 1644 çeşidinde 69 kg/hl olarak belirlenirken, en düşük hektolitre ise Dkc 6120 çeşidinde 65 kg/hl olarak belirlenmiştir. Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir. Sıcaklıklarla beraber mısır çeşitlerinin su stresine karşı toleranslarında etkili olduğu düşünülmektedir. Tepe püskülü çiçeklenme döneminde yaşanan yüksek sıcaklıklardan dolayı polen canlılık oranlarını azaltmış buna paralel olarak hektolitre ağırlıklarında farklılıklar görülmesine neden olmuştur.

Tane Verimi (kg/da)

Şanlıurfa koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen verim miktarına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında verim bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek verim Agm 1690 çeşidinde 1422 kg/da olarak belirlenirken, en düşük verim ise Dkc 6101 çeşidinde 1044 kg/da olarak belirlenmiştir. Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir. Keskin ve ark. (2011), Han (2016),

Kalkan (2008), Sakin ve ark. (2016) araştırmalarından daha yüksek verimler elde edilirken, Vartanlı ve Emeklier (2007) ile Howell ve ark. (1996), yapmış olduğu çalışmalara benzer sonuçlar elde edilmiştir.

Farklılıkların en büyük sebebi çalışmalarda kullanılan çeşitlerin genetiksel farklılıklarından kaynaklı olduğu düşünülmektedir.. Bunun yanında yapılan gübreleme, çapalama, ilaçlama gibi kültürel işlemlerdeki farklılık mısır gibi C4 bitkisinde verim ve diğer unsurları yüksek oranda etkilemektedir.

SONUÇ

Şanlıurfa koşullarında farklı mısır çeşitlerinin verim ve kalite özelliklerinin karşılaştırılması sonucunda, çeşitler arasında incelenen tüm özellikler bakımından istatistiksel olarak önemli farklılıklar belirlenmiştir. Bunun sonucunda en yüksek tane verimi Agm 1690 çeşidinde 1422 kg/da olarak ve en yüksek hektolitre ağırlığı ise Agm 1644 çeşidinde 69 kg/hl olarak belirlenmiştir.

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**KIZILTEPE KOŞULLARINDA BAZI MISIR ÇEŞİTLERİNİN VERİM
ÖZELLİKLERİNİN BELİRLENMESİ**

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Özet

Bu çalışma, 2015 yılında Kızıltepe koşullarında ikinci ürün olarak yetiştirilen bazı mısır çeşitlerinin tane verimi özelliklerini belirlemek amacıyla yürütülmüştür. Çalışma tesadüf blokları detane nemie desenine göre üç tekrarlamalı olarak kurulmuştur. Çalışmada 3 çeşit (As 66, Agn 720 ve 32T83) kullanılmıştır. Çeşitler arasındaki farklılıklar tüm özellikler için ötene nemili bulunmuştur. Çalışmada bitki sayısı, tane nemi içeriği, hektolitre ağırlığı ve tane verimi özellikleri analiz edilmiştir. Çalışmada incelenen özelliklerden elde edilen ortalama sonuçlara göre, bitki sayısı 7800 (bitki/da) ile 8000 (bitki/da) arasında, tane nemi içeriği %25 ile %27 arasında, hektolitre ağırlığı 63 kg/hl ile 68 kg/hl arasında ve tane verimi 1244 kg/da ile 1408 kg/da arasında değişmiştir. Tane verimi açısından 32T83 önde gelen çeşit olmuştur.

Anahtar Kelimeler: Mısır, Çeşit, Tane verimi, Kalite

**DETERMINATION OF YIELD CHARACTERISTICS OF SOME MAIZE
VARIETIES UNDER KIZILTEPE CONDITIONS**

Abstract

This study was conducted to determine the yield characteristics of some maize varieties as second crop in Kiziltepe conditions in 2015. The study was established according to the randomized block design with three replications. In the study, 3 varieties (As 66, Agn 720, and 32T83) were used. Differences between varieties were found to be significant for all traits. In the study, plant number, moisture content, hectoliter weight and yield characteristics were analyzed. According to the average results obtained from the traits examined in the study, the number of plants varied between 7800 (plants/da) and 8000 (plants/da), grain moisture content between 25% and 27%, hectoliter weight between 63 kg/hl and 68 kg/hl and grain yield between 1244 kg/da and 1408 kg/da. 32T83 was the leading variety in terms of grain yield.

Keywords: Maize, Genotype, yield, quality

Giriş

Mısır dünyanın ılıman ve tropik bölgelerinde yetiştirilen ve tarla bitkileri içerisinde geliştirilen en mükemmel bir bitkidir. Buğdaygiller (Gramineae) familyasının *Maydea* oymağından olan mısır bitkisi; tahıl türü bitkiler içinde en yüksek tane ve kuru madde tane verimii sağlayabilen, güneş ışığından optimum faydalanabilen (C4 bitkisi) tek yıllık bir bitkidir (Kırtok, 1998). Çok geniş koşullara adapte olmuş üretimi yapılan pek çok mısır tipleri vardır. Mısır bitkisi normal şartlar altında ilk iki ay içerisinde 2.5-3 m boyunda bir bitki meydana gelir. Bundan sonraki iki ay içinde de 600–1000 arasında tohum barındıran koçanı oluşturur. Bu yüksek tane verimi özelliği nedeniyle, insan ve hayvan beslenmesindeki ötene nemii ve makineli tarımı en fazla yapılan bitkilerden biridir. Diğer birçok yemlere göre daha fazla hazmolabilir enerji ihtiva etmekte ve bu nedenle dünyanın bir çok yerinde sığırların ve koyunların beslenmesinde, özellikle süt sığırlarında yaygın bir şekilde kullanılmaktadır (Akdemir ve ark., 1997).

Türkiye’de mısır bitkisi, buğday ve arpadan sonra en fazla tarımı yapılan tahıl türüdür. TÜİK verilerine göre Türkiye’de 2021 yılında 758 bin hektar alanda ekilen mısırdan 6 milyon 750 bin ton mısır üretimi gerçekleştirilmiştir, ortalama mısır tane verimii ise 890 kg/da olduğu hesaplanmıştır (TÜİK, 2021).

Bitki besin elementlerinden azot; bitkinin yeşil aksamlarının gelişmesini teşvik eden, bitkinin fotosentez gibi ötene nemili fizyolojik işlevlerini sağlıklı bir şekilde sürdürebilmesini sağlayan ötene nemii yüksek bir besin elementidir.

Mısır, içinde bulundurduğu zengin besin maddesi nedeniyle insan ve hayvan beslenmesinde büyük değer taşımaktadır. Dünyada üretilen mısırın yaklaşık %27’si insan beslenmesinde, %73’ü ise hayvan yemi olarak tüketilmektedir. Gelişmekte olan ülkelerde üretilen mısırın %45.9’u hayvan, %54.1’i insan beslenmesinde kullanılırken mısırın hayvan yemindeki payı %88.9’a ulaşmaktadır (Anonim, 2003).

Bu çalışma; bazı mısır çeşitlerinin karşılaştırılması amacıyla yürütülmüştür. Özellikle bölge üreticileri için daha uygun çeşitlerin tespiti amacıyla yapılmış olup, daha sonra yürütülecek diğer çalışmalara katkı sağlanması amacıyla taşımaktadır.

MATERYAL VE METOD

Bu çalışma 2015 yılında Akça köyü/Kızıltepe/Mardin’de çiftçi arazisinde yürütülmüştür. Denemede materyal olarak 3 adet mısır çeşidi kullanılmıştır.

Araştırma Tesadüf Blokları Deneme Deseni’ne göre üç tekerrürlü olarak yürütülmüştür.

Çizelge 1. Mardin ilinde uzun yıllar yağış ortalaması (1960-2016), çalışma yıllarına ait sıcaklık, yağış ve tane nemi değerleri.

Aylar	2015	2016	UY O	2015	2016	UY O	2015	2016	UYO
Haziran	25.9	26.2	25.6	2.9	1.0	4.7	29.0	28.2	32.3
Temmuz	31.8	30.6	29.9	0,2	0.1	1.3	19.6	22.4	27.7
Ağustos	30.5	32.2	29.5	0.4	1.4	0.2	25.8	21.7	28.4
Eylül	28.4	24.3	25	9.9	-	1.8	23.0	28.7	32.6
Ekim	19.5	20.5	18.4	58.2	16.5	32.9	49.6	33.3	45.1
Toplam				71.6	18.0	40.9			
Ortalama	27.2	26.8	25.7				29.4	26.9	32.4

Araştırmanın yürütüldüğü yıllara ait iklim verilerine bakıldığında, en yüksek sıcaklık Temmuz ve Ağustos aylarında ortalama 31.8-30.5 °C olarak görülmüştür (Tablo 1).

Denemede parseller 2.8 m x 5.0 m= 14 m²,dir. Her parselde 2 sırası parsel kenar tesiri (1 sıra sağda, bir sıra solda) olmak üzere 6 sıra olacak şekilde tertiplenmiştir. Bir detane nemie çeşitlerin dane tane verimii belirlemek sıra arası 70 cm, sıra üzeri 18 cm olarak düzenlenmiştir. Ekim 01.07.2015 tarihinde yapılmıştır. Dekara 45 kg olarak 20.20.0 gübre ve 28 kg Üre gübresi verilmiştir.

Ekimden sonra detane nemie alanları yağmurlama sistemiyle sulanmış devamında ilki boğaz doldurmadan sonra olmak üzere ihtiyaca göre karıklara salma sulama ile toplamda 10 adet sulama yapılmıştır. Mısır bitkileri toprak üzerine çıktıktan on beş gün sonra beş-altı yapraklı iken birinci çapa ile teklenmiş, bitkiler 30-40 cm olduğunda ikinci çapa ile birlikte boğaz doldurma işlemi yapılmıştır.

Hasat her parselde, hasat zamanında parsel ortasındaki iki sırada elle yapılmıştır. Ölçümler ise 10 adet bitkide yapılmıştır. Hasat 27.11.2015 tarihinde yapılmıştır.

Araştırma sonucunda elde edilen veriler, tesadüf parselleri detane nemie deseninde faktöriyel düzene göre 3 tekerrürlü olarak JUMP istatistiki paket programıyla analiz edilmiştir.

BULGULAR ve TARTIŞMA

Kızıltepe koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bulgular Çizelge 1’de belirtilmiştir.

Çizelge 1. Araştırma sonucunda elde edilen bulgular

Çeşitler	Bitki Sayısı (adet/da)	Tane Tane nemi (%)	Hektolitire (kg/hl)	Tane verimi (kg/da)
32T83	8000 a	25 b	63 b	1408 a
Agn 720	7800 b	27 a	68 a	1316 b
As 66	8000 a	25 b	65 b	1244 b
LSD	554	2,44	3,1	98

Bitki Sayısı (adet/da)

Kızıltepe koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bitki sayısına ait bulgular Çizelge 1’de belirtilmiştir.

Araştırma sonucunda çeşitler arasında bitki sayısı bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek bitki sayısı 32T83 ve As66 çeşitlerinde 8000 (adet/da) olarak belirlenirken, en düşük bitki sayısı ise Agn 720 çeşidinde 7800 adet/da olarak belirlenmiştir. Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir.

Tane nemi (%)

Kızıltepe koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen tane nemi oranına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında tane nemi oranı bakımından ötene nemili farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek tane nemi oranı Agn 720 çeşidinde %27 olarak belirlenirken, en düşük tane nemi oranı ise 32T83 ve As66 çeşitlerinde %25 olarak belirlenmiştir. Özmen (2008) hasatta tane tane nemi yönünden genotip x çevre interaksiyonunun önemli olduğunu bildirmiştir.

Hektolitire Ağırlığı (kg/hl)

Şanlıurfa koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen hektolitire ağırlığına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında hektolitire bakımından istatistiksel olarak önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek hektolitire ağırlığı Agn 720 çeşidinde 68 kg/hl olarak belirlenirken, en düşük hektolitire ağırlığı ise 32T83 ve As 66 çeşitlerinde 63 – 65 kg/hl olarak belirlenmiştir. Hektolitire ağırlığı önemli bir kalite parametresidir. Koç (2020), çalışmasında hektolitire ağırlığını ortalama 75 kg/hl ve mısır çeşidi yönünden

istatistiksel olarak önemli bularak çalışmamızla yakın düzeyde veriler elde etmiştir. Babaoğlu (2003), Tekkanat ve Soylu (2005), Özmen (2008), çalışmasında 74,7- 78,7 kg/hl değerleri ile bulgularımıza yakın değerler elde edip ve hektolitre ağırlığında genotip x çevre interaksyonunun otane nemili olduğunu bildirmiştir. Elmalı ve Soylu (2008) ve Özel (2019) çalışmalarında bulgularımızın altında değerler belirterek hektolitre ağırlığını çalışmamızın aksine istatistiksel olarak otane nemisiz olduğunu bildirmişlerdir.

Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir. Sıcaklıklarla beraber mısır çeşitlerinin su stresine karşı toleranslarında etkili olduğu düşünülmektedir. Tepe püskülü çiçeklenme döneminde yaşanan yüksek sıcaklıklardan dolayı polen canlılık oranlarını azaltmış buna paralel olarak hektolitre ağırlıklarında farklılıklar görülmesine neden olmuştur.

Tane verimi (kg/da)

Şanlıurfa koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen tane verimi miktarına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında tane verimi bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek tane verimi 32T83 çeşidinde 1408 kg/da olarak belirlenirken, en düşük tane verimi ise Agn 720 ve As 66 çeşitlerinde çeşidinde 1316-1244 kg/da olarak belirlenmiştir. Tane veriminde, bitkinin dışarıdan verilebilen ihtiyaç duyduğu besin maddelerinin sağlanmasının yanında sulama ve bakım işlemlerinin zamanında ve doğru yapılmasının önemli etkileri olmaktadır. Bunun yanında bitkinin yetiştirildiği çevre koşulları, uygun hava sıcaklığı ve tane nemii tane tane verimiine etki etmektedir. Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir. Keskin ve ark. (2011), Han (2016), Sakin ve ark. (2016) araştırmalarından daha yüksek tane verimleri elde edilirken, Vartanlı ve Emeklier (2007), Sarikurt (2005), Atakul ve ark. (2014), Kılınç ve ark. (2014), Kahraman (2016) ile Howell ve ark. (1996), yapmış olduğu çalışmalara benzer sonuçlar elde edilmiştir. Farklılıkların en büyük sebebi çalışmalarda kullanılan çeşitlerin genetiksel farklılıklarından kaynaklı olduğu düşünülmektedir.. Bunun yanında yapılan gübreleme, çapalama, ilaçlama gibi kültürel işlemlerdeki farklılık mısır gibi C4 bitkisinde tane verimi ve diğer unsurları yüksek oranda etkilemektedir.

SONUÇ

Kızıltepe koşullarında farklı mısır çeşitlerinin verim ve kalite özelliklerinin karşılaştırılması sonucunda, çeşitler arasında incelenen tüm özellikler bakımından istatistiksel olarak önemli farklılıklar belirlenmiştir. Bunun sonucunda en yüksek tane verimi 32T83 çeşidinde 1408 kg/da olarak ve en yüksek hektolitre ağırlığı ise Agn 720 çeşidinde 68 kg/hl olarak belirlenmiştir.

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DERİK KOŞULLARINDA FARKLI MISIR ÇEŞİTLERİNİN VERİM ÖZELLİKLERİNİN DEĞERLENDİRİLMESİ

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Özet

Bu çalışma, 2015 yılında Derik koşullarında ikinci ürün olarak yetiştirilen bazı mısır çeşitlerinin verim özelliklerini belirlemek amacıyla yürütülmüştür. Çalışma tesadüf blokları deneme desenine göre üç tekrarlamalı olarak kurulmuştur. Çalışmada 4 çeşit (As 66, Agn 720, Dkc 6101 ve 32T83) kullanılmıştır. Çeşitler arasındaki farklılıklar tüm özellikler için önemli bulunmuştur. Çalışmada bitki sayısı, nem içeriği, hektolitre ağırlığı ve verim özellikleri analiz edilmiştir. Çalışmada incelenen özelliklerden elde edilen ortalama sonuçlara göre, bitki sayısı 7000 (bitki/da) ile 8800 (bitki/da) arasında, tane nem içeriği %21 ile %27 arasında, hektolitre ağırlığı 66 kg/hl ile 69 kg/hl arasında ve tane verimi 629 kg/da ile 1123 kg/da arasında değişmiştir. Dkc 6101 tane verimi açısından lider çeşit olmuştur.

Anahtar Kelimeler: Mısır, Çeşit, Tane verimi, Kalite

**EVALUATION OF YIELD CHARACTERISTICS OF DIFFERENT MAIZE
VARIETIES UNDER DERİK CONDITIONS**

Abstract

This study was conducted to determine the yield characteristics of some maize varieties as second crop in Derik conditions in 2015. The study was established according to the randomized block design with three replications. In the study, 4 varieties (As 66, Agn 720, Dkc 6101 and 32T83) were used. Differences between varieties were found to be significant for all traits. In the study, plant number, moisture content, hectoliter weight and yield characteristics were analyzed. According to the average results obtained from the traits examined in the study, the number of plants varied between 7000 (plants/da) and 8800 (plants/da), grain moisture content between 21% and 27%, hectoliter weight between 66 kg/hl and 69 kg/hl and grain yield between 629 kg/da and 1123 kg/da. Dkc 6101 was the leading variety in terms of grain yield.

Keywords: Maize, Genotype, yield, quality

Giriş

Mısırın kullanım alanlarının başında insan gıdası ve endüstri hammaddesi gelmektedir. Mısırın sap ve yaprakları özellikle silaj şeklinde hayvan yemi olarak değerlendirilmekte, yine sap ve yaprakları sanayide kâğıt yapımı ve küçük çapta hasır el işleri yapımında da değerlendirilmektedir. Mısırın özel kullanım alanları içerisinde yağ ve tatlandırıcı sektörü ile biyoyakıt-biyoetanol üretimi de bulunmaktadır (Öztürk *ve ark.*, 2019). 2019 yılı verilerine göre dünyada 1.109 milyon ton mısır üretimi yapılmış olup, ihracatçı ülke olarak birinci sırada yer alan ABD, mısır tüketiminde %27'lik bir paya sahiptir (FAO, 2020).

Ülkemizde mısır üretim açığının bulunması, mısır kullanım alanlarının genişliği, mısıra dayalı sanayinin gelişen bir sanayi olması ve bu sanayi ürünlerinin diğer sektörler için ara hammadde olması nedeniyle mısır tarımının önemi her geçen gün artmaktadır.

Mısır üretimini artırmak için yapılması gereken çalışmaların başında bölgenin ekolojik koşullarına uygun, çevresel faktörlere dayanıklı çeşitlerin seçimi, kaliteli tohumluk kullanımı ve üretimde melez çeşitlerin yaygınlaştırılması gelmektedir.

Dünyada tahıl üretimi için ayrılan ekim alanından, mısır bitkisi ekim alanı dünyada üçüncü sıradadır. Tahıl türü bitkiler arasında verim olarak dünyada birinci sıradadır. FAO verilerine göre 2020-2021 yıllarında dünyada 186 milyon ton mısır üretilmiştir (FAO, 2021).

Türkiye'de mısır bitkisi, buğday ve arpaadan sonra en fazla tarımı yapılan tahıl türüdür. TÜİK verilerine göre Türkiye'de 2021 yılında 758 bin hektar alanda ekilen mısırdan 6 milyon 750 bin ton mısır üretimi gerçekleştirilmiştir, ortalama mısır tane verimi ise 890 kg/da olduğu hesaplanmıştır (TÜİK, 2021). Arpa ve mısırdan ise verim daha da yüksek olup gübrelenen alan açısından tahıllar içerisinde en fazla mısır ekim alanı (%95.6) gelmektedir (Şahin 2016).

Bitki besin elementlerinden azot; bitkinin yeşil aksamalarının gelişmesini teşvik eden, bitkinin fotosentez gibi ötane nemli fizyolojik işlevlerini sağlıklı bir şekilde sürdürebilmesini sağlayan ötane nemli yüksek bir besin elementidir.

Mısır yetiştiriciliği bakımından bölge bazında Ege, Akdeniz ve Güneydoğu Anadolu bölgelerinde yaygın olarak ana ürün ya da ikinci ürün olarak yetiştiricilik yapılmaktadır. Bölgelere uygun melez mısır çeşitlerinin yetiştirilmeye başlanmasıyla, son yıllarda mısır üretiminde önemli artışlar elde edilmiştir.

Bu çalışma; Türkiye'de tarımsal sanayinin ihtiyacını karşılamak için mısırın yeterli miktarda ve uygun kalitede üretilmesi gerekmektedir.

Bu nedenle bazı mısır çeşitlerinin karşılaştırılması ve özellikle bölge üreticileri için daha

uygun çeşitleri belirlemek amacıyla yapılmıştır.

MATERYAL VE METOD

Bu çalışma 2015 yılında Derik/Mardin’de çiftçi arazisinde yürütülmüştür. Araştırmada deneme materyali olarak 4 adet mısır çeşidi kullanılmıştır.

Araştırma Tesadüf Blokları Deneme Deseni’ne göre üç tekerrürlü olarak yürütülmüştür.

Çizelge 1. Mardin ilinde uzun yıllar yağış ortalaması (1960-2016), çalışma yıllarına ait sıcaklık, yağış ve tane nemi değerleri.

Aylar	2015	2016	UY O	2015	2016	UY O	2015	2016	UYO
Haziran	25.9	26.2	25.6	2.9	1.0	4.7	29.0	28.2	32.3
Temmuz	31.8	30.6	29.9	0,2	0.1	1.3	19.6	22.4	27.7
Ağustos	30.5	32.2	29.5	0.4	1.4	0.2	25.8	21.7	28.4
Eylül	28.4	24.3	25	9.9	-	1.8	23.0	28.7	32.6
Ekim	19.5	20.5	18.4	58.2	16.5	32.9	49.6	33.3	45.1
Toplam				71.6	18.0	40.9			
Ortalama	27.2	26.8	25.7				29.4	26.9	32.4

Araştırmanın yürütüldüğü yıllara ait iklim verilerine bakıldığında, en yüksek sıcaklık Temmuz ve Ağustos aylarında ortalama 31.8-30.5 °C olarak görülmüştür (Tablo 1).

Denemede parseller 2.8 m x 5.0 m= 14 m², dir. Her parselde 2 sırası parsel kenar tesiri (1 sıra sağda, bir sıra solda) olmak üzere 6 sıra olacak şekilde tertiplenmiştir. Bir detane nemie çeşitlerin dane tane verimii belirlemek sıra arası 70 cm, sıra üzeri 18 cm olarak düzenlenmiştir. Ekim 03.07.2015 tarihinde yapılmıştır. Dekara 45 kg olarak 20.20.0 gübre ve 50 kg Üre gübresi verilmiştir.

Ekimden sonra detane nemie alanları yağmurlama sistemiyle sulanmış devamında ilki boğaz doldurmadan sonra olmak üzere ihtiyaca göre karıklara salma sulama ile toplamda 9 adet sulama yapılmıştır. Mısır bitkileri toprak üzerine çıktıktan on beş gün sonra beş-altı yapraklı iken birinci çapa ile teklenmiş, bitkiler 30-40 cm olduğunda ikinci çapa ile birlikte boğaz doldurma işlemi yapılmıştır.

Hasat her parselde, hasat zamanında parsel ortasındaki iki sırada elle yapılmıştır. Ölçümler ise 10 adet bitkide yapılmıştır. Hasat 21.11.2015 tarihinde yapılmıştır.

Araştırmada, bitki sayısı, tane nemi, hektolitre ve tane verimi araştırılmıştır. Araştırma sonucunda elde edilen veriler, tesadüf parselleri detane nemie deseninde faktöriyel düzene

göre 3 tekerrürlü olarak JUMP istatistiki paket programıyla analiz edilmiştir.

BULGULAR ve TARTIŞMA

Derik koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bulgular Çizelge 1’de belirtilmiştir.

Çizelge 1. Araştırma sonucunda elde edilen bulgular

Bitki Sayısı (adet/da)

Çeşitler	Bitki Sayısı (adet/da)	Tane Nemi (%)	Hektolitre ağırlığı(kg/hl)	Tane Verimi (kg/da)
As 66	8800 a	24 b	66 c	629 c
Agn 720	7000 d	27 a	69 a	998 b
Dkc 6101	8600 b	21 c	68 b	1123 a
32T83	7900 c	21 c	69 a	982 b
LSD	14,36	2,3	2,3	118

Derik koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bitki sayısına ait bulgular Çizelge 1’de belirtilmiştir.

Araştırma sonucunda çeşitler arasında bitki sayısı bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek bitki sayısı As66 çeşidinde 8800 (adet/da) olarak belirlenirken, en düşük bitki sayısı ise Agn 720 çeşidinde 7000 adet/da olarak belirlenmiştir. Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir.

Tane nemi (%)

Derik koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen tane nemi oranına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında tane nemi oranı bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek tane nemi oranı Agn 720 çeşidinde %27 olarak belirlenirken, en düşük tane nemi oranı ise Dkc 6101 ve 32T83 çeşitlerinde %21 olarak belirlenmiştir. Özmen (2008) hasatta tane tane nemi yönünden genotip x çevre interaksiyonunun önemli olduğunu bildirmiştir.

Hektolitre Ağırlığı (kg/hl)

Derik koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen hektolitre ağırlığına ait bulgular Çizelge 1’de belirtilmiştir.

Araştırma sonucunda çeşitler arasında hektolitre ağırlığı bakımından istatistiksel olarak önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek hektolitre ağırlığı Agn 720 ve 32T83 çeşitlerinde 69 kg/hl olarak belirlenirken, en düşük hektolitre ağırlığı ise As 66 çeşidinde 66 kg/hl olarak belirlenmiştir. Hektolitre önemli bir kalite unsurudur. Koç (2020), çalışmasında hektolitre ağırlığını ortalama 75 kg/hl ve mısır çeşidi yönünden istatistiksel olarak önemli bularak çalışmamızla yakın düzeyde veriler elde etmiştir. Akan, (2017), farklı mısır çeşitlerinde yaptıkları çalışmada hektolitre özelliğinin çeşitler üzerinde etkisinin önemsiz olduğunu belirtmiştir. Babaoğlu (2003), Tekkanat ve Soylu (2005), Özmen (2008), çalışmasında 74,7- 78,7 kg/hl değerleri ile bulgularımıza yakın değerler elde edip ve hektolitre ağırlığında genotip x çevre interaksiyonunun önemli olduğunu bildirmiştir.

Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir. Sıcaklıklarla beraber mısır çeşitlerinin su stresine karşı toleransları da etkili olduğu düşünülmektedir. Tepe püskülü çiçeklenme döneminde yaşanan yüksek sıcaklıklardan dolayı polen canlılık oranlarını azaltmış buna paralel olarak hektolitre ağırlıklarında farklılıklar görülmesine neden olmaktadır.

Tane verimi (kg/da)

Derik koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen tane verimi miktarına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında tane verimi bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek tane verimi Dkc 6101 çeşidinde 1123 kg/da olarak belirlenirken, en düşük tane verimi ise As 66 çeşidinde 629 kg/da olarak belirlenmiştir. Tane tane veriminde, bitkinin dışarıdan verilebilen ihtiyaç duyduğu besin maddelerinin sağlanmasının yanında sulama ve bakım işlemlerinin zamanında ve doğru yapılmasının etkisi oldukça önemlidir. Bunun yanısıra bitkinin yetiştirildiği çevre koşulları, uygun hava sıcaklığı ve tane nemi tane verimine etki etmektedir. Tane verimi ile ilgili olarak elde edilen sonuçların birbirinden farklı olması çalışmalarda kullanılan çeşidin genetik yapısından kaynaklı olduğu düşünülmektedir.

Çakır 1996, tane verimini 925.5-1502 kg da⁻¹, Konoşkan ve ark. (2015), 1378-1218 kg da⁻¹ arasında tespit etmiştir. Keskin ve ark. (2011), Han (2016), Sakin ve ark. (2016) araştırmalarından daha düşük tane verimi elde edilmiştir.

Farklılıkların en büyük sebebi çalışmalarda kullanılan çeşitlerin genetiksel farklılıklarından kaynaklı olduğu düşünülmektedir. Bunun yanında yapılan gübreleme, çapalama, ilaçlama gibi kültürel işlemlerdeki farklılık mısır gibi C4 bitkisinde tane verimi ve diğer unsurları yüksek oranda etkilemektedir.

SONUÇ

Derik kořullarında farklı mısır çeřitlerinin verim ve kalite özelliklerinin karşılaştırılması sonucunda, çeřitler arasında incelenen tüm özellikler bakımından istatistiksel olarak önemli farklılıklar belirlenmiştir. Bunun sonucunda en yüksek tane verimi Dkc 6101 çeřidinde 1123 kg/da olarak ve en yüksek hektolitre ağırlığı ise Agn 720 ve 32T83 çeřitlerinde 69 kg/hl olarak belirlenmiştir.

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**MARDİN KOŞULLARINDA FARKLI MISIR ÇEŞİTLERİNİN VERİM
UNSURLARININ DEĞERLENDİRİLMESİ**

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Özet

Bu çalışma, 2016 yılında Mardin koşullarında ikinci ürün olarak yetiştirilen bazı mısır çeşitlerinin verim özelliklerini belirlemek amacıyla yürütülmüştür. Çalışma tesadüf blokları deneme desenine göre üç tekrarlamalı olarak kurulmuştur. Çalışmada 4 çeşit (Agm 1506, Agm 1644, Dkc 6120 ve Dkc 6101) kullanılmıştır. Çeşitler arasındaki farklılıklar tüm özellikler için önemli bulunmuştur. Çalışmada bitki sayısı, nem içeriği, hektolitre ağırlığı ve verim özellikleri analiz edilmiştir. Çalışmada incelenen özelliklerden elde edilen ortalama sonuçlara göre, bitki sayısı 8600 (bitki/da) ile 8900 (bitki/da) arasında, tane nem içeriği %16,2 ile %19,5 arasında, hektolitre ağırlığı 66 kg/hl ile 68 kg/hl arasında ve tane verimi 1043 kg/da ile 1223 kg/da arasında değişmiştir. Tane verimi açısından Agm1506 önde gelen çeşit olmuştur.

Anahtar Kelimeler: Mısır, Çeşit, Tane verimi, Kalite

EVALUATION OF YIELD FACTORS OF DIFFERENT CORN VARIETIES UNDER MARDIN CONDITIONS

Abstract

This study was conducted to determine the yield characteristics of some maize varieties as second crop in Mardin conditions in 2016. The study was established according to the randomized block design with three replications. In the study, 4 varieties (Agm 1506, Agm 1644, Dkc 6120 and Dkc 6101) were used. Differences between varieties were found to be significant for all traits. In the study, plant number, moisture content, hectoliter weight and yield characteristics were analyzed. According to the average results obtained from the traits examined in the study, the number of plants varied between 8600 (plants/da) and 8900 (plants/da), grain moisture content between 16,2% and 19,5%, hectoliter weight between 66 kg/hl and 68 kg/hl and grain yield between 1043 kg/da and 1223 kg/da. Agm1506 was the leading variety in terms of grain yield.

Keywords: Maize, Genotype, yield, quality

Giriş

Mısır dünyada tahıl ekiliş alanı itibari ile buğday ve çeltikten sonra üçüncü, üretim bakımından ise ikinci sırada yer alan önemli bir tahıl bitkisidir. Güneydoğu Anadolu Bölgesinde mısır ekim alanları ve üretim miktarı önemli düzeyde artış göstermiş, mısırın ekim nöbeti sistemleri içerisindeki payı her geçen gün artmaktadır.

Ülkemizde mısırın kullanım alanları gün geçtikçe artmaktadır. Mısır bitkisinin tanesinde %70–75 nişasta, %8–10 protein ve %4–5 yağ bulunmaktadır (Earle et al. 1946). Mısır taneleri içerdiği zengin besin maddeleri nedeniyle hem insan hem de hayvan beslenmesinde kullanılabilir. Hayvan beslenmesinde yem hammaddesi olarak kullanılan mısır, insan beslenmesinde ise doğrudan kullanımı ile birlikte birçok gıda maddesinin üretiminde hammadde olarak kullanılmaktadır. Gıda sanayisinde mısır; nişasta, protein, nişasta bazlı şeker ve yağ kaynağı olarak kullanılmaktadır. Ayrıca bioetanol yakıt olarak kullanımı ile dikkat çekmektedir.

Diğer birçok yemlere göre daha fazla hazmolanabilir enerji ihtiva etmekte ve bu nedenle dünyanın bir çok yerinde sığırların ve koyunların beslenmesinde, özellikle süt sığırlarında yaygın bir şekilde kullanılmaktadır (Akdemir ve ark., 1997).

Türkiye’de mısır bitkisi, buğday ve arpadan sonra en fazla tarımı yapılan tahıl türüdür. TÜİK verilerine göre Türkiye’de 2021 yılında 758 bin hektar alanda ekilen mısırdan 6 milyon 750 bin ton mısır üretimi gerçekleştirilmiştir, ortalama mısır tane verimii ise 890 kg/da olduğu hesaplanmıştır (TÜİK, 2021).

Mısır yetiştiriciliği bakımından bölge bazında Ege, Akdeniz ve Güneydoğu Anadolu bölgelerinde yaygın olarak ana ürün ya da ikinci ürün olarak yetiştiricilik yapılmaktadır. Bölgelere uygun melez mısır çeşitlerinin yetiştirilmeye başlanmasıyla, son yıllarda mısır üretiminde önemli artışlar elde edilmiştir. Türkiye’de 639.000 ha ekim alanı, üretim 6.000.000 ton ve elde edilen verim ise 1062 kg da⁻¹ olarak gerçekleşmiş olup dünya ortalamasının (580 kg da⁻¹) yaklaşık olarak 2 katıdır (FAO, 2020). Ülkemizde mısır üretim alanı olarak 1.345.064 ton ile Konya, 717.802 ton Adana ve 421.130 ton ile Mardin ili gelmektedir (TÜİK, 2020).

Bitki besin elementlerinden azot; bitkinin yeşil aksamalarının gelişmesini teşvik eden, bitkinin fotosentez gibi önemli fizyolojik işlevlerini sağlıklı bir şekilde sürdürebilmesini sağlayan önemli yüksek bir besin elementidir.

Mısır yetiştiriciliğinde çeşit, ekim zamanı, ekim sıklığı, sulama, gübreleme gibi kültürel uygulamalar verimi önemli ölçüde etkilemektedir.

Bu çalışma; bazı mısır çeşitlerinin karşılaştırılması amacıyla yürütülmüştür. Özellikle bölge üreticileri için daha uygun çeşitlerin tespiti amacıyla yapılmış olup, daha sonra yürütülecek diğer çalışmalara katkı sağlanması amacıyla taşımaktadır.

MATERYAL VE METOD

Bu çalışma 2016 yılında Ersoylu köyü/ Kızıltepe/Mardin'de çiftçi arazisinde yürütülmüştür. Denemede materyal olarak 4 adet mısır çeşidi kullanılmıştır.

Araştırma Tesadüf Blokları Deneme Deseni'ne göre üç tekerrürlü olarak yürütülmüştür.

Çizelge 1. Mardin ilinde uzun yıllar yağış ortalaması (1960-2016), çalışma yıllarına ait sıcaklık, yağış ve tane nemi değerleri.

Aylar	2015	2016	UY O	2015	2016	UY O	2015	2016	UYO
Haziran	25.9	26.2	25.6	2.9	1.0	4.7	29.0	28.2	32.3
Temmuz	31.8	30.6	29.9	0,2	0.1	1.3	19.6	22.4	27.7
Ağustos	30.5	32.2	29.5	0.4	1.4	0.2	25.8	21.7	28.4
Eylül	28.4	24.3	25	9.9	-	1.8	23.0	28.7	32.6
Ekim	19.5	20.5	18.4	58.2	16.5	32.9	49.6	33.3	45.1
Toplam				71.6	18.0	40.9			
Ortalama	27.2	26.8	25.7				29.4	26.9	32.4

Araştırmanın yürütüldüğü yıllara ait iklim verilerine bakıldığında, en yüksek sıcaklık Temmuz ve Ağustos aylarında ortalama 31.8-30.5 °C olarak görülmüştür (Tablo 1).

Denemede parseller 2.8 m x 5.0 m= 14 m²'dir. Her parselde 2 sırası parsel kenar tesiri (1 sıra sağda, bir sıra solda) olmak üzere 6 sıra olacak şekilde tertiplenmiştir. Bir detane nemie çeşitlerin dane tane verimii belirlemek sıra arası 70 cm, sıra üzeri 18 cm olarak düzenlenmiştir. Ekim 25.06.2016 tarihinde yapılmıştır. Dekara 45 kg olarak DAP gübresi ve 45 kg %46 Üre gübresi verilmiştir.

Ekimden sonra deneme alanları yağmurlama sistemiyle sulanmış devamında ilki boğaz doldurmadan sonra olmak üzere ihtiyaca göre karıklara salma sulama ile toplamda 10 adet sulama yapılmıştır. Mısır bitkileri toprak üzerine çıktıktan on beş gün sonra beş-altı yapraklı iken birinci çapa ile teklenmiş, bitkiler 30-40 cm olduğunda ikinci çapa ile birlikte boğaz doldurma işlemi yapılmıştır.

Hasat her parselde, hasat zamanında parsel ortasındaki iki sırada elle yapılmıştır. Ölçümler ise 10 adet bitkide yapılmıştır. Hasat 29.11.2016 tarihinde yapılmıştır.

Araştırma sonucunda elde edilen veriler, tesadüf parselleri detane nemi deseninde faktöriyel düzene göre 3 tekerrürlü olarak JUMP istatistiki paket programıyla analiz edilmiştir.

BULGULAR ve TARTIŞMA

Mardin koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bulgular Çizelge 1’de belirtilmiştir.

Çizelge 1. Araştırma sonucunda elde edilen bulgular

Çeşitler	Bitki Sayısı (bit/da)	Tane Nemi (%)	Hektolitre Ağırlığı (kg/hl)	Tane Verimi (kg/da)
Agm 1506	8600 c	19,5 a	68 a	1223 a
Agm 1644	8800 b	16,2 c	66 c	1180 b
Dkc 6120	8900 a	17,7 b	66 c	1086 c
Dkc 6101	8600 c	17,9 b	67 b	1043 d
Lsd	170	1,5	0,9	39

Bitki Sayısı (Adet/da)

Mardin koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen bitki sayısına ait bulgular Çizelge 1’de belirtilmiştir.

Araştırma sonucunda çeşitler arasında bitki sayısı bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek bitki sayısı Dkc 6120 çeşidinde 8900 (adet/da) olarak belirlenirken, en düşük bitki sayısı ise Agm 1506 ve Dkc 6101 çeşitlerinde 8600 adet/da olarak belirlenmiştir. Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir.

Tane nemi (%)

Mardin koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen tane nemi oranına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında tane nemi oranı bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek tane nemi oranı Agm 1506 çeşidinde %19,5 olarak belirlenirken, en düşük tane nemi oranı ise Agm 1644 çeşidinde %16,2 olarak belirlenmiştir. Özmen (2008) hasatta tane tane nemi yönünden genotip x çevre etkisinin önemli olduğunu bildirmiştir.

Hektolitre Ağırlığı (kg/hl)

Mardin koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen hektolitre ağırlığına ait bulgular Çizelge 1’de belirtilmiştir. Araştırma sonucunda çeşitler arasında hektolitre ağırlığı bakımından istatistiksel

olarak önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek hektolitreye ağırlığı Agm 1506 çeşidinde 68 kg/hl olarak belirlenirken, en düşük hektolitreye ise Agm 1644 ve Dkc 6120 çeşitlerinde 66 kg/hl olarak belirlenmiştir. Hektolitreye önemli bir kalite parametresidir. Koç (2020), çalışmasında hektolitreye ağırlığını ortalama 75 kg/hl ve mısır çeşidi yönünden istatistiksel olarak önemli bularak çalışmamızla yakın düzeyde veriler elde etmiştir. Babaoğlu (2003), Tekkanat ve Soylu (2005), Özmen (2008), çalışmalarında bulgularımıza yakın değerler elde edip ve hektolitreye ağırlığında genotip x çevre etkileşiminin önemli olduğunu bildirmiştir. Elmalı ve Soylu (2008) ve Özel (2019) çalışmalarında bulgularımızın altında değerler belirterek hektolitreye ağırlığını çalışmamızın aksine istatistiksel olarak önemli olmadığını bildirmişlerdir.

Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir. Sıcaklıklarla beraber mısır çeşitlerinin su stresine karşı toleranslarında etkili olduğu düşünülmektedir. Tepe püskülü çiçeklenme döneminde yaşanan yüksek sıcaklıklardan dolayı polen canlılık oranlarını azaltmış buna paralel olarak hektolitreye ağırlıklarında farklılıklar görülmesine neden olmuştur.

Tane verimi (kg/da)

Mardin koşullarında bazı mısır çeşitlerinin verim özelliklerinin karşılaştırılması amacıyla yapılan araştırma sonucunda elde edilen tane verimi miktarına ait bulgular Çizelge 1'de belirtilmiştir. Araştırma sonucunda çeşitler arasında tane verimi bakımından önemli farklılıklar belirlenmiştir. Araştırma sonucunda en yüksek tane verimi Agm 1506 çeşidinde 1223 kg/da olarak belirlenirken, en düşük tane verimi ise Dkc 6101 çeşidinde 1043 kg/da olarak belirlenmiştir. Tane veriminde, bitkinin dışarıdan verilebilen ihtiyaç duyduğu besin maddelerinin sağlanmasının yanında sulama ve bakım işlemlerinin zamanında ve doğru yapılmasının önemli etkileri bulunmaktadır. Bunun yanında bitkinin yetiştirildiği çevre koşulları, uygun hava sıcaklığı ve tane nemi tane verimine etki etmektedir. Bu farklılığın çeşitlerin genetiksel farklılıklarından kaynaklandığı düşünülmektedir. Bunun yanında yapılan gübreleme, çapalama, ilaçlama gibi kültürel işlemlerdeki farklılık mısır gibi C4 bitkisinde tane verimi ve diğer unsurları yüksek oranda etkilemektedir.

Keskin ve ark. (2011), Han (2016), Sakin ve ark. (2016) araştırmalarından daha yüksek tane verimleri elde edilirken, Vartanlı ve Emeklier (2007), Sarikurt (2005), Atakul ve ark. (2014), Kılınç ve ark. (2014), Kahraman (2016) ile Howell ve ark. (1996), yapmış olduğu çalışmalara benzer sonuçlar elde edilmiştir.

SONUÇ

Mardin koşullarında farklı mısır çeşitlerinin verim ve kalite özelliklerinin karşılaştırılması sonucunda, çeşitler arasında incelenen tüm özellikler bakımından istatistiksel olarak önemli farklılıklar belirlenmiştir. Bunun sonucunda en yüksek tane verimi Agm 1506 çeşidinde 1223 kg/da olarak ve en yüksek hektolitre ağırlığı ise Agm 1506 çeşidinde 68 kg/hl olarak belirlenmiştir.

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GENETIC EROSION AND CONSERVATION GENETICS

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Abstract

Conservation biologists study the factors that cause species extinction/loss and which species can be protected to ensure the continuation of biodiversity. However, with the development of genetic science and its use as an important tool for restoring and maintaining population viability, another scientific field has emerged called conservation genetics. The applications of genetics in conservation biology are wide-ranging. We need to understand the fact that biodiversity depends on genetic diversity, and if genetic diversity is lost, long-term continuation of biodiversity will be impossible. Population size has a significant impact on the survival of a species. Some species, especially those adapted to unusually rare habitats, have never been abundant. Biologists call these types of species natural rare species. On the other hand, the species we call new rare species are species whose numbers are decreasing due to pressures such as habitat loss. Genetic influence is greater in small and isolated populations. Genetic erosion reduces genetic diversity. The loss of genetic diversity that previously existed in a species is called genetic erosion. This can lead to the loss of potentially useful genes (alleles). Heterozygosity decreases as alleles disappear from the gene pool. Species survival is necessary to maintain genetic diversity. Ex situ conservation refers to the protection of plants and animals outside their natural habitat in artificial environments such as botanical gardens and zoos. This collection of creatures forms the basis of a captive breeding program. In situ conservation is an effort to maintain the population diversity and size of a species in its native habitat. Using species inventories to identify diversity hotspots and protect plants and animals from hunter-gatherers is an important tool in establishing parks and nature reserves to protect habitats. Thus, the habitats of these species are protected, and the issue of establishing farms for domestic species is also of particular interest.

Keywords: genetic erosion, conservation genetics, Ex situ conservation, In situ conservation

Introduction

The amount of genetic variation between individuals of a species or different populations of a species is measured as a result of DNA recombination through mutations, genetic drift, and gene flow between populations (Brown, 1983). These three mechanisms of action cause changes/differences in the DNA sequence, protein or phenotypic characteristics. Genetic diversity within a population in plants and animals is determined by the hereditary material of its members that can achieve reproductive success. The main force that ensures selection pressure and evolution in the population is genetic diversity. This selection pressure can be natural or artificial, depending on the variations present (Nevo et al., 1984).

To calculate genetic diversity, alleles and their effects or distribution frequencies are generally calculated. If we want to learn what genetic diversity is and calculate the genetic diversity of a species, we actually need to know the subjects of three different fields of study. These are special fields of study that we call population genetics, evolutionary genetics/speciation mechanisms and conservation genetics.

The genetic heritage of a species is important in fighting against pests in the natural environment and protecting against diseases. It allows the species to adapt and survive when environmental conditions change in ways that may cause stress. If the gene pool is low in diversity, sensitivity to this type of environmental stress develops for that species. In addition, genetic diversity is essential to preserve hybrid varieties of cultivated species and to grow products with high yield quality (Salgotra & Chauhan, 2023).

The subject of genetic diversity, which evolutionary biologists first started researching, is still an area that has been researched with interest for 100 years (Wright, 1920). In the following years (1970s), it became the subject of study mostly by population geneticists and was revolutionized especially with allele studies. With the realization that genetic diversity should be protected (1980s), a new field was formed and studies turned to the field of biodiversity conservation and conservation genetics. And here too the issue of genetic erosion has been remarkable. Because in order to preserve genetic diversity, situations that reduce or endanger this diversity must be combated.

FACTORS CAUSING LOSS OF GENETIC DIVERSITY AND EROSION

The genetic diversity of the population may decrease due to various factors. The main reasons for these changes are mutation over time, selection pressure, drift mechanism and gene flow. Genotypes that exhibit superior characteristics may become dominant through natural or

artificial selection, and in this case, the frequency of the gene pool changes (Salgotra & Chauhan, 2023).

The loss of genetic diversity is called genetic erosion, and this has mostly increased as a result of human activities. For example, using productive varieties in agriculture and constantly breeding certain types causes allele loss in the gene pool of that species after a while. Especially after the industrial revolution, the cultivation of only abundant yielding species and the loss of ecosystems of natural species have accelerated erosion.

The result of this situation is a decrease in the number of alleles and distribution frequency. Phenotypic and genomic markers are used to quantify the loss caused by genetic erosion. To measure the decrease in genetic diversity of the population, genetic erosion must first be measured at the species level (such as reduction in population size and distribution area). Genetic erosion at the agricultural level occurs in the form of an increase in the monoculture system and a decrease in variants and the loss of ancestral seeds (the use of imported species instead of local species) (Rogers & McGuire, 2015).

Another mechanism that negatively affects genetic diversity is genetic drift. Genetic drift changes the frequency with which alleles in the gene pool are passed on to future generations when the number of individuals in the population with reproductive capacity is very small. Because the fewer individuals left, the less genetic diversity there is. This effect occurs in the form of two phenomena we call the "bottleneck effect" and the "founder effect" (Rogers, 2004). The drift mechanism may occur due to random reasons and change the allele frequency over time. For example, each pollen has its own unique allele diversity and is carried to other flowers by human influence, winds or pollinator organisms. Therefore, the genetic diversity of the plant may decrease with each reproduction (Parsons, 1963).

CONSERVATION GENETICS

In order to understand biodiversity and ensure its continuation, conservation biologists study the factors that cause species to decline and which of these species can be protected and how. However, with the development of genetic science and its use as an important tool to restore and maintain the viability of populations, a separate field of science called conservation genetics has emerged. Small populations are more susceptible to genetic processes and are at greater risk of extinction (Salgotra & Chauhan, 2023).

The survival of species is necessary to preserve genetic diversity. Scientists trying to maintain biodiversity face a variety of dilemmas: should the focus be on protecting individual populations, or should a broader approach be taken to protect all individual plants and animals

in the ecosystem, not just one species? There are three conservation methods that can be used to ensure the survival of the species. These are ex situ conservation, in situ conservation and increasing the population size by external intervention.

If the population is preserved and protected in its natural environment, this is called *in situ* conservation. For example, plants are protected in their original environment. In this form of protection, people are prevented from interfering with the environment. Especially forest ecosystems are protected in this way. It also supports the genetic diversity of plant species. It is protected by two methods: protecting farms and cultivation lands and protecting the genetic reserve. Areas where genetic diversity is very active and need to be protected as heritage for a very long time are mostly forest reserve areas. Protection of farm and planting lands is to ensure the use of seeds of domestic products. However, this protection may sometimes be insufficient, especially when there are natural disasters or climate problems. In this case, *ex-situ* protection should come into play (Hammer & Teklu, 2008; Ogwu et al., 2014; Pandotra & Gupta, 2015). Different approaches can be applied, especially in the field of plant protection (in situ and ex situ) (Fig 1). Increasing the population is another protection method. In this type of protection, seed and pollen diversity can be increased for plants with external intervention.

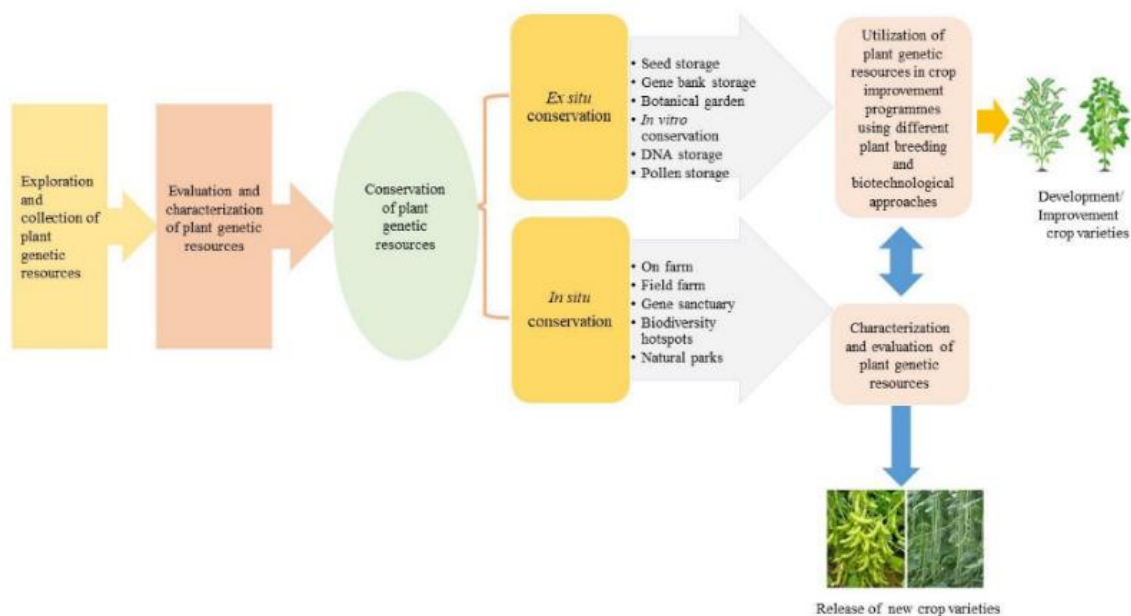


Fig. 1 Different approaches for in situ and ex situ (Salgotra & Chauhan, 2023)

BIOTECHNOLOGICAL APPROACHES IN CONSERVATION GENETICS

The fact that genetic markers can now be examined more easily has benefited the field of conservation genetics. Further discovery/screening of neutral loci has increased the chances of estimating and validating various parameters important in conservation genetics, such as inbreeding and kinship. However, the most important contribution of genomic research to conservation is that it will enable the prediction and handling of new problems that may arise in many different species. An example of this is the effect size of loci along the genome sequence and it is possible to examine whether there is overlap between different populations of the species (Allendorf et al., 2010; Ellegren & Sheldon, 2008; Slate et al., 2009).

Especially in protecting plant diversity, genetic resources have been protected by using in vitro culture techniques (tissue culture and other micropropagation methods) and seed banks.

- **In Vitro Spreading**

In vitro gene banks are where seeds and pollen are stored in an artificial nutrient medium. With this technique, it is possible to prevent genetic erosion by making large productions without diseases and pests. It also allows growing quality products that last all year round (Paunescu, 2009; Rajasekharan & Sahijram, 2015; Salgotra & Chauhan, 2023).

- **Cryopreservation**

This technique is a method of storing plant tissue in liquid nitrogen tanks at -196 °C to preserve it. Thus, the plant tissues to be preserved can be stored for many years as there is no metabolic activity at this temperature. It is cost effective. It also provides the opportunity to get rid of plant pathogens. The method of application of the technique is to remove all water content in case of freezing and apply the ultra-fast freezing method. Thus, crystal ice formation is prevented (Fahy et al., 1984; Kaviani, 2011; Martin et al., 1998; Salgotra et al., 2015; Scowcroft, 1984).

- **DNA Banks**

Preservation of genetic resources through DNA is a cost-effective process. DNA storage has become an important issue, especially in terms of food safety. Genetic reserve can be stored in three types (DNA, RNA and cDNA). Thus, these data banks can be used globally. It is also an alternative method, especially for species in danger of extinction. However, this conservation method does not mean preserving the entire genetic diversity of the organism because it is difficult to preserve all original genotypes (Dulloo et al., 2006).

CONCLUSION

Many plant and animal species are at risk of extinction, and biodiversity is being lost. Conservation genetics applies the principles of population genetics to the conservation and

recovery of endangered species. Genetic diversity decreases when the population of a species decreases excessively. Populations facing bottlenecks have decreasing genetic diversity even as their numbers increase. Loss of genetic diversity reduces a population's ability to adapt to changing environmental and climatic conditions because it leads to the loss of useful alleles from the gene pool. Introducing individuals from large populations of the same species elsewhere into a declining population can be used to increase recruitment and genetic diversity, but it can also lead to the collapse of outbreeding and genetic extinction.

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BIYOÇEŞİTLİLİK SORUNU VE TARIM ÜRÜNLERİNDE GENETİK ÇEŞİTLİLİK

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Özet

Biyoeçeşitlilik terimi tropik yağmur ormanları gibi doğal ortamların hızlı bir biçimde yok olması konusunda kaygılı olan ve korunması için toplumun önlem almasını isteyen naturalistler tarafından ortaya atılmıştır. Bir çevre sorunu olarak biyoeçeşitlilik kavramı 80'li yılların başlarında ortaya atılmıştır. 92'de rio'daki sürdürülebilir kalkınma konferansında biyolojik çeşitlilik sözleşmesi imzalanması ile de işlerlik kazanmıştır. Biyoeçeşitliliğin ele alınışı, yönetimi ve korunması ile ilgili ilişkili sorunların tam olarak fark edildiği nokta da burası olmuştur. Çünkü biyolojik çeşitlilik aynı zamanda farmasötik ve gıda endüstrileri için de bir ekonomik kaynaktır. En başında doğayı korumak ile sınırlanan bu terim sonrasında etik ve sosyal kaygıların yanında ekonomik boyutta da derinlik kazanmıştır ve bugün gelinen noktada biyoeçeşitlilik ile ilgilenmemizin sebebi: bilimsel anlamda türleri tanımak adlandırmak sınıflandırmak, tehlike altındaki popülasyonları korumak, küresel çevre sorunları ile mücadele etmek, sağlık ve eczacılık alanındaki çeşitli bilimsel araştırmalarda kullanmak, gıda ve gelişmişlikle orantılı olarak sosyo-ekonomik sebepler, ticarileşme, canlıların patentlenmesi ve etik kaygılar gibi sebeplerdir. Yiyeceklerimizin tümü biyoeçeşitlilik kaynaklıdır. İnsanoğlunun avcılık ve toplayıcılıkla geçindiği zamandan günümüze denizlerin canlı kaynakları halen kullanılmaktadır. Toplayıcılığın günümüzdeki en büyük biçimi olan balıkçılık günümüzde aşırı avlanmanın tehdidi altındadır. Fakat insanlık dehasının bütün boyutunu ortaya koyduğu alan bitki ve hayvanların evcilleştirilmesi alanıdır. Tarım ve su ürünleri yetiştiriciliği biyolojik çeşitlilik tahribinin en önemli sebebi arasındadır. Tarımın erken dönemlerinde başlayan bu küreselleşme tüm kıtaların yarar sağlamasını ve birçok diğer faydayı kapsamıştır. Doğal olarak bu tanıştırılan türlerden yerel koşullara uyum sağlayan birçok ırk ve varyete üretilmiştir. İnsanoğlunun ürettiği bu yüzlerce hatta binlerce varyete de tehlike altındadır. Çünkü İkinci Dünya Savaşı sonrası ortaya çıkan modern tarım yani yeşil devrim sonrası sadece yüksek verimli birkaç varyette kullanılmakta ve böylelikle yerel ırklar görmezden gelinmektedir. Birçok yerel ırk tohum kaybolmuştur. Endüstri de biyoeçeşitliliğin belli öğelerine daha yakın ilgi duyar: mikroorganizmalar moleküller genler gibi. İster kültür bitkilerinin çeşitliliğini içeren gıda ve tarım sektörleri olsun isterse de yabancı türlerle ilgilenen farmasötik sektörün olsun biyoteknolojinin endüstriyel alanda uygulanması önemli stratejik çıkarlar oluşturmaktadır.

Anahtar Kelime: biyolojik çeşitlilik, genetik çeşitlilik, tarım, kültür bitkileri

BIODIVERSITY PROBLEM AND GENETIC DIVERSITY OF AGRICULTURAL PRODUCTS

Abstract

The term biodiversity was coined by naturalists who were concerned about the rapid extinction of natural environments such as tropical rainforests and wanted society to take measures to protect them. The concept of biodiversity as an environmental problem was introduced in the early 80s. It became operational with the signing of the Convention on Biological Diversity at the sustainable development conference in Rio in 1992. This was the point where the associated problems with the treatment, management and conservation of biodiversity were fully realized. Because biodiversity is also an economic resource for the pharmaceutical and food industries. This concept, which was initially limited to the protection of nature, has gradually gained depth in social, economic and ethical dimensions, and the reason why we are interested in biodiversity at this point today is: to recognize species in a scientific sense, to name and classify them, to protect endangered populations, to combat global environmental problems, to combat various scientific studies in the field of health and pharmacy. Reasons such as use in research, socio-economic reasons in proportion to food and development, commercialization, patenting of living things and ethical concerns. All of our food comes from biodiversity. Living resources of the seas are still used from the time when human beings made their living by hunting and gathering. Fishing, the largest form of gathering today, is now threatened by overfishing. But the field where human genius reveals its full extent is the field of domestication of plants and animals. Agriculture and aquaculture are among the most important causes of biodiversity destruction. This globalization, which started in the early ages of agriculture, has benefited all continents and many other benefits. Naturally, many breeds and varieties adapted to local conditions have been produced from these introduced species. Hundreds or even thousands of these assets produced by human beings are also in danger. Because after the modern agriculture that emerged after the Second World War, that is, the green revolution, only a few high-yielding varieties are used and thus local breeds are ignored. Many landrace seeds have been lost. Industry is also paying closer attention to certain elements of biodiversity: microorganisms, molecules, genes, etc. The application of biotechnology in the industrial field creates important strategic interests, whether in the food and agricultural sectors, which include the diversity of cultivated plants, or in the pharmaceutical sector, which deals with wild species.

Keywords: biodiversity, genetic diversity, agriculture, cultivated plants

Giriş

Biyoeçitlilik ekolojik sistemlerin hayati bir özelliğidir. Genel olarak kara, deniz ve diğer su ekosistemlerindeki tüm yaşam formlarının çeşitliliği olarak açıklanmaktadır (Kazemi ve ark., 2018; Overmars ve ark., 2014). Bu nedenle araştırmalar genetik, tür veya ekosistem düzeyindeki farklı biyolojik çeşitlilik düzeylerini kapsamalıdır. Bu, temel gözlem hedeflerine, ekosistem özelliklerine ve ekosistemdeki öğelerin genel zenginliğine bağlıdır (Moonen & Bärberi, 2008). Bir ekosistem içinde yaşayan her tür, süreçler başlatır ve enerji, madde ve malzeme akışı yaratır. Dolayısıyla tek bir türün yok olması, geri dönüşü olmayan değişikliklere yol açarak ekosistem özelliklerinin istenmeyen yönlere değişmesine neden olabilir. Yaşam çeşitliliği ekolojik işlevi stabilize eder ve biyojeokimyasal sistemlerin (örneğin su döngüsü, sera gazlarının akışı ve karbon tutulması) dengeli bir şekilde çalışmasına olanak tanır. Biyoeçitlilik aynı zamanda gıda üretimi, ilaçlara yönelik maddelerin sağlanması ve enerji kaynaklarının dağıtımıyla da doğrudan bağlantılıdır. Sonuç olarak biyoeçitlilik toplum için yeri doldurulamaz bir iyiliktir (Dirzo & Raven, 2003).

Biyoeçitlilik üzerine araştırmaların gündemi; biyolojik çeşitliliğin modern tarımsal ekosistemler, kentsel tarım ve sürdürülebilir tarım ekosistemi gibi ekosistemleri destekleme yeteneği; gıda güvenliği, haşere kontrolü ve ekolojik restorasyon gibi ekosistem hizmetlerinin sağlanmasında biyoeçitliliğin rolü ve bunun iklim değişikliği, arazi kullanımı, genetik erozyon ve karbon tutumu üzerindeki etkisine yöneliktir. Tarımsal faaliyetlerde 10.000 yıllık bir hazine olan biyoeçitlilik, tarımın ve insan refahının sürdürülmesi için gerekli olan ekosistem hizmetlerinin temelidir. Binlerce yıllık insan müdahalesi mevcut mahsul ve hayvancılık biyoeçitliliğine etki göstermiştir. Biyoeçitlilik ve tarım birbiriyle güçlü bir şekilde ilişkilidir. Biyoeçitlilik tarım için kritik öneme sahip olmakla birlikte, biyoeçitliliğin sürdürülebilir kullanımı tarımsal yapı ve işleve karşılık gelir ve dolayısıyla tarım uygulamaları için bir göstergedir. Gerçekten de biyolojik çeşitlilik, gıda güvenliği, beslenme ve geçim kaynakları açısından sürdürülebilir tarımın hayati bir bileşeni olarak değerlendirilmektedir. Ek olarak, değişen yetiştirme sistemlerinin dinamikleri ve dayanıklılığının daha iyi anlaşılması için biyoeçitlilik kullanılabilir (Kazemi ve ark., 2018).

TARIM SİSTEMLERİNDE SON TEKNOLOJİ BİYOÇEŞİTLİLİK

Biyolojik çeşitliliğin tarımdaki rolünü ve etkisini anlamak için, tarım sistemlerindeki veya tarımsal biyolojik çeşitlilikteki biyoeçitlilik araştırmalarının durumunu incelemek gerekir. Biyoeçitlilik, sürdürülebilir tarımın, gıda güvenliğinin ve sağlığın temel ilkelerinden biridir ve

sürdürülebilir bir tarımsal ekosisteme yönelik sistemleri yönetmenin en önemli unsurlarından biridir. Biyoçeşitlilik, kentsel tarım gibi yeni tarım sistemlerinde farklı hizmetler sunmaktadır. Günümüzde modern tarımın en önemli zorlukları arasında haşere kontrolü, CO2 emisyonları ve genetik erozyon yer almaktadır. Tarımsal ekosistemlerdeki çeşitliliği ve çeşitli zaman ölçeklerini artıran tüm uygulamalar, tarımsal ekosistemlerin haşere kontrolü ve karbonu tutma kapasitesini geliştirebilir. Tarımsal ekosistemlerin ekolojik restorasyonu, bu ekosistemlerdeki biyolojik çeşitliliği iyileştirmenin etkili bir yolu olarak önerilebilir. Buna karşılık, çoğu arazi örtüsü/arazi kullanımı değişikliği biyolojik çeşitliliği etkileyebilir ve ilgili ekosistem hizmetlerini azaltabilir. Ayrıca biyolojik çeşitlilik, farklı arazi kullanım türleriyle karşılaştırıldığında doğal bir referans durumu tür zenginliği açısından küresel ölçekte entegre edilebilir (Kazemi ve ark., 2018).

TARIMSAL BİYOLOJİK ÇEŞİTLİLİK

'Tarımsal biyolojik çeşitlilik' terimi 1980'lerde ortaya çıkmıştır. Tarımsal biyoçeşitlilik, doğrudan insanlar tarafından geliştirilen ve yönetilen genel biyolojik çeşitliliğin alt kümesidir. Biyoçeşitlilik terimine benzer şekilde, tarımsal biyolojik çeşitlilik de farklı seviyeleri kapsar. Tarımsal ekosistemlerin biyoçeşitliliğinin yanı sıra mahsul ve çiftlik hayvanlarının türlerini ve popülasyonlar, çeşitler ve ırklar içindeki genetik çeşitliliği ifade eder. Toprak organizmaları, böcekler, mantarlar ve tarım dışı doğal yaşam alanlarındaki yabancı türlerin yanı sıra biyolojik çeşitliliğe ilişkin kültürel ve yerel bilgiler, biyolojik çeşitlilikten yararlanmanın temelini oluşturur (Baudron & Giller, 2014; Kazemi ve ark., 2018). Tarımsal biyolojik çeşitliliğin dört temel bileşeni mevcuttur:

1. gıda ve tarıma yönelik genetik kaynaklar;
2. tarımın ekosistem hizmetlerini destekleyen biyolojik çeşitlilik;
3. abiyotik faktörler,
4. sosyoekonomik ve kültürel boyutlar (Zimmerer, 2014).

Gıda ve Tarım Örgütü (Food and Agriculture Organization,FAO), tarımsal biyoçeşitliliği, gıda ve tarım için hayati öneme sahip olan ve çevre, genetik kaynaklar, yönetim sistemleri ve bu uygulamalar arasındaki etkileşimden kaynaklanan hayvan, bitki ve mikroorganizmaların çeşitliliği ve değişkenliği olarak açıklamaktadır (Kazemi ve ark., 2018). Özellikle iki kategori içerir:

- evcilleştirilmiş türlerin yabancı akrabaları (örneğin, mahsul türlerinin yabancı akrabaları veya genetik olarak kullanılabilir üreme materyali olan türler);

- bitkilerin ve evcil hayvanların (mahsuller söz konusu olduğunda yerel türler olarak anılır) bireylerinin yetiştirilmesi (Amend, 2008).

Sürdürülebilir Tarımın Gerekliliği Olarak Biyoçeşitlilik

Modern tarım sistemlerinin üretimin çevresel boyutları ve ekosistem sağlığı üzerinde olumsuz etkileri vardır. Monokültür nedeniyle biyolojik çeşitliliğin kaybı bu olumsuz sonuçlardan biridir. Tarım işletmelerinde sınırlı sayıda bitki ve hayvan türünün verimini maksimuma çıkarmak, kaçınılmaz olarak istenmeyen türlerle rekabet gücünü zayıflatmakta ve azaltmaktadır (Parris, 2002). Biyoçeşitlilik ve tarımın birbiriyle ilişkili olduğu ve fayda sağlayabileceği inkar edilemez. Modern tarım sistemlerinin aksine sürdürülebilir tarım, gelecek nesillerin gıda üretme kabiliyetini kısıtlamadan gıda üretmemizi sağlar. Biyoçeşitlilik, sistemlerin doğa çerçevesinde yönetilmesini sağlayan en önemli unsurlardan biridir (Pretty, 2008). Ekolojik açıdan bakıldığında biyolojik çeşitlilik sistemin hayatta kalmasının temelidir ve sürdürülebilir tarım sistemlerinin hayati bir bileşeni olarak kabul edilebilir (Kazemi ve ark., 2018).

Kentsel Tarım Sistemlerinde Biyolojik Çeşitlilik

Kentsel arazi kullanımında düşük düzeyde doğal biyolojik çeşitliliğe sahip basitleştirilmiş yeşil alanlar ve yoğun şekilde geliştirilmiş ekosistemler, biyolojik çeşitliliği artırabilir ve sonuç olarak parçalanmış habitatlarda işlevler ve hizmetler sağlayabilir (Lin & Fuller, 2013).

Bu işlevler ve hizmetler; tarımsal ormancılık, su ürünleri yetiştiriciliği, arıcılık ve bahçecilik kapsamında bir köy, kasaba veya şehir içinde veya çevresinde gıdanın yetiştirilmesi, işlenmesi ve dağıtılması işlevlerini içerir. Şehirlerde belirli biyolojik çeşitlilik hizmetleri, yağmur suyu akışı, hava kirliliğinin azaltılması, karbon depolama ve tutulmasına katkı ve iyileştirilmiş su kalitesinin sağlanması için hizmetler sağlayabilir (Lin ve ark., 2015; McLain ve ark., 2012).

Tarımsal Ekosistemlerde Biyolojik Çeşitlilik Yoluyla Haşere Kontrolü

Tarımsal yoğunlaşma, birim girdi başına tarımsal üretimin artması olarak tanımlanabilir. Yoğunlaştırma, uzay-zamansal çevre koşullarına uyarlanmış özel mahsullerin ve mahsul çeşitlerinin seçimine dayanmaktadır. Dolayısıyla biyolojik çeşitliliğin kaybı, tarımsal ekosistemlerdeki haşere kontrolü zorluklarını daha da artırmıştır (Hill, 1987). Zararlılarla mücadelede kültürel, mekanik, kimyasal ve biyolojik kontroller en çok uygulanan seçeneklerdir. Tarımın yoğunlaşmasıyla zararlı biyo-kontrol yöntemlerinin kullanımı azaldı. Bunun yerine, zararlıları kontrol etmek veya yönetmek için kimyasal tedaviler ve genetiği değiştirilmiş organizmaların kullanımı benimsenmiştir. Böylece doğal sistem kontrolü, insan

kaynaklı kontrol mekanizmalarına kaydırılmıştır. Bu değişiklikler çevresel maliyetleri, su ve yeraltı suyu kirliliğini ve tarımsal ekosistemlerdeki biyolojik çeşitlilik kayıplarını artırmıştır (Benbrook, 2001; Bengtsson ve ark., 2005; Kazemi ve ark., 2018; Philpott, 2013)

Doğal düşmanlar, zararlıları baskılayan veya onların verdiği zararı azaltan unsurlar olarak kabul edilir. MS 300 civarındaki kayıtlar, Çinli çiftçilerin akar popülasyonlarını kontrol altına almak için portakal bahçelerindeki karıncaları ve doğal düşmanları kullandıklarını göstermektedir (Huang & Yang, 1987). Zararlıları, verim düşüşlerini, ekonomik kayıpları ve dolayısıyla insani felaketleri azaltmak için geleneksel biyolojik mücadele mekanizmaları uygulanmıştır. 1980'lerde ABD'de haşere kontrolü amacıyla 160 yırtıcı eklembacaklı türü ve 16 böcek öldürücü kuş türü serbest bırakılması buna örnektir (Letourneau ve ark., 2009). Şu ana kadar dünya çapında 2000'den fazla tür doğal mücadele için çevreye salınmıştır (Philpott, 2013).

Gıda Güvenliği Ve Sağlık İçin Biyolojik Çeşitlilik

Gıda güvenliği genel olarak gıdanın toplum için bulunabilirliği ve erişilebilirliği anlamına gelmektedir. Dünya Bankası bu ifadeyi, tüm insanların her zaman aktif ve sağlıklı bir yaşam için gıdaya erişimi olarak tanımlamaktadır (Maxwell & Wiebe, 1999; Reutlinger, 1986). Bunun en yaygın kabul gören ve kullanılan tanımı Dünya Gıda Zirvesi'nde ortaya atılmıştır; Gıda güvenliği, tüm insanların her zaman sağlıklı ve aktif bir yaşam için beslenme ihtiyaçlarını ve gıda tercihlerini karşılamak üzere fiziksel ve ekonomik erişime sahip olduğu zaman var olur (Pinstrip-Andersen, 2009; Sunderland, 2011).

SONUÇ

Bazı çalışmalar, biyoçeşitliliğin aslında genetik çeşitlilik kaybını (genetik erozyon) nasıl etkileyebileceğini göstermiştir. Genetik çeşitliliğin boyutu, bir popülasyonun veya türün yeni mahsul zararlıları, hastalıklar ve kuraklık gibi çevresel zorluklara adaptasyon durumunu belirler. Biyoçeşitlilik, çiftçilerin evdeki gıda gereksinimlerini karşılamak ve onları zararlılara karşı korumak için mahsul sistemlerini yerel ekolojik mikro nişlerle eşleştirmesine yardımcı olur. Genetik erozyonun tarımsal ekosistemlerin önemli sorunlarından biri olduğu göz önüne alındığında, tarımsal ekosistemlerde biyolojik kontrol stratejilerinin genişletilmesi için, tarımsal ekosistemlerin yoğunlaştırılması, biyolojik çeşitlilik ve zararlı kontrolü arasındaki ilişkinin desteklenmesi gerektiğini ortaya koymaktadır. Tarımsal ekosistemlerde doğal düşman çeşitliliğinin azalmasının su ve yeraltı suyu kirliliğini ve çevresel maliyetleri artırdığı dikkate

alınmalıdır. Bu konuda yapılmış en kapsamlı literatür çalışması Karezmi ve arkadaşlarının (Kazemi ve ark., 2018) derleme çalışmasıdır. Bu sunumda da bu çalışmadan yararlanılmıştır.

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SİMÜLASYON DESTEKLİ TEKNOLOJİNİN İLKOKULDA ZİHİNDEN TOPLAMAYA ETKİSİ

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ÖZET

Bu çalışma doğal sayıların alt konusu olan “En çok dört basamaklı doğal sayıları 100’ün katlarıyla zihinden toplar.” kazanımını simülasyon destekli teknolojik materyalleri kullanarak matematik dersinin başarısına etkisi araştırılmıştır. Araştırmanın modeli ön test-son test kontrol gruplu yarı deneysel araştırma modelidir. Araştırmanın örnekleme Mersin ili Yenişehir İlçesi ve Şanlıurfa ili Eyyübiye ilçelerinde bulunan 2 farklı ilkokulun 4. sınıfta okuyan öğrencilerden toplam 4 şube seçilmiştir. Her gruba da araştırma öncesinde Millî Eğitim Bakanlığı’nın uygulaması olan EBA platformunda bulunan geçerliliği ve güvenilirliği test edilmiş çoktan seçmeli 10 adet sorudan oluşturulan bir ölçek (Zihinden Toplama Başarı Testi), ön test olarak uygulanmıştır. Ön test sonucunda aritmetik puan ortalaması diğer gruba göre daha düşük olan Mersin ili Yenişehir ilçesinde seçilen sınıfların bir şubesi ve Şanlıurfa’nın Eyyübiye ilçesinde seçilen sınıfların bir şubesi toplam 2 şubedeney grubu olarak belirlenmiştir. Aritmetik puan ortalaması daha yüksek olan diğer iki şube ise kontrol grubu olarak belirlenmiştir. Doğal sayılar konusunun “En çok dört basamaklı doğal sayıları 100’ün katlarıyla zihinden toplar” kazanımını bu çalışmada çalışılmıştır. Deney grubunda, ilgili kazanım 2 gün süreyle simülasyon teknolojileri kullanarak anlatılmıştır. Kontrol grubunda da ilgili kazanım müfredatın önerdiği anlatım yöntemi kullanarak 2 gün süreyle yürütülmüştür. Öğretimlerin sonunda deney ve kontrol grubuna “Zihinden Toplama Başarı Testi” son test olarak uygulanmıştır. Araştırma sonucunda kontrol gruplarına göre, deney gruplarının başarısında bir artış olduğu görülmüştür. Bu sonuca göre simülasyon destekli teknolojik materyaller kullanılarak yapılan öğretimin öğrencilerin matematik dersi akademik başarılarına olumlu katkıda bulunduğu söylenebilir.

Anahtar kelimeler: Teknolojik materyal, simülasyon, zihinden toplama, matematik başarısı.

THE EFFECT OF SIMULATION SUPPORTED TECHNOLOGY ON MENTAL COLLECTION IN PRIMARY SCHOOL

Abstract

This study covers the sub-topic of natural numbers: "Mentally adds four-digit natural numbers with multiples of 100." The effect of using simulation-supported technological materials on the success of the mathematics course was investigated. The model of the research is a quasi-experimental research model with a pretest-posttest control group. A total of 4 branches were selected as the sample of the research from the 4th-grade students of 2 different primary schools in Mersin province Yenişehir District and Şanlıurfa province Eyyübiye districts. Before the research, a scale consisting of 10 multiple-choice questions (Mental Collection Achievement Test), whose validity and reliability were tested on the EBA platform, an application of the Ministry of National Education, was applied to each group as a pre-test. As a result of the pre-test, one branch of the classes selected in the Yenişehir district of Mersin province, whose arithmetic score average was lower than the other group, and one branch of the classes selected in the Eyyübiye district of Şanlıurfa, were determined as the experimental group for a total of 2 branches. The other two branches with higher arithmetic score averages were determined as the control group. The objective of the subject of natural numbers, "Mentally adds four-digit natural numbers with multiples of 100", was studied in this research. In the experimental group, the relevant objective was explained using simulation technologies for 2 days. In the control group, the relevant acquisition was carried out for 2 days using the narrative method recommended by the curriculum. At the end of the training, the "Mental Collection Achievement Test" was applied to the experimental and control groups as a posttest. As a result of the research, it was seen that there was an increase in the success of the experimental groups compared to the control groups. According to this result, it can be said that teaching using simulation-supported technological materials contributes positively to students' academic success in mathematics.

Keywords: Technological material, simulation, mental addition, mathematics achievement.

Giriş

Bireylerin doğumdan başlayarak hayatı boyunca eğitim alırken pek çok farklı seçenekler ile karşılaşır. Kimi zaman ailesinden kimi zaman sınıf öğretmeninden eğitim ve öğretim görmektedir (Arı, 2019: 1.). Öğrenme insanın yaşadığı sürece bitmeyen bir süreçtir (Köse, 2021: 32). Eğitim ve öğretim toplumun gereksinimlerini karşılamalı birey de buna ayak uydurmalıdır. Günümüzde bilgiye ulaşmak, kullanmak ve yönetmek önemli hale gelmiştir (Erbaş ve Ağmaz, 2020: 1). Dolayısıyla bu dönemde teknolojinin gelişimi ile birlikte öğrenme daha hızlı ve kolay olmaktadır (Arı, 2019: 1). Bilgi ve teknolojinin hızla bir şekilde ilerlediği ve geliştiği bu yüzyılda öğrenin artık teknoloji ile sağlanması kaçınılmazdır (Köse, 2021: 32). Alkış Küçükaydın ve Sarıtepeci (2021)'ye göre öğrenmede teknoloji kullanımının bir seçenektan çıkıp zorunluluk olduğunu söylemektedir. Ülkemizde teknolojiye yatırım her geçen gün artmaktadır. Okulun en önemli katkısı gençlere yönelik süreçlerin amacı, öğrenme ortamlarının gelişmiş teknolojik donanımlarla donatılmasıdır (Yeşilyurt, 2021: 26). Öğretim yapılan okul ve sınıflarda öğrenciler yeni teknolojik araç ve gereçlerle tanışıyor ve sınıflar bu şekilde donatılmaktadır. 2004 yılından bu yana ülkemizde güncellenen eğitim programında eğitim ve öğretimde teknolojiye yer verilmiş olup daha etkin bir şekilde kullanılmasına özen gösterilmiştir. MEB tarafından açıklanan eğitim sistemimizin bilişim teknoloji vizyonu olarak “yenilikleri desteklemek, değerlendirip geliştirmek, öğrenci merkezli teknolojileri kullanmak, eğitim sistemini ileriye taşımak, proje tabanlı eğitim sistemi oluşturmak” olarak açıklamıştır (MEB, 2013, akt. Önal, 2022). Ülkemiz BİT vizyonuna baktığımızda bu süreçte öğretmenler önemli bir rol düşmektedir. Özellikle teknolojiyi kullanmakta öğretmenler öğrencilere rol model olmalı sınıf içi uygulamalarda teknolojiyi etkin bir şekilde kullanmalıdır. Yeni nesil öğrenciler daha okul öncesi dönemden itibaren teknolojiyi kullanmakta ve teknolojik gelişmelere bir hayli hevesli olduğu görülmektedir. Dolayısıyla öğretmen ve öğretmen adaylarının eğitim ve öğretim sürecinde güncel teknolojik uygulamaları bilmesi, bu uygulamaları kullanabilmesi ve teknolojiye ait olan temel özelliklere sahip olması gerekmektedir (Önal, 2022: 2, 6).

Günümüzde teknolojinin sağladığı birçok uygulama alanları vardır. Bilgisayar yazılımlarını eğitim amaçlı kullanımı vardır. Örneğin okula yeni başlayan çocuk eğitsel yazılımlarla sesleri öğrenebilir. Eğitsel yazılımların öğrencilere etkinlik ve uygulama yazılımlarıyla hedefe ulaştırmayı sağlar. Bunun yanında elektronik kitaplar da eğitim amaçlı kullanılmaktadır. Elektronik kitaplar ses efektleri, müzik, sesli okuma gibi çoklu medya özellikleri içerdiğinden çocukların dikkatleri çekebilme ve öğrenmeyi anlamlı kılmaktadır. Teknolojinin bizlere

sunduğu bir başka özellik dijital oyunlardır. Dijital oyunlar çocukların ilgisini içerikleriyle çekebilmektedir. Dolayısıyla öğrenmeyi ve motivasyonu geliştirmektedir (Erbaş ve Ağmaz, 2020: 37, 45).

Alkış Küçükaydın ve Sarıtepeci (2021: 110)'ye göre teknoloji, yaşamımızın her alanında karşımıza çıktığını, ev ortamından iş hayatına kadar sürekli teknoloji ile bir ilişkimiz olduğunu söylemektedir. Dolayısıyla teknoloji ile öğretmenler, öğrenciler ve eğitimin diğer paydaşları teknoloji ile tanışmaları gerektiğine vurgu yapmaktadır. Ayrıca Alkış Küçükaydın ve Sarıtepeci (2021: 110)'ye göre eğitimde teknolojinin kullanılacağı gibi özellikle matematik eğitimi ve öğretiminde teknoloji kaçınılmaz bir seçenektir. Teknoloji matematik derslerine entegre edilmelidir. Matematik derslerinde somut etkinliklerden ziyade teknolojik etkinlikler öğretimi kolaylaştıracaktır. İlköğretim döneminde öğrenciler henüz somut işlemler döneminde olduğu için matematik konularında soyut işlemleri teknoloji kullanarak soyut hale getirebiliriz. Sınıf öğretmenlerinin teknolojiye karşı algılarının olumlu olması matematik öğretiminde kolaylık sağlayacaktır (Alkış Küçükaydın ve Sarıtepeci, 2021: 110, 112). Bu bağlamda eğitim ve öğretim faaliyetlerinde teknolojik destekli ders anlatımının öğrenci derslerine başarıları artırılması gerekmektedir.

1.1.Araştırmanın Amacı

4.sınıf matematik dersindeki doğal sayılar ünitesinden seçilen “En çok dört basamaklı doğal sayıları 100’ün katlarıyla zihinden toplar.” konusunun simülasyon destekli teknolojik materyallerle yapılan öğretimin öğrencilerin akademik başarıları üzerindeki etkisini belirlemektir.

1.2.Araştırmanın Problemi

Araştırmanın problemi ilkokul 4. Sınıf öğrencilerinin simülasyon destekli teknolojik materyallerle yapılan öğretim programının matematik dersine etkisi incelenmek istenmiştir. Bununla beraber araştırmanın alt problem cümlesi; Simülasyon destekli teknolojik materyallerle yapılan bir öğretim yönteminin uygulandığı deney grubu öğrencileri ile müfredatın önerdiği anlatım yönteminin uygulandığı kontrol grubu öğrencilerinin matematik dersinde zihinden toplamaya konusuna ilişkin akademik başarıları açısından farklılık var mıdır? Bu araştırma; ilkokul 4.sınıf Matematik dersi “Doğal Sayılar” ünitesi, “En çok dört basamaklı doğal sayıları 100’ün katlarıyla zihinden toplar.” konusu deney grubunda kullanılmak üzere teknolojik öğretim materyali ve 2023-2024 öğretim yılı, Şanlıurfa ili Eyyübiye ilçesi, Mersin ili Yenişehir ilçesinde bulunan birer ilkokulun rastgele seçilen iki şubesi ile sınırlıdır.

YÖNTEM

Bu bölümde araştırmanın modeli, evreni, örnekleme, veri toplama aracı ve verilerin analizi bulunmaktadır.

Araştırmanın Modeli

Yapılan çalışmada nicel araştırma yöntemlerinden, Ön Test-Son Test kullanılarak kontrol ve deney grubu belirlenerek, yarı deneysel araştırma yöntemi kullanılmıştır. Yarı deneysel araştırma modeli, çalışmada deney ve kontrol grubunu yansız bir şekilde seçilen ve bir değişkenin sebep-sonuç ilişkisini belirlemek için kullanılan bir modeldir (Özmen ve Karamustafaoğlu, 2019: 210.). Araştırmacılar tarafından yapılan seçkisiz atama yöntemi ile belirlenen şubelerden yapılan ön test sonucunun ortalamasının daha düşük olduğu şube, deney grubu; ön test sonucunun daha yüksek olduğu şube kontrol grubu olarak belirlenmiştir (Tablo 1). Kontrol grubunda yapılan öğretim Milli Eğitim Bakanlığı Talim Terbiye Kurulunun müfredatına uygun olarak gerçekleştirilmiştir. Deney grubunda yapılan öğretim, öğrencilerin aktif bir şekilde katılması gözetilerek etkileşimli tahtadan Wordwall desteği ile gerçekleştirilmiştir. Araştırma için izlenen yol Tablo 2’de belirtilmiştir.

Tablo 1. Ön Test Ortalamaları

Okul	Gruplar	Ön Test	N	X
Piri Reis İlkokulu (Mersin)	4-D	Başarı Testi	15	35,33
	4-A		15	37,33
Yenice Merkez İlkokulu (Şanlıurfa)	4-E	Başarı Testi	15	45,33
	4-J		15	49,33

Tablo 2. Araştırma İçin İzlenen Yol

Okul	Gruplar	Öğretim Öncesi	Öğretim Yöntemi	Öğretim Sonrası
Piri Reis İlkokulu (Mersin)	Deney Grubu N=15	Zihinden Toplama Başarı Testi (Ön Test)	Wordwall Öğretim	Destekli Zihinden Toplama Başarı Testi (Son Test)
	Kontrol Grubu N=15		Müfredata Öğretim	Uygun
Yenice Merkez İlkokulu (Şanlıurfa)	Deney Grubu N=15	Zihinden Toplama Başarı Testi (Ön Test)	Wordwall Öğretim	Destekli Zihinden Toplama Başarı Testi (Son Test)
	Kontrol Grubu N=15		Müfredata Öğretim	Uygun

Araştırmanın Örneklemi

Araştırmada çalışma grubu, 2023-2024 Eğitim Öğretim yılı içerisinde Mersin ili Yenişehir ilçesinde bulunan ve devlet okuluna öğrenim gören 30 4. Sınıf öğrencisi ve Şanlıurfa ili Eyyübiye ilçesinde bulunan ve devlet okulunda öğrenim gören 30 4. Sınıf öğrencisinden oluşmaktadır. Örneklem, araştırmaya hız ve kolaylık sağlaması için kolay ulaşılabilir örnekleme yöntemi olarak belirlenmiştir.

Veri Toplama Aracı

Araştırmada belirlenen veri toplama aracı 2023-2024 Eğitim Öğretim yılında kullanılan MEB'in öğrencilere uygun görmüş olduğu EBA sisteminde bulunan tarama testlerinden ve matematik ders kitaplarında bulunan "En çok dört basamaklı doğal sayıları 100'ün katlarıyla zihinden toplar" kazanımına uygun olarak görülen sorulardan, 10 soru olacak şekilde "Zihinden Toplama Başarı Testi" olarak hazırlanmıştır. Araştırmada uygulanan ön test ve son testler aynı sorulardan oluşmaktadır. Testler belirlenen kontrol ve deney gruplarına araştırmacılar tarafınca uygulanmıştır.

2.4.Verilerin Analizi

Araştırmada elde edilen veriler SPSS20.0 programı ile analiz edilmiştir. Ön test ve son test uygulanarak, deney ve kontrol gruplarından elde edilen verilerin arasındaki farkın bağımsız olarak analiz edilmesi için veriler Bağımsız Örneklem T testi uygulanarak analiz edilmiştir. Çoklu gruplar arasındaki farkın analiz edilmesi için de Anova testi kullanılmıştır. Anlamlılık

düzeıı 0.05 olarak belirlenmiř, deney ve kontrol gruplarından elde edilen verilerin arasında anlamlı bir fark olup olmadığı P değeri ile belirlenmiřtir.

3.BULGULAR

Arařtırma dođrultusunda elde edilen bulgular tablo halinde belirtilmiř ve tablolardaki verilere göre yorumlanmıřtır.

Piri Reis İlkokulu ve Yenice Merkez İlkokulu, deney ve kontrol grubu öğrencilerinin ön test deđiřkenli t testi sonuçları Tablo 3’de verilmiřtir.

Tablo 3. Ön Test T Testi Sonuçları

Okullar	Deđiřken	Gruplar	N	X	SS	t	df	P
Piri Reis İlkokulu (Mersin)	Ön test	Deney	15	35,33	3,362	-,454	27,238	,377
		Kontrol	15	37,33	2,840			
Yenice Merkez İlkokulu (řanlıurfa)	Ön test	Deney	15	45,33	4,866	-,584	27,998	,564
		Kontrol	15	49,33	4,827			

Tablo 3. incelendiđinde, deney ve kontrol grupları ortalamaları arasında çok da büyük bir fark olmadığını, yani düzeylerinin benzer olduğunu görüyoruz. P değerinin 0,05’den büyük olması da deney ve kontrol grupları arasında anlamlı bir fark bulunmadığı tespit edilmiřtir($p=,377$, $p=,564$). Bu durum öğrencilerin ön bilgileri açısından farklılık göstermediğini belirtmiřtir.

Piri Reis İlkokulu ve Yenice Merkez İlkokulu, deney ve kontrol grubu öğrencilerinin son test deđiřkenli t testi sonuçları Tablo 4’te verilmiřtir.

Tablo 4. Son Test T testi Sonuçları

Okullar	Değişken	Gruplar	N	X	SS	t	df	P
Piri Reis İlkokulu (Mersin)	Son test	Deney	15	71,33	4,008	4,365	27,999	,000
		Kontrol	15	46,67	3,984			
Yenice Merkez İlkokulu (Şanlıurfa)	Son test	Deney	15	76,67	4,102	2,856	26,790	,008
		Kontrol	15	58,00	5,090			

Tablo 4. incelendiğinde, deney ve kontrol grupları son test puanları arasında anlamlı bir fark olduğu görülmektedir ($p=,000$, $p=,008$). Bu durum Tablo 3 ile karşılaştırıldığında yapılan deneysel çalışmanın deney grubunda zihinden toplama kazanımında akademik başarı gösterildiğini belirtmektedir.

Piri Reis İlkokulu ve Yenice Merkez İlkokulu, deney ve kontrol grubu öğrencilerinin ön test değişkenli Anova testi sonuçları Tablo 5’de verilmiştir.

Tablo 5. Ön Test Değişkenli Anova Testi Sonuçları

Değişken	Varyansın Kaynağı	Kareler Toplamı	sd	Kareler Ortalaması	F	p	η^2	Anlamlı Fark
Ön Test	Gruplar Arası	1965,000	3	655,000	2,633	,059	0,12	4>3>2>1
	Gruplar İçi	13933,333	56	248,810				
	Toplam	15898,333	59					

1=kontrol grubu1, 2=deney grubu1, 3=kontrol grubu2, 4=deney grubu2

Tablo 5 incelendiğinde, deney ve kontrol gruplarındaki öğrencilerin ön bilgilerine göre ön testten aldıkları puanlar arasında anlamlı bir fark bulunmadığı görülmektedir. Post hoc karşılaştırmalarına göre gruplar arasında bir başarı karşılaştırılması yapıldığında gruplar arasında anlamlı fark 4>3>2>1 şeklinde tespit edilmiştir.

Piri Reis İlkokulu ve Yenice Merkez İlkokulu, deney ve kontrol grubu öğrencilerinin son test değişkenli Anova testi sonuçları Tablo 6’da verilmiştir.

Tablo 6. Son Test Değişkenli Anova Testi Sonuçları

Değişken	Varyansın Kaynağı	Kareler Toplamı	sd	Kareler Ortalaması	F	p	η^2	Anlamlı Fark
Son Test	Gruplar Arası	8218,333	3	2739,444	9,784	,000	0,34	4>2>3>1
	Gruplar İçi	15680,000	56	280,000				
	Toplam	23898,333	59					

1=kontrol grubu1, 2=deney grubu1, 3=kontrol grubu2, 4=deney grubu2

Tablo 6 incelendiğinde, deney ve kontrol gruplarındaki öğrencilerin son testten aldıkları puanlar arasında anlamlı bir fark bulunmuştur. Bu durum teknolojik materyal kullanmanın öğrencilerin zihinden toplama kazanımı konusunda akademik başarıları üzerinde orta düzeye yakın bir fark görüldüğünün göstergesidir ($\eta^2=0,34$). Bu fark gruplar arasında 4>2>3>1 şeklinde tespit edilmiştir.

Tartışma, Sonuç ve Öneriler

Bu araştırmada ilkokul 4. Sınıf Matematik dersi zihinden toplama konusunun öğretiminde Wordwall Web.2.0 aracının öğrencilerin akademik başarılarına etkisi incelenmiştir. 4 sınıf arasından belirlenen deney ve kontrol grupları arasında yapılan ön test puanları arasında anlamlı fark bulunmamıştır. Bu durum öğrencilerin düzeylerinin birbirine yakın olduğunu ifade etmektedir. Deney ve kontrol grupları arasında yapılan son test puanları arasında anlamlı bir fark bulunmuştur. Bu durum ise Web2.0 araçlarından olan Wordwall'un zihinden toplama kazanımı adına akademik başarı kazandırdığını göstermektedir. Wordwall'un öğrencilerin akademik başarısına olumlu etkisi olduğunu belirten bulgular alanyazında bulunmaktadır (Taş, Coşkun, Ayverdi ve Bolat, 2023), (Hamalı ve Hamalı, 2021: 14.). Matematik dersi teknolojik materyallerle desteklendiğinde, çoklu zekaya uygun öğrenmeler sunar. Örnek olarak, matematik kavramlarını somutlaştırmak ve görsel olarak sunmak için animasyonlar, simülasyonlar, karikatürler ve videolar kullanılabilir. Bu materyallerin öğrenciye katkısı, kavramlar arası bağlantıları daha kolay kurmalarını ve bir bütün olarak görmelerini sağlar. Derslerin teknolojik materyal ile desteklendiğinde öğrencilerin akademik başarılarına olumlu etkide bulunduğunu belirten çalışmalar alanyazında bulunmaktadır (Duran, Özden ve Yeşilyurt, 2023), (Akyıldız, Uçan ve Yeşilyurt, 2023), (Çelikçi, Karabacak, ve Yeşilyurt, 2023).

Araştırmada elde edilen sonuçtan yola çıkarak; sınıf öğretmenlerinin öğrencilerine ders sırasında müfredatın önerdiği yöntem ile ders anlatmasının yanı sıra simülasyon destekli teknolojik materyal kullanarak ders anlatması öğrencilerin akademik başarılarını olumlu

etkilemekle birlikte öğrencilerin derse aktif katılmalarına ve güdülenmelerine yol açabilir. Öğrenciler için ise teknolojik materyal kullanarak ders çalışmak kendi kendilerine öğrenme düzeylerinde olumlu etki sağlayabilir.

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FEN BİLİMLERİ DERSİNDE EĞİTSEL OYUNLARIN BAŞARIYA ETKİSİ: BİR META-ANALİZ ÇALIŞMASI

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Özet

Fen bilgisi dersinde eğitsel oyunlar öğretimi için önemli olarak görülmektedir. Fen eğitiminde kullanılan eğitsel oyunlar, öğrencileri akademik anlamda birçok alanda etkilemektedir. Bu alanların başında ise başarı gelmektedir. Fen bilgisi dersinde eğitsel oyunların başarıya etkisi çalışmalarına sıkça yer verilmektedir. Bu araştırma; fen bilimleri dersinde eğitsel oyunların başarıya etkisini belirlemek amacıyla gerçekleştirilmiştir. Araştırma örneklemini 2012-2022 yılları arasında Türkiye’de yayınlanmış ve ölçütleri karşılayan bilimsel çalışmalar oluşturmuştur. Araştırmaya dahil edilen çalışmalara Google Akademik, TR Dizin, YÖKTEZ ve DergiPark veri tabanlarından ulaşılmıştır. Taramalar yapılırken "fen bilgisi dersinde eğitsel oyunlar", "fen eğitiminde eğitsel oyunlar" ve "eğitsel oyunların başarıya etkisi" anahtar kelimeleri kullanılmıştır. Araştırmaya dahil edilen çalışmaların uygun gruplanması ve istenilen verilere ulaşılabilmesi için kodlama formu kullanılmıştır. Araştırmada 14 adet deneysel yöntemle yapılmış bilimsel çalışma dahil edilerek veri edilmiştir. Araştırmada bir meta analiz yazılımı olan CMA programı ile çalışmaların heterojenlik testleri, yayın yanlılığı, Hedges’s, Cohens’g’ye göre bireysel ve genel etki büyüklüğü katsayıları hesaplanmıştır. Yapılan analiz sonuçlarına göre fen bilimleri dersinde eğitsel oyunların başarıya etkisinin pozitif yönde ve yüksek düzeyde olduğu sonucuna ulaşılmıştır. Elde edilen sonuçlar alan yazın ışığında tartışılarak yorumlanmış ve önerilerde bulunulmuştur.

Anahtar kelimeler: Fen bilimleri, eğitsel oyunlar, meta-analiz, CMA

THE EFFECT OF EDUCATIONAL GAMES ON SUCCESS IN SCIENCE: A META-ANALYSIS STUDY

Abstract

It is seen as important for teaching educational games in science. Educational games used in science education affect students academically in many fields. Success comes first among these fields. Studies on the effect of educational games on success in science is frequently included. This research; this study was conducted to determine the effect of educational games on success in science. The research sample consisted of scientific studies that were published in Turkey between 2012 and 2022 and met the criteria. The studies included in the research were accessed from Google Scholar, TR Index, YÖKTEZ and DergiPark databases. While scanning, the keywords "educational games in science", "educational games in science education" and "the effect of educational games on success" were used. A coding form was used to group the studies included in the research appropriately and access the desired data. In the research, 14 scientific studies conducted with experimental methods were included and provided data. In the study, heterogeneity tests, publication bias, individual and overall effect size coefficients according to Hedges's and Cohens'g were calculated with the CMA program, which is a meta-analysis software. According to the results of the analysis, it was concluded that the effect of educational games on success in science was positive and at a high level. The results obtained were discussed and interpreted in the light of the literature and suggestions were made.

Keywords: Science, educational games, meta-analysis, CMA

Giriş

Eğitsel oyunlar, eğitimde sıkça kullanılan ve öğrencilerin ilgili dersin kazanımlarına başarıyla ulaşabilmesini sağlamak için başvurulan bir yöntemdir. Eğitsel oyunlar, öğrencilerin aktif katılımıyla gerçekleşen, eğlenceli olduğu kadar öğrenilen bilginin tekrar ve pekiştirilmesini sağlayan öğretim yöntemi olarak tanımlanmaktadır. (Güler, 2011). Bir diğer deyişle, eğitsel oyunlar öğrencilerin algılama düzeylerine, pratik olarak düşünme becerilerine ve karar verme becerine katkı sağlamaktadır (Yiğit, 2007). Eğitsel oyunların içermesi gereken önemli özellikleri vardır. Buna göre eğitsel oyunlar; uygulanacak sınıfta bulunan tüm öğrencilerin seviyelerine uygun sadelikte, oyuna aktif katılımın mümkün olduğu düzeyde ve hem basit hem de ilgi çekici olmalıdır (Karamustafaoğlu ve Kılıç, 2020). Eğitsel oyunu yöneten öğretmen oyunu daima kontrol altında tutabilmeli ve öğrencilere oyun sırasında rehber olmalıdır (Demirel, 2012). Eğitsel oyun, rekabet ortamı yaratırsa öğrencilerin oyuna aktif katılımını sağlayabilir (Karamustafaoğlu ve Kılıç, 2020). Kısaca eğitsel oyunlar, ders kazanımlarının etkili bir şekilde sağlanması ve öğrenci başarısının artması noktasında önemli rol oynamaktadır.

Eğitsel oyunlar, fen bilgisi dersinde de kullanılır ve öğrencilerin başarıya ulaşması için önemli görülmektedir. Fen bilimleri dersi öğrenciler için her ne kadar okullarda öğretilen bir ders olarak görülse de etkilerini günlük yaşamın her alanında görmek mümkündür. Özellikle yeni dünya düzeninde fen bilimleri eğitimi toplumların geleceğe ilişkin gelişimlerinde önemli bir rol oynamaktadır. Fen bilimleri eğitimine en çok gelişmiş toplumlar tarafından önemsenmekte bunun yanı sıra tüm toplumlar fen bilimleri eğitiminde kaliteyi ve verimi artırmak için çalışmalar yürütmektedir (Çepni, 2014.) Fen bilimleri dersi kendi içinde soyut olan kavram ve kazanımlar barındırmaktadır. Öğrencilerin anlayabilecekleri seviye üzerinde olan bazı soyut fen bilimleri hedeflerinin anlaşılır hale getirilmesi, bunun için farklı yol ve yöntemlerin denenmesi, öğrencilerin bu sayede kendi bilgilerini değerlendirerek gereken bilgiye ulaşması hedeflenmektedir (Uzuntiryaki, Çakır ve Geban, 2001). Diğer bir deyişle, fen bilimleri dersinde öğrenciyi başarıya ulaştırmak için bu soyut kavramların gerekirse somutlaştırarak aktarılması gerekmektedir. Bu somutlaştırmanın sağlanması ve başarıya ulaşma için karşıma çıkan önemli yöntemlerin başında eğitsel oyun gelmektedir.

Eğitsel oyun, anlamlı bir öğrenme ortamının sağlanmasına ve çeşitli aktif öğrenmeler sunarak somutlaştırmaya imkan sağlar (Açıkgöz-Ün, 2003). Somutlaştırabilmek için gerekli olan aktif öğrenmelerle öğrenciler kendi kendine öğrenmeyi sağlar ve konunun dikkat çekici olması, keyif alınması, etkin katılmayı sağlayarak öğrenmelere pozitif yönde katkı sunar (Gürbüz, Gülburnu

ve Şahin, 2017). Öğrenmeye pozitif yönde katkı sunarak aktif öğrenmeyi sağlayacak olan eğitsel oyunların kullanım zamanı oldukça geniş alanı kapsamaktadır yalnızca ders sırasında, konu tekrarında değil ders dışı zamanlar da kullanımı mümkündür (Kavşut, Çavuş ve Akpınarlı, 2011). Fen bilimleri dersi öğrencilerin öğrenmede güçlük çektiği, üniteleri kavramada zorlandıkları bir ders olarak görülmektedir (Önen, 2005). Bunun sebebi ise, fen bilimleri dersi içinde öğrenciler için anlaşılması zor olan soyut kavramların bulunması ve bilgiler arasındaki ilişkilendirmenin de kurulamamasından kaynaklanmaktadır (Azar, 2001). Fen bilimleri dersinde sıkça rastlanan soyut kavramlar öğrencilerin derse ilişkin akademik başarısını da olumsuz etkilemektedir. Öğrencilerin başarıya ulaşabilmesi için soyut kavramları kavrayabilmesi önemlidir. Buradaki önemli olan soyut kavramlar aktarılırken mümkün olduğunca somutlaştırılmasıdır. Bu somutlaştırmalar için çeşitli materyallerden destek alınabilir ya da aktif katılımı sağlayan, öğrenmeyi eğlenceli hale getiren eğitsel oyun yöntemine başvurulabilir. Fen bilimleri dersinde kullanılan eğitsel oyunlar sayesinde öğrencilerin derse ilişkin olumlu tutum sergiledikleri, fen bilimleri dersine ait temel bilgi ve becerileri kazandıkları ifade edilmektedir (Demir, 2012). Eğlenceli yöntemlere başvurmak ve hem aktif katılımı sağlayacak hem de anlama düzeyini pozitif yönde etkileyerek fen bilimleri dersindeki öğrenci başarısına katkı sağlayacaktır.

Alan yazın incelendiğinde, fen bilimleri dersinde eğitsel oyunların başarıya etkisini inceleyen çalışmalara rastlanmıştır. Fen bilimleri öğretiminde oyun ve model kullanımını başarıya olan etkisine bakılmış ve oyun kullanımının fen bilimleri dersinde başarıyı pozitif yönde etkilediği bulunmuştur (Ercanlı, 1997). Bir başka çalışmada ise, ilkökul düzeyinde işlenen derslerde eğitsel oyunlarla işlenen ünitelerin geleneksel metodlarla öğretilen ünitelere göre daha kalıcı olduğu tespit edilmiştir (Beyazitoğlu, 1996). Şaşmaz- Ören ve Erduran Avcı (2004) tarafından gerçekleştirilen bir başka fen bilimleri dersi ile başarıyı inceleyen çalışmada da benzer sonuca ulaşılmıştır. Deneysel yöntemle gerçekleştirilen çalışmada eğitsel oyunlarla ders işleyen deney grubu öğrencilerin başarı puanlarının kontrol grubundaki öğrencilerden daha yüksek olduğu görülmüştür. Benzer yöntemle gerçekleştirilmiş bir başka araştırmada fen bilimleri dersinde eğitsel oyunların akademik başarıya olan etkisine bakılmış ve anlamlı farklılık bulunmuştur. Buna göre, elde edilen bulgularda eğitsel oyunlarla kazandırılan fen bilimleri dersindeki öğretim başarısının pozitif yönde etkilendiği bulunmuştur (Bayat, Kılıçaslan ve Şentürk, 2014).

Tüm bu bilgiler ışığında eğitsel oyunlarla yapılmış ve öğrencilerin başarılarına etkisini inceleyen meta analiz çalışmalarının bulunmasına karşın fen bilimleri dersinde eğitsel

oyunların başarıya etkisini inceleyen çalışmaların alan yazında yetersiz olduğu görülmüştür. Bu sebepten fen bilimleri dersinde eğitsel oyunların başarıya etkisine ilişkin bir meta-analiz çalışmasının alan yazına katkı sağlayacağı düşünülmüştür. Ayrıca oyunu seven ve oyun yoluyla temel ihtiyaçlarını giderebilen öğrencilerin derslerdeki kazanımları sağlama süreci daha başarılı geçeceği düşünülmektedir. Bu sebepten fen bilimleri eğitiminde de eğitsel oyunların öğrencileri başarıya götürmede etkili olacağı düşünülmektedir. Fen bilimleri dersindeki başarı için kullanılan yöntemlerin ön plana çıktığı ve bu yöntemlerden en etkili olan eğitsel oyunların incelenmesi önem arz etmektedir. Bu sebepten fen bilimleri dersinde eğitsel oyunları ele alan ve başarıya etkisini inceleyen bir araştırmaya ihtiyaç olduğu görülmektedir. Sonuç olarak, araştırmanın amacı fen bilimleri dersinde eğitsel oyunların başarıya etkisini belirlemektir.

YÖNTEM

Araştırmanın Modeli

Araştırma ortaya konulurken literatür tarama yöntemlerinden biri olan meta-analiz yöntemi kullanılmıştır. Meta-analiz kavramı, alan yazında ilk defa Glass (1976) tarafından kullanılmıştır. Meta-analiz kavramı, bir araştırma probleminde birçok çalışmanın sonuçlarının bir araya gelmesi olarak tanımlanmaktadır (Akgöz, Ercan ve Kan, 2004). Bir başka ifade ise meta-analiz, bir konu üzerinde birbirine benzer araştırmaların belirlenen ölçütlerle bir araya getirilip çalışmalara ait olan nicel veriler ışığında yorumlanması olarak açıklanmıştır (Dinçer, 2014).

Meta-analizle yapılan çalışmalarda, ortaya konmuş olan deneysel çalışma verilerini dikkate alınır ve nicel veriler sağlandıktan sonra konuyla ilgili yapılmış tüm çalışmalarla genel bir sonuca ulaşılır (Bakioğlu ve Göktaş, 2019). Deneysel olmayan çalışmalar için de meta-analiz ile çalışma yapmak mümkündür. Bununla ilgili olarak Greenland (1987) tarafından deneysel olmayan çalışmaların meta-analizi için istatistiksel yöntemler ayrıca tanımlanmıştır.

Alan Yazın Tarama İşlemi

Bu çalışma ortaya konmadan önce araştırmacı tarafından alan yazın taranmıştır. Alan yazın taraması sonucunda çalışmanın konusuna karar verilmiştir. Bir sonraki aşamada yapılan çalışmaya dahil edilecek bilimsel araştırmalara ait ölçütlere karar verilmiştir. Bu ölçütler ifade edilmiştir. Buna göre; araştırma örneklemini 2013-2023 yılları arasında Türkiye’de yayınlanmış ve ölçütleri karşılayan makaleler oluşturmuştur. Araştırmaya dahil edilecek çalışmalara Google Akademik, TR Dizin, YÖKTEZ ve DergiPark veri tabanlarından ulaşılmıştır. Taramalar yapılırken "fen bilgisi dersinde eğitsel oyunlar", "fen eğitiminde eğitsel

oyunlar" ve "eğitsel oyunların başarıya etkisi" anahtar kelimeleri kullanılmıştır. Araştırmaya dâhil edilecek çalışmaların gruplanması ve istenilen verilere ulaşılabilmesi için kodlama formu kullanılmıştır. Araştırmacı tarafından 17 bilimsel çalışma ilgili konu kapsamında belirlenmiştir. 17 bilimsel çalışmanın 3 tanesi deney ve kontrol grubu oluşturmadığı tespit edildiğinden ölçütlere uymadığı gerekçesiyle elenmiştir. Araştırmaya kalan 14 bilimsel çalışmayla devam edilmiştir. Araştırmaya dahil edilen bilimsel araştırmaların listesi Ek-1’de verilmiştir.

Geçerlilik ve Güvenirlik Çalışmaları

Meta-analiz yöntemi kullanılırken araştırmaya dahil edilen çalışmalar seçilip analiz edilirken bulgulara ait veriler ortaya konurken dikkatli ve ayrıntılı bir süreç yürütülmesi önemlidir. Bu çalışmaya dahil edilen bilimsel araştırmaların geçerliliği ve güvenirliliği kontrol edilmiştir. Bunun için bilimsel araştırmalara ait bir kodlama formu kullanılmıştır. Kodlama formu, çalışmalara ait numara, isim, yazar, yılı, konusu, örnekleme ait kademesi ve çalışmanın örneklem büyüklüğü başlıklarını ele almaktadır. Hazırlana kontrol listesine göre kodlanan bilimsel çalışmalar bir başka alan uzmanı tarafından da kontrol edilmiştir. İki kodlayıcı arasında tutarlılığın sağlanması için kodlamalar önce bağımsız olarak yapılmıştır. Daha sonrasında iki kodlama karşılaştırılıp tutarlılığı sağlanmıştır.

Verilerin Analizi

Araştırma konuları aynı olan örneklem, yer ve zaman açısından farklılık gösteren çalışmaların sonuçlarını bir arada gösterebilmek amacıyla yöntem ve bulgular için farklı istatistik birleştirme yöntemleri bulunmaktadır. Araştırmanın istatistiksel veri analizi için etki büyüklüğü katsayısı hesabı yapılmıştır. Deney grubundaki ortalama değerden küçük olanın oranı kontrol grubundaki değerlere olan oranı etki büyüklüğü olarak tanımlanmaktadır (Hedges ve Olkin, 1985). Diğer bir deyişle, etki büyüklüğüne uygulanmış olan deney sonucu, deney grubuna ait olan ortalama değerden ve kontrol grubuna ait ortalama değer farkıyla alınıp standart sapma değerine bölerek ulaşılır. Elde edilen sonuç, deney grubuna ait olan yöntemin ne yönde ne kadar etkili olduğunu ifade etmektedir (Thalheimer ve Cook, 2002). Sonuç olarak elde edilmiş olan etki büyüklükleri Hedges’e ait istatistiksel yöntemle göre bulunmuştur. Meta-analiz işlemleri yapılırken sonuçta elde edilen etki büyüklük değerlerinin yorumu sırasında birçok sınıflandırma yönteminden faydalanılmaktadır. Etki büyüklüklerine ait büyüklük dereceleri Cohen ve vd., (2007) tarafından açıklanmıştır. Buna göre; $0 \leq$ Etki büyüklüğü $\leq 0,30$ zayıf seviyede, $0,31 \leq$ Etki büyüklüğü $\leq 0,50$ küçük seviyede, $0,51 \leq$ Etki büyüklüğü $\leq 1,00$ orta seviyede, $1,01 \leq$ Etki büyüklüğü güçlü seviyede etkili olduğu anlamına gelmektedir. Bu çalışmaya ait istatistik

hesaplama ve grafiklerinin oluşturulmasında Comprehensive Meta Analysis (CMA) hesaplama programından yararlanılmıştır. Ayrıca çalışmaya ait heterojenlik testleri, yayın yanlılığı, Hedges's g'ye göre bireysel ve genel etki büyüklüğü katsayıları hesaplanmıştır.

BULGULAR

Fen bilimleri dersinde eğitsel oyunların başarıya etkisinin belirlenmesine yönelik bu meta-analiz çalışması gerçekleştirilmiştir. Bu meta-analiz çalışmasına 2012- 2022 yılları arasında fen bilimleri dersinde eğitsel oyunların başarıya etkisini konu alan 14 adet deneysel yöntemle oluşturulmuş bilimsel çalışma dahil edilerek veri elde edilmiştir. Yapılan analizlerde Hedges's g meta analiz uygulaması gerçekleştirilmiş ve kullanılacak olan modelin belirlenmesi için heterojenlik testi yapılmıştır. Heterojenlik testinin analizine ilişkin istatistik verileri Tablo 1'de verilmiştir.

Tablo 1. Heterojenlik Testi Sonuçları

Etki Türü	Ort. Etki İfadesi	df	Q	p
Sabit Etki	1.165	13	72,84	0,00
Rastgele Etki	1,312			

Tablo 1'de yer alan heterojenlik testi sonuçlarına göre p değeri ($p=0,000$) $0,05$ 'ten küçük olması sebebiyle çalışmalar arasında anlamlı bir fark olduğuna karar verilmiştir. Ayrıca X^2 tablosunda $df=13$ 'tür. Analiz sonucu elde edilen Q değeri ise 72,84 olarak bulunmuştur. Bu değer X^2 tablosundaki değerden büyük olması sebebiyle çalışmaların heterojen bir yapıda olduğuna karar verilmiştir. Bu u analizlerin Rastgele Etkiler Modeli altında yapılmasına karar verilmiştir. Rastgele Etkiler Modeli altında yapılan analiz sonuçları Tablo 2'de sunulmuştur.

Tablo 2. Fen Bilimleri Dersinde Eğitsel Oyunların Başarıya İlişkin Etki Büyüklük Değerleri

Araştırma Adı	Hedge's g	Std. Hata	Varyans	Alt Sınır	Üst Sınır	Z	P
Arslan, 2021	1,544	0,379	0,144	0,801	2,288	4,070	0,00
Bayat, Kılıçarslan ve Şentürk, 2014	1,836	0,265	0,070	1,317	2,355	6,834	0,00
Coşkun, Akarsu ve Kariper, 2012	2,566	0,486	0,236	1,614	3,518	5,282	0,00
Ağırçöl, Kara ve Dönel-Akgül, 2022	1,169	0,279	0,078	0,622	1,716	4,192	0,00
Dadaylı ve Pekbay, 2021	0,653	0,276	0,076	0,112	1,193	2,368	0,018
Demircioğlu ve Akdemir, 2019	3,171	0,460	0,212	2,269	4,072	6,893	0,00
Evmez, 2018	0,885	0,322	0,103	0,255	1,516	2,753	0,006
Gürbüz, 2019	0,999	0,249	0,062	0,510	1,488	4,007	0,00
Gürbüz, Çeker ve Töman, 2017	2,044	0,398	0,158	1,264	2,825	5,138	0,00
Nur, 2019	0,771	0,365	0,133	0,056	1,486	2,113	0,035
Kaya ve Elgün, 2014							
Yıldırım ve Can, 2017	1,465	0,205	0,042	1,064	1,866	7,163	0,00
Yıldız, Şimşek ve Araz, 2016	0,631	0,311	0,097	0,022	1,240	2,030	0,042
Yıldız ve Şimşek, 2020	0,143	0,218	0,047	0,284	2,285	5,138	0,00
Genel Etki	1,312	0,190	0,036	0,940	1,684	6,909	0,00

Tablo 2’de yer alan analizler incelendiğinde Rastgele Etkiler Modeline göre genel etki 1,312 olarak hesaplanmıştır. Genel etkinin yüksek düzeyde olduğu görülmektedir. Bireysel etki büyüklüklerine göre etki büyüklüğü en yüksek olan üç çalışma: Demircioğlu ve Akdemir, 2019 (EB: 3,171); Coşkun, Akarsu ve Kariper, (EB: 2,566); Gürbüz, Çeker ve Töman, 2017 (EB: 2,044) şeklinde sıralanmaktadır. Etki büyüklüğü en düşük çalışma ise; Yıldız ve Şimşek, 2020 (EB: 0,143). Analizlerde bütün sonuçların deney grubu lehinde olduğu görülmektedir.

Analize dahil edilen çalışmaların yayın yanlılığı olup olmadığını belirlemek amacıyla huni grafiği saçılımına bakılmıştır. Huni grafik saçılımında yayın yanlılığı olmadığı gözlenmiştir.

TARTIŞMA, SONUÇ VE ÖNERİLER

Yapılan çalışmada fen bilimleri dersinde eğitsel oyunların başarıya etkisini ortaya koymak için ilgili konuda yapılmış olan bilimsel araştırmalar incelenmiş ve elde edilen istatistiki veriler bir araya getirilmiştir. Fen bilimleri dersinde eğitsel oyun kullanımının genel olarak öğrencilerin başarılarını anlamlı seviyede arttırdığı sonucuna ulaşılmıştır. Alan yazın incelendiğinde, fen bilimleri dersinde eğitsel oyun kullanımının başarı yönünden, pozitif bir etki oluşturduğu birçok

çalışmaya rastlanmaktadır. Ayan ve DüNDAR (2009) tarafından ortaya konan bir çalışmada eğitsel oyunların öğrencilerdeki başarının arttırdığı bulunmuştur. Diğer bir çalışmada da fen bilimleri dersinde kullanılan eğitsel oyunlarla geleneksel öğretim yöntemiyle karşılaştırılmıştır. Yapılan araştırma sonucunda fen bilimleri dersinde eğitsel oyun kullanımının başarıda daha etkili olduğu gözlenmiştir (Ören ve Avcı, 2004). Alan yazındaki diğer çalışmalara bakıldığında, yapılmış olan çalışmaların çoğunda fen bilimleri dersinde eğitsel oyunların başarıya etkisinin olumlu etkisi görülmektedir. Yapılan meta-analiz çalışmasına eklenen araştırmalar da bu bulguyu desteklemektedir.

Koca (2019) tarafından gerçekleştirilen bir başka çalışmada da fen bilimleri dersindeki oyun temelli uygulamalar üzerine bir meta-analiz çalışması gerçekleştirilmiş ve bu çalışmada fen bilimleri dersinde oyun temelli uygulamalardan yararlanmanın akademik başarı açısından pozitif yönde olumlu bir etkisinin olduğu sonucuna ulaşılmıştır. Elde edilmiş bu çalışmalar sonucunda bakılırsa, fen bilimleri dersinde eğitsel oyun kullanımı öğrencilerin başarısı üzerinde olumlu bir etki oluşturduğu bulgusu desteklenmektedir. Yapılan çalışması sırasında alan yazında taranırken fen bilimleri eğitiminde eğitsel oyunlardan yararlanmanın son yıllarda önemli görülmüş ve sağladığı avantajlardan bahsedilmiştir. Eğitsel oyunlarla öğretim hem başarıyı hem de kalıcılığı artıracaktır. Bireysel öğrenmeye destek vermesi de fen bilimleri dersinde eğitsel oyun kullanımının en önemli avantajlarındadır (Gürbüz, Gülburnu ve Şahin, 2017). Bu açıdan bakıldığında gerçekleştirilen meta-analiz çalışmasında elde edilen, fen bilimleri dersinde eğitseloyun kullanımının başarıyı olumlu yönden etkilemesi bulgusunu kanıtlar niteliktedir. Bir başka araştırma da eğitsel oyunlardan fen bilimleri dersinde yararlanmanın yapay zekâ uygulamalarından eğitimde yararlanmanın önemi isimli araştırmasında, yapay zekâ destekli uygulamaların birçok alanda kullanıldığı ve bu uygulamaların öğrencilerin, akademik başarılarını yükselttiğini vurgulamıştır (Bayat, Kılıçarslan ve Şentürk, 2014) Fen bilimleri eğitimi alanında eğitsel oyunların kullanımı uygulamalarının süreç ile bütünleştirilmesi, gelecekte bu konuda yapılacak çalışmalar için önemli olarak görülmektedir. Yapılmış olan bu çalışmada fen bilimleri eğitiminde eğitsel oyunlar sayesinde, öğrenen ve öğretmen bilgilerinin saklanması, elde edilen bulguların değerlendirilip yorumlanmasının yapılması ve konuyla ilgili önerilerin ifade edilmesi şeklinde olan katkıları olacağı düşünülebilir. Özetle, alan yazında ilgili konuda yapılmış olan bilimsel çalışmalara bakıldığında fen bilimleri dersinde eğitsel oyunların başarı açısından etki büyüklüğü yüksek olarak bulunmuştur. Bu durumun sebebi olarak yapılmış olan bilimsel çalışmaların örneklem büyüklüklerinin olduğu söylenebilir. Ayrıca 21. yüzyıldaki yeni eğitim

anlayışında geleneksel yöntemlerin yerini aktif öğrenmelerin alması sebebiyle eğitsel oyunlarla ilgili bilimsel çalışmaların sayılarının artması ile açıklanabilir.

Bununla birlikte fen bilimleri dersinde eğitsel oyunlardan yararlanmanın daha çok ilkökul ve ortaokul düzeyinde olduğu görülmüştür. Bunun nedeni olarak, ilgili yaş grubundaki öğrencilerinin oyun çağında olmaları, buldukları gelişim dönemi sebebiyle birçok alandaki ihtiyaçlarını oyun yoluyla ifade etmeleri ve oyunların öğrenme sürecine aktif katılım sağlaması gibi durumlar gösterilebilir. Belirtilen bu yararlar eğitsel oyun yoluyla öğrencilere sunulabilmektedir. Meta-analize dahil edilen çalışmalara bakıldığında, 2012 yılından sonra, fen bilimleri eğitimde eğitsel oyunların kullanımına ilişkin ortaya konuşmuş bilimsel araştırmalara bakılarak ilgili konuda yapılan çalışmalarsa belirli bir artış olduğu gözlenebilir. Bu açıdan bakıldığında eğitsel oyunların fen bilimleri dersini eğlenceli kılması, soyut kavramları rahatça somutlaştırması, öğrenciler için ilgi çekici olması ve dersin yalnızca ders içi faaliyetle değil ders dışı faaliyetlerle de öğrenilmesinin son yıllarda oldukça önemli görülmesinden dolayı olduğu ifade edilebilir. Eğitsel oyunlar için benzer olan oyun temelli öğrenmelere bakıldığında da benzer sonuçların olduğu görülmektedir. Alan yazında yurt içi ve yurtdışı kaynakların oldukça yetersiz olduğu söylenebilir. Oyun temelli öğrenmeler sayesinde öğrencilerin akademik başarılarının arttığı yönünde çalışmalar bulunmaktadır (Alıcı, 2016; Babaandaç, 2013; Charlton, Williams, ve Mc Laughlin, 2005; Chuang ve Chen, 2007).

Özetlenecek olursa, fen bilimleri dersinde eğitsel oyunlardan yararlanmanın öğrencilerin akademik başarısına etkisini belirlemek amacıyla gerçekleştirilen meta-analiz çalışması sonucunda fen bilimleri dersinde eğitsel oyunların kullanımının öğrencilerin başarılarında güçlü seviyede pozitif yönde etkisinin olduğu bulunmuştur. Bu sonuçtan hareketle fen bilimleri dersinde eğitsel oyun kullanımının ders dışında fen öğrenmeye ve bireysel öğrenmeye katkı sunacağı düşünülebilir. Yapılmış olan meta-analiz çalışması sayesinde fen bilimleri dersindeki başarıda eğitsel oyunlardan yararlanmanın pozitif etkili olduğu görülmüştür. Bu sebepten fen bilimleri dersi okutan öğretmenlerin bu yöntemi sıkça kullanması öğrenme üzerindeki verimi artıracığı ve başarıyı yükselteceği söylenebilir. Fen bilimleri alanında lisans öğrenimi gören öğretmen adaylarının bu konuda gelişim göstermesi için alan derslerine eğitsel oyun dersinin eklenmesi düşünülebilir.

Bunların yanı sıra etki büyüklükleri farklı olan diğer araştırmalar da analiz edilerek farklılık yönüne ve farklılık kaynağına bakılması önerilebilir. Yüksek lisans ve doktora tez çalışmalarında meta-analize yer vermek isteyen araştırmacılar için yabancı kaynakların

taranması teşvik edilebilir. Konuyla ilgili yabancı alan yazındaki meta-analiz çalışmalarının Türkçe'ye çevirisi yapılabilir. Fen bilimleri dersinde eğitsel oyunların başarıya etkisini ele alan yabancı kaynaklar da dahil edilerek kıyaslama yapılabilir. Fen bilimleri dersinde eğitsel oyunların başarıya etkisine ilişkin yapılmış olan araştırmaların çoğunluğunun nicel yöntemle yapılmış olduğu görülmektedir. Gelecekte yapılacak olan çalışmalarda nitel ve karma yöntemlere daha çok yer verilebilir. Farklı yöntem ve farklı örneklem gruplarıyla farklı sonuçlar elde edilebilir. Bu sayede alan yazına katkı sunulabilir. Fen bilimleri dersi için eğitsel oyunların başarı yönünden etkisine bakılmıştır. Bu alan kapsamı genişletilerek tutum, ilgi, yaratıcılık vb. konularda meta-analiz çalışmaları ortaya konabilir. Fen bilimleri dersinde eğitsel oyunların başarıya etkisinin gelecekte de başka araştırmacılar tarafından incelenmeye devam edeceği düşünülmektedir. Bu çalışmanın tekrarı yeniden sağlanabilir. Eğitsel oyunlarla ilgili yapılan çalışmalar, yalnızca fen bilimleri dersindeki başarı için değil diğer derslerdeki başarı için de yürütülmelidir.

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Ek-1

Meta-analize Dahil Edilen Bilimsel Çalışmaların Listesi

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**ENVIRONMENTAL IMPACT OF ANTHROPOGENIC SOURCES: STIRPAT
MODEL ANALYSIS FOR BANGLADESH**

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Abstract

Background: Recently, global warming has been the most concern issue due to dramatically increasing the carbon dioxide (CO_2) emission all over the world. It is considered that CO_2 is the principal source for global warming. Bangladesh has experienced a rapidly growing population, expanding economy, increasing industrialization, and migration of rural people to urban areas to improve their livelihood. At the same time, carbon emission has been rising due to an increase in anthropogenic sources or human activities. Objective: In this study, we attempted to examine the factors responsible for the impact of carbon emissions on the environment of Bangladesh. It is also investigated to determine the nature and direction of the relationship among the variables under study. Methodology: The study applied the STIRPAT model with time series data available from 1972 to 2014 while the study was conducted. These data are collected from the World Bank Database. Findings: The study's findings showed that in the long run, working-age population, GDP per capita, and industrialization significantly affect carbon emissions. The short-run results suggest that only industrialization significantly affects carbon emissions. The findings also show that urbanization has no impact on carbon emissions both in the long run and in the short run. Policy implication: Considering the environmental impact, the authority should take proper steps to control the carbon emissions on the environment of Bangladesh.

Keywords: Anthropogenic Sources, Environment, Carbon Emission, STIRPAT Model, Bangladesh.

Introduction

In recent years, alarmingly increasing global warming due to climate change is the most important concerning issue in the world. Climate change has the evidence for increasing sea levels, rising temperature in the world, and the degradation of ecological systems (IPCC Report 2014a, b; Azizalrahman & Hasyimi, 2018; Solomon, Qin, Manning, Averyt, & Marquis, 2007). According to the world database, we know that human activities have a significant contribution to climate change. It is considered that carbon dioxide (CO_2) is the principal source for global warming, emissions of which have grown rapidly in the last century. Due to human activities, mainly by the use of fossil fuels consumption such as oil, gas, coal, etc. as the main sources of power for electricity generation, manufacturing activities, transport, and consumption of goods and services caused a significant increase in the level of (CO_2) in the atmosphere. However, such activities are directly connected with economic growth of a nation (Fischer-kowalski, 2016).

As Bangladesh is the developing country, economic activities are rapidly growing in the whole country. It also has a dense population in which maximum people want to migrate from rural to urban areas for searching work and economics and social development or educational purpose. As a result, it creates high pressure on the urban areas which impact on the environment. Since Bangladesh is a growing economy, manufacturing industry and service sectors are increasing day by day and growing income of people which increased demand for consumer goods and services.

The purpose of the study is to examine the increasing of carbon-dioxide gas in Bangladesh as a result of the intervention of the population, affluence, and technology within industry and urbanization. The carbon dioxide is a measure of environmental impact. It estimates environmental degradation from the consumption of goods and services, migration of people from rural areas to urban areas for economic development and social development, increasing technology used in industrial sectors. That's why there is a systematic relationship among the variables which are influenced each other. In this study, we used an extended STIRPAT model as a measurement of environmental impact and applied time series data which are secondary collected from World Data Bank (2018). The time duration is from 1972 to 2014 and country for Bangladesh.

Methodology

To measure the environmental impact we have approved is the carbon-dioxide gas (Cramer 1998; Dietz & Rosa 1997; Shi 2003; and York et al. 2003a,b). Using this estimation to organize

our analysis, we adopted IPAT means the impact, population, affluence and technology, this framework was first suggested in the early 1970s Ehrlich & Holdren (1971) as part of an ongoing controversy on the driven factors of environmental impact. This measurement of environmental impact has also previously been adopted by (Shi 2003; York et al. 2003; Fan 2006). It is found that it still widely used as an orienting proposed. The framework includes the key feature of human intervention of environmental change into a model is as follows:

$$I=P*A*T------(1)$$

Where (I) is the environmental impact, (P) is population, (A) is Affluence or consumption per capita, and (T) is Technology or impact per unit of economic activity which is determined by the technology utilized for the production of goods and services and by the culture and social organization that estimates how the technology is integrated, (*) presents the multiplied the independence variables.

Dietz & Rosa (1994) proposed the STIRPAT model as a reformulation of the IPAT model to overcome this limitation. STIRPAT states that Stochastic Impact by Regression on Population, Affluence and Technology (Shi 2003; York et al. 2003; Fan 2006; Martínez-Zarzoso 2007; Martínez-Zarzoso & Maruotti 2011; Tian & Da Costa 2014; Li & Lin 2015; and Lin 2016). In this study we used variables of the STIRPAT model which are carbon-dioxide (CO₂) as an environmental impact, the structural working-age population for population variable, gross domestic product (GDP) for affluence, and industry added value and urbanization as a proxy of technology.

Thomas Dietz & Rosa (1994) York (2007); Lin (2017) suggested the STIRPAT model (stochastic impact by Regression on Population, Affluence, and Technology) to overcome this major limitation. That is the stochastic or random form of IPAT model which is known as STIRPAT. This model is expressed as follows;

$$I = \beta_0 P_t^{\beta_1} A_t^{\beta_2} T_t^{\beta_3} e_t \quad (2)$$

By taking logarithms;

$$\ln I_t = \beta_0 + \beta_1(\ln P_t) + \beta_2(\ln A_t) + \beta_3(\ln T_t) + e_t \quad (3)$$

Where t is the year; β_0 is the constant; β_1 , β_2 & β_3 are the coefficients of P, A, & T respectively, e is the error term. The study conducted the various test and chose the best model under the time series data to estimate the impact of the carbon emission due to effect of population, Affluence and Technology factors.

The STIRPAT model restructured from the extended IPAT model as the stochastic form, which is known the extended STIRPAT model (Dietz & Rosa 1997). This STIRPAT model is as following:

Adoptive equation with log used in this study under time series data:

$$\ln CO_{2t} = \beta_0 + \beta_1(\ln POSG_t) + \beta_2(\ln GDP_t) + \beta_3(\ln IND_t) + \beta_4(\ln URB_t) + e_t$$

(4)

Where $\ln CO_2$ is the log of carbon emission per ton; $\ln POSG$ is the log of population of working age structure; $\ln GDP$ is the log of GDP per capita; $\ln IND$ is the log of industry (value added to GDP); $\ln URB$ is the log of urban people percentage of total population; and e is the log of residual which are not included in these variables.

Findings

The OLS results

The results of OLS regression model, long-run equation, show a positive relationship between Carbon-dioxide (CO_2) emission and working-age population, per capita GDP, industry value added to GDP but the result of urbanization shows statistically insignificant to impact on the Carbon-dioxide (CO_2) emission. According to result, in long-run, a 10 percent increase in population size will lead to 10.17 percent increase CO_2 emission on average in the environment of Bangladesh, and it is the highest impact on the CO_2 emission. These results are found statistical significance at 1% level. A 6.67% increase in the CO_2 emission concentration in the environment due to a 10% increase in GDP per capita in the economy of Bangladesh. Its impact on the environment is also great, and the result is statistically significant at 1% level of significance. Besides, a 10% rise in industry value added to GDP leads to a 1.95% increase carbon-dioxide (CO_2) emission, on average in the long run in the environment of Bangladesh. This model is the best fit as the adjusted R^2 value is very high (0.993668), as well as the explanatory variables, can be explained dependent variable by 99.37%. F-statistic value is also high, and the corresponding probability value is much low.

Table 1: OLS estimation

Method: Least Squares Regression				
Sample: 1972 2014, Included observations: 43				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPOSG	1.016987	0.127260	7.991405	0.0000
LGDP	0.666566	0.074193	8.984241	0.0000
LIND	0.195476	0.075436	2.591283	0.0135
LURB	0.041506	0.127660	0.325127	0.7469
C	-24.86916	1.824707	-13.62912	0.0000
R-squared	0.994271	Adjusted R-squared		0.993668
Log-likelihood	71.97466	Std.Error of regression		0.048269
F-statistic	1648.688	Durbin-Watson stat		1.355276
Prob(F-statistic)	0.000000	Dependent Variable		Log of CO ₂
Sum squared resid	0.088537			

The Error Correction Model (ECM)

the results of the ECM model, a short run equation model, clearly states that the ECT coefficient (E (-1)) is negative and it is found statistical significance. Thus, the deviations in short-run are significant. It is indicated that both in long-run and short-run relationships are stable. A 10% increase in Industry value added to GDP leads to a 2.27% increase in Carbon-dioxide (CO₂) emission concentration, on average in short-run. It appears from the above results that the industry value added to GDP variable and Carbon-dioxide (CO₂) are positively correlated from 1972 to 2014 and has a statistically significant at 5% level. All other variables are statistically insignificant without error term. Since all short-run coefficients are statistically insignificant except industry, this indicates that there is a short-run causality between the variables. It implies that disequilibrium adjustment rate in a year is 64.62% that also known as the speed of error correction.

Table 2: ECM outputs

Method: Least Squares Regression Sample (adjusted): 1973 2014 Included observations: 42 after adjustments				
Variables	Co-efficient	Strd. Error	t-Statistic	Prob.
D(LPOSG)	-0.590727	1.505585	-0.392357	0.6971
D(LGDP)	0.036392	0.366782	0.099221	0.9215
D(LIND)	0.227012	0.057993	3.914466	0.0004
D(LURB)	-0.058945	0.346514	-0.170109	0.8659
E(-1)	-0.646247	0.151604	-4.262738	0.0001
C	0.060461	0.049899	1.211650	0.2335
R-squared	0.512206	Adjusted R-squared		0.444457
Log-likelihood	74.55083	S.E. of regression		0.044295
F-statistic	7.560328	Sum squared resid		0.070634
Prob (F-statistic)	0.000061	Durbin-Watson stat		1.876161
Dependent Variable	D(LCO ₂)			

Conclusion

Carbon-dioxide is the dominant fact to increase global warming in the world. It creates various hamper in the environment such as growing disasters, rising water level of the sea, damaging ecological system and increasing temperature in the world, etc. In recent year, the temperature of the weather also remarkably has increased in Bangladesh. The population growth rate of Bangladesh is at 1.37% and GDP per capita is at USD 1677, and the GDP growth rate is at 7.65% in 2018 according to BBS. The industrial sector contribution to GDP is at 33.71% which is the growth rate at 11.99%. It indicates that industrial sectors are increasing and production is also increasing which ultimately raising the income level of the population of Bangladesh.

The study is used time series data duration 1972 to 2014 which collected from World Data Bank (2018) to analyze the environmental impact of Bangladesh based on the extended IPAT model or the STIRPAT model. Here we included five variables Carbon-dioxide (CO_2) emission, working-age population, GDP per capita, industry value added to GDP and urban population (percentage of total population) to measure the impact of the variables on Bangladesh's environment.

This study adopts the ADF unit root test and the Johansen approach which is widely used to co-integration along with OLS model and ECM model to reveal both the long run and the short-run relation between the variables. From the empirical result of this study, we found that the

working-age population share has a tremendous positive relationship to the carbon-dioxide emission, which is the responsible for the environmental impact of Bangladesh, on average, in the long run. The working-age population has the most significant effect due to this part of the population being the largest income group. An increase in income may lead to rising consumption. It is related to GDP per capita with great effect of increasing carbon dioxide (CO_2) emission on the environment. The GDP per capita and the industry both have a significant impact on increasing carbon dioxide (CO_2) emission on the environment. Increasing GDP per capita means increasing the number of production and increasing production ultimately increases industry in our country. And thereby, an increase in the use of fuel, gas and other fossil resources in industry sectors produces the increasing demand for consumption of product, which has the contributes to emitting carbon dioxide into the environment. But the, urbanization does not statistically significantly to impact carbon dioxide which means that urbanization has no contribution to the environment of Bangladesh, on average, in both the long run and short run.

ECM model suggests that all explanatory variables respond to correct long-run disequilibrium if the system is shocked. This study finds a high value (-0.6462) of the error correction term. Various diagnostic tests are performed regarding the OLS regression model and the ECM model. The analysis of the study suggests that the results are more robust and the models are the best fitted. On the contrary, the industry has contributed to generating carbon dioxide in Bangladesh's environment, on average, in both the long run and short run. This is because industry can initially cause carbon dioxide gas, which instantly impacts the environment. But on average, other variables have no significant impact on the environment in the short run because the population, income level, and urbanization initially cannot generate carbon dioxide so much, which may instantly impact the environment. Finally, the result indicated that industry would increase, and income level and consumption would increase by the working-age population, which would raise the emission of carbon dioxide into Bangladesh's environment in the future. In this study, we did not include all variables that may impact Bangladesh's environment. So, there is an option for more research in the future.

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THIRD SECTOR ECONOMY PUBLICATIONS: A BIBLIOMETRIC ANALYSIS

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Abstract

The third sector economy comprises non-profit, voluntary, and social organizations of an economy that mostly remain out of mainstream economics research. The present study is the first-ever attempt to review the literature using a quantitative bibliometric approach. Along with the brief content analysis, the study used historical analysis, illustration of keywords co-occurrence network, thematic map and three-field plot sketching and importantly, analyses of most contributing sources, countries, and authors. The results of the analyses reveal that the mainstream studies on third sector economy come from various social sciences other than economics. The micro and macroeconomic aspects of the third sector economy are yet to be explored, although both keyword and thematic analyses indicate that some studies incorporated 'social economy' as a sub-stream. Based on the findings of the study, the third sector economy could be further accentuated by mainstream studies in economics.

Keywords: Non-profit Sector, Third Sector Economy, Third Sector Organizations, Social Economy, Voluntary Sector

JEL Codes: A12, A13, A31, B55, C02.

Introduction

The voluntary sector (e.g. Non-government organizations) of an economy is categorized as the third sector (Jasinska-Biliczak, 2019). Besides private and public sectors, the voluntary sector contributes significantly to every economy (Amendola, Garofalo, & Nese, 2011). When both market and government fail, the voluntary sector could prove to be pivotal to meet the market demand (Lacerda & Vieira, 2011). However, the mainstream economic analysis does not incorporate this sector into the macroeconomic performance of an economy (Hasan, 2008).

According to the economics concerning human welfare maximization, identification of the nature of ongoing research in the field of third sector economy is crucial. Over the past two decades, multiple researchers (Arvidson, 2009; Garkisch, Heidingsfelder, & Beckmann, 2017; McCabe, Phillimore, & Mayblin, 2010; Moxham, 2014) attempted to review the literature on third sector economy. Among them, Arvidson (2009) studied the literature on third sector organization (TSOs), academics, and funding agencies to outline the way evaluation is experienced, discussed, and practised. The paper addresses the difficulties involved in negotiating structures of evaluation and its impact.

On the other hand, Garkisch et al. (2017) conducted a systematic literature review (SLR) that records only the academic disputes on TSOs and migration issues. Importantly, McCabe et al. (2010) present the literature review results which elucidate the term 'below the radar' and its effectiveness of activities in community-based organisations. The study further reviews the literature to discover the role, nature, and focus of insignificant organisations and activities, and the difficulties they encounter. Moxham (2014) applied SLR of 55 papers on third sector organizations. The analysis of the selected papers provides a prospective methodological discrepancy between the prevalent measurement approaches including the justification for measuring the activities of TSOs.

Although informative, the above reviews failed to encompass comprehensive analysis, historical trend, and quantitative analysis of the literature. Given the limitations of existing review articles, the present study intends to analyze academic literature on third sector economy using a bibliometric approach to determine future research agenda.

This paper reviewed 118 documents published under various indexes of Web of Science (WOS) that include SSCI, A&HCI, CPCI-S, SCI-EXPANDED, BKCI-S, BKCI-SSH, CPCI-SSH, ESCI since 2000. Using bibliometric software and analytical tools, the current study reports historical analysis, the impact of multiple authors and sources in the field, topics and themes

already studied and recognizes gaps in the existing literature. The paper includes five subsections. The section underneath renders a detailed description of data exploration and the methodology used followed by the findings of bibliometric analysis. The subsequent section identifies the gaps in existing literature using the content analysis approach. Finally, the paper ends with a conclusion.

DATA AND METHODOLOGY

The study comprises every article on third sector economy published in the Web of Science (WOS) database from 2000 to 2020 retrieved on 05 February, 2021. The reason behind the selection of WOS database for this study is basically, the number of journals published in social sciences from developed countries are more available in WOS database than SCOPUS database (Mongeon & Paul-Hus, 2016). For an unbiased data analysis, the study used the SALSA technique for data collection (Papaioannou, Sutton, Carroll, Booth, & Wong, 2010). SALSA is an acronym that stands for Search, Appraisal, Synthesis, and Analysis

At the third stage- synthesis stage, we restricted the search to “Articles” and the languages to “English” only. We prepared a list of articles on third sector economy from the titles and abstracts excluding any irrelevant article previously selected due to the presence of searched words in it. Finally, the filtered data set stood at 118 documents.

The fourth stage- analysis stage included both bibliometric and content analyses of the 118 documents. Bibliometric analysis of the study relied on Microsoft excel, VOS viewer software, and bibliometrix package of R programming for visualization and presentation. Lastly, content analysis was used to recognize the gaps in the existing literature.

The initial search (data collection) included all the possible documents published under the entire database of Web of Science in the field of the third sector. For this, we used "Third sector" OR "voluntary sector" OR the "Non-profit sector" as the title of the document. It generated a total of 1496 documents. We boiled down from the extended search of the third sector to the third sector economy. To narrow down the search and to avoid missing any relevant

document, we used the key terms “Economy” OR “Economic” OR “Social” in the titles, abstracts, and keywords of the entire WOS database which led to 569 documents.

The second stage-appraisal stage further corrected the searched data of the first stage. Our search output displayed a wide variety of publications in different subject areas and years. Before 2000, the annual number of publications was only 1 or 2. For this, we obtained data for the years 2000 to 2020 in the fields of “Economics”, “Public Administration”, “Social Issues” OR “Social Sciences Interdisciplinary”. Consequently, the number of documents reduced to 228.

At the third stage- synthesis stage, we restricted the search to “Articles” and the languages to “English” only. We prepared a list of articles on third sector economy from the titles and abstracts excluding any irrelevant article previously selected due to the presence of searched words in it. Finally, the filtered data set stood at 118 documents.

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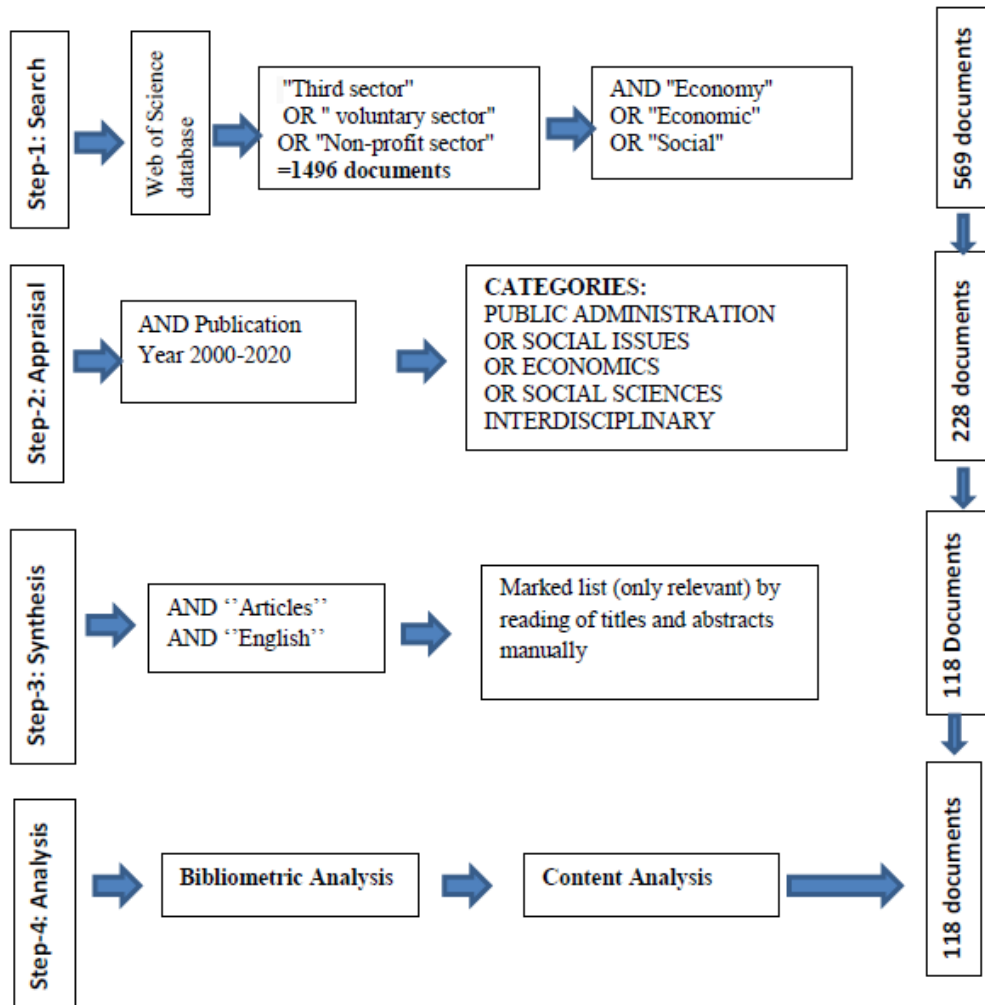


Figure 1: SALSA Steps of Data Selection and Analysis

BIBLIOMETRIC FINDINGS AND DISCUSSION

Historical Series Analysis

Research on the third sector economy has risen over the past two decades. **Hata! Başvuru kaynağı bulunamadı.** illustrates the trends in scientific production in Web of Science (WOS) since 2000 with the highest peak in 2016. The graph depicts the peaks and troughs in the number of scientific productions over the years between 2009 and 2012, the production only kept increasing. With a sharp decline in 2013, the number of publications continued a rising trend until 2016 eventually reaching a peak of 14.

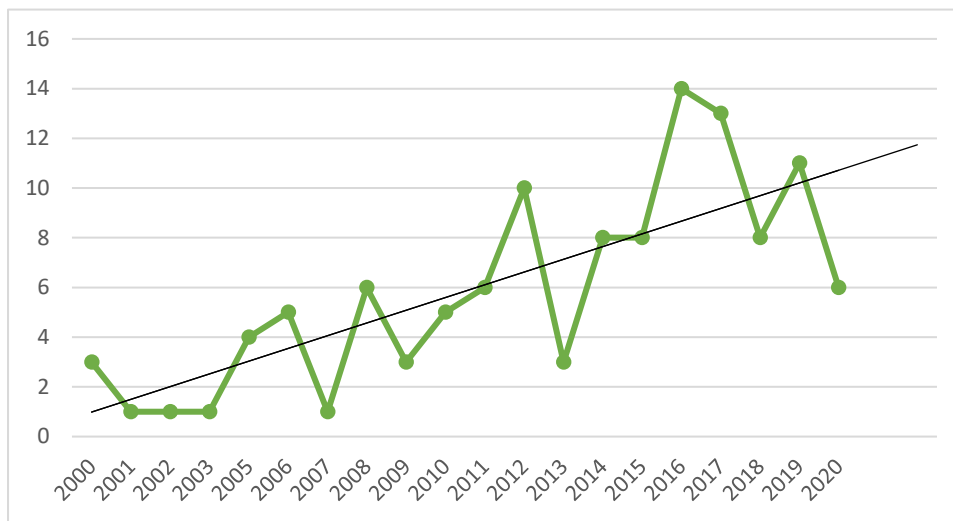


Figure 2: Annual scientific production

Figure 3 illustrates the trends in citations. Here N shows the number of articles published each year. The mean total citation (TC) per article dramatically increased in 2005 and reached a peak of 100 citations in 2007.

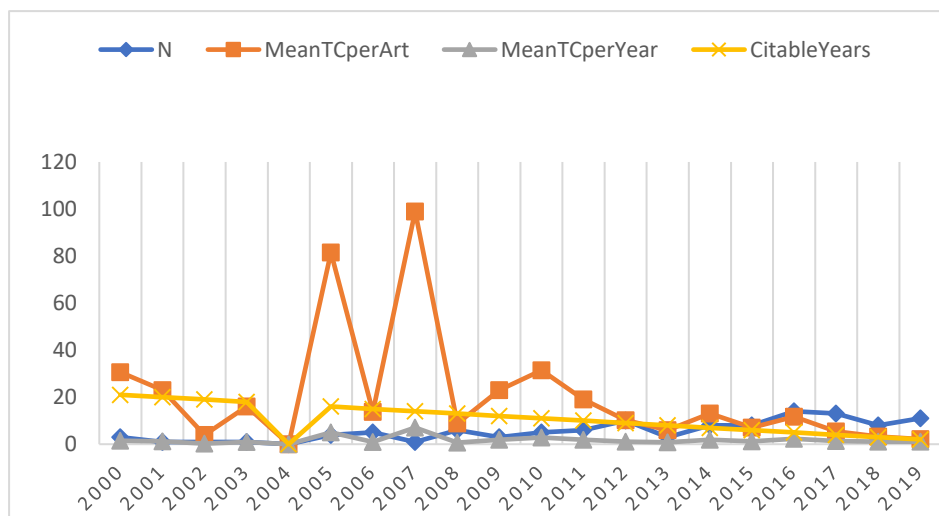


Figure 3: Citations Trend

Later on, the mean TC per article maintained fluctuations over the years with a sharp decline in the recent years. The mean total citation per year declined in the contemporary years. Moreover, the Number of citable years followed a continuous declining trend over the years.

Authors and Their Productivity

A total of 211 authors contributed to the publication of 118 documents considered in this review. However, only a small percentage of the authors have more than one publication as

reported by Lotka Law (Lotka, 1926). In any given field, it labels the frequency of publication by authors. Figure -4 illustrates the findings of this law. The publications in this field are widely diversified and lack specialization since more than 94% of the authors possess only a single publication. Nearly 5% of the authors issued 2 publications while only one author out of 211 has 3 publications (Valentinov, 2008, 2009, 2012).

Hata! Başvuru kaynağı bulunamadı., the top authors' production over the years, represents only 11 authors with more than one publication. The Intensity of the blue colour is proportional to the number of citations of each article. McCall C. contributed to two articles (McCall & Itcaina, 2017; McCall & Williamson, 2000) with an interval of 17 years between the two publications. However, other top authors have relatively two consecutive publications in recent years (Halford, Leonard, & Bruce, 2015; Itcaina, 2019; Leonard, Halford, & Bruce, 2016; McCall & Itcaina, 2017). Such sequential publications indicate a more concentration by some authors in this field.

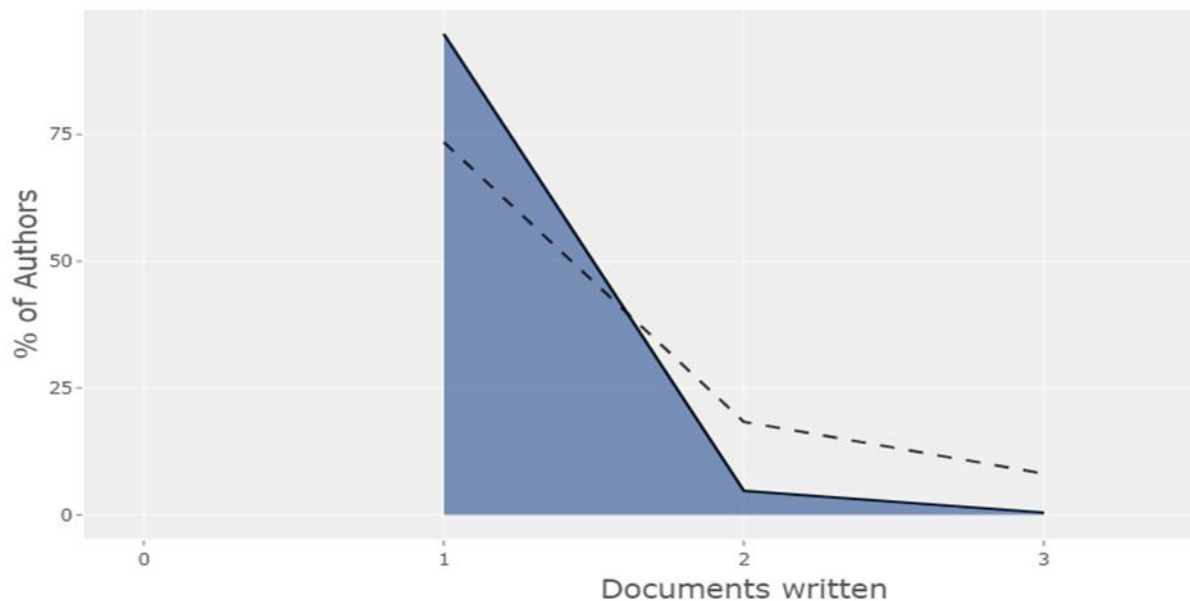


Figure 5: Top-authors' Production over Time

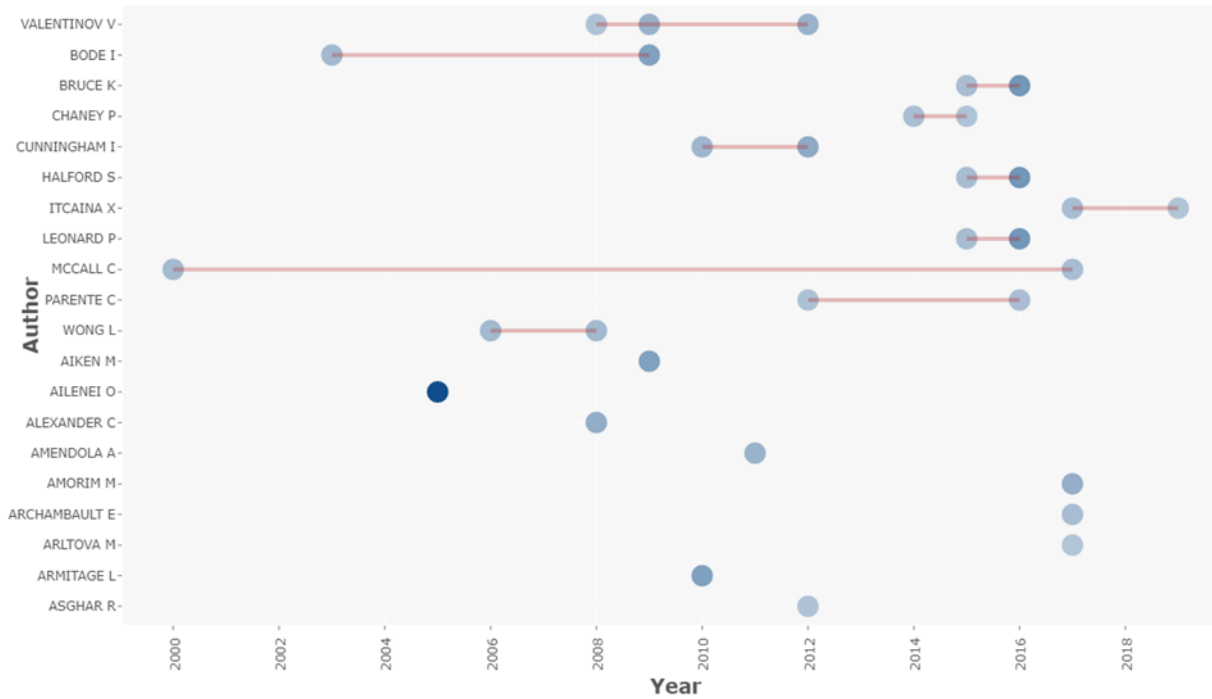


Figure 4: The Frequency Distribution of Scientific Productivity (Lotka Law)

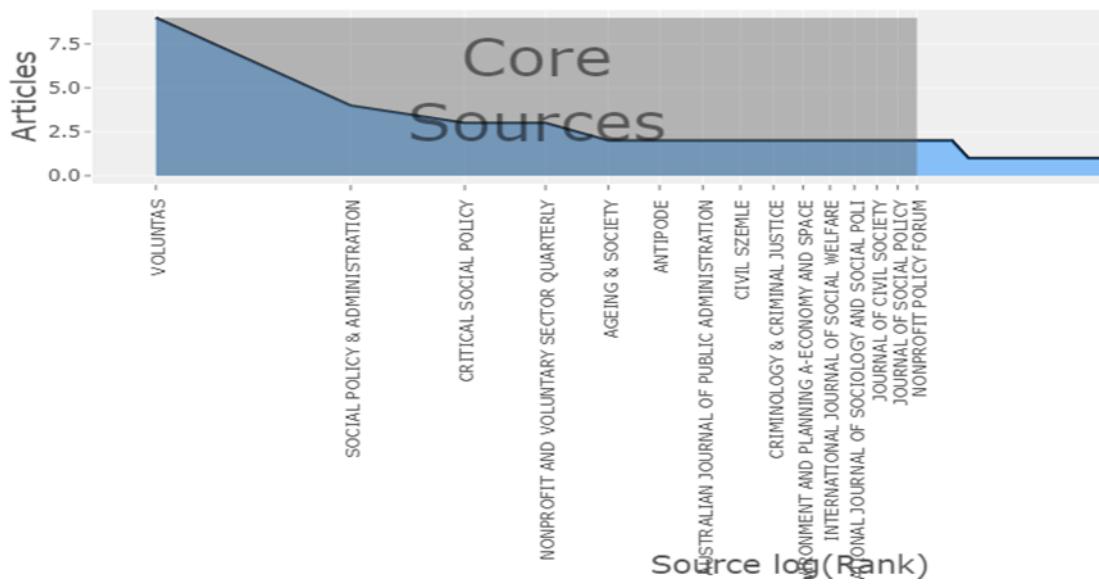


Figure 4: Source Clustering through Bradford's Law

Most Impactful Sources

According to the findings of Bradford's law (Bradford, 1934), this field consists of 15 core journals that publish one-third of the total collection as indicated by the shaded area in

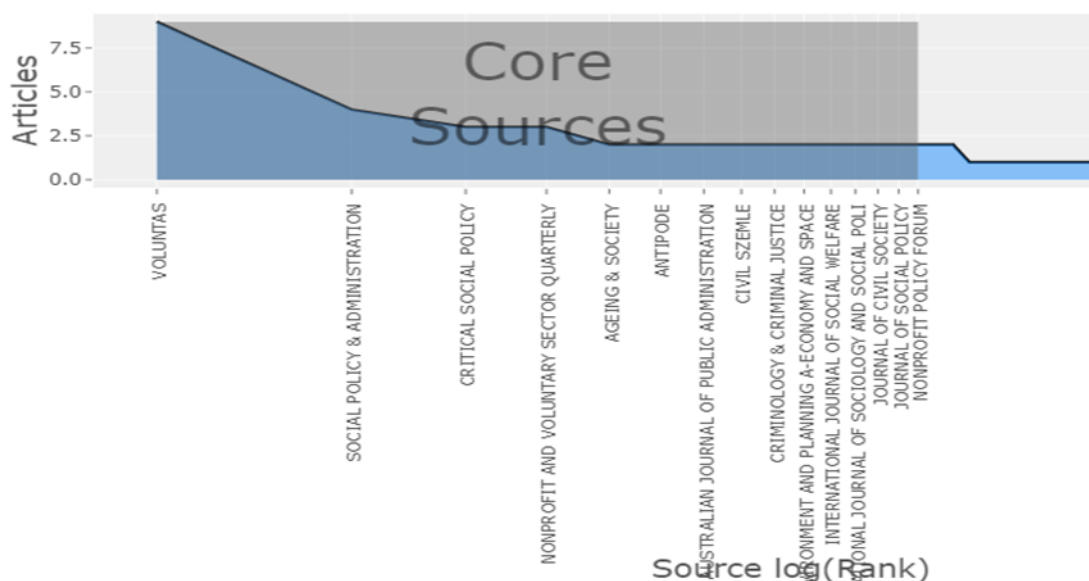


Figure 4. Of which, 9 articles (22%) come from Voluntas followed by Social Policy and Administration (9%) and Critical Social Policy (7%) respectively. The rest of the two-third comes from 91 different sources.

From the perspective of citation and h-index, Voluntas is also at the top with 132 total global citations (TGC) with h-index 5 (Table 3). That is 5 articles of the journal have been cited at least 5 times. The second source in this field is the journal of Social Policy & Administration, a relatively older journal that started publication in the year 2002. With 4 articles, it has 56 citations and an h-index of 3. However, the third journal, Critical Social Policy, with 80 total citations possesses h-index 3 and 3 publications. More importantly, none of these journals belongs to the field of economics.

Table 3: Sources Impact

Sl. No.	Source	h_index	TGC	NP	PY_start
1	VOLUNTAS	5	132	9	2010
2	SOCIAL POLICY & ADMINISTRATION	3	56	4	2002
3	CRITICAL SOCIAL POLICY	3	80	3	2005
4	NONPROFIT AND VOLUNTARY SECTOR QUARTERLY	2	32	3	2003
5	AGEING & SOCIETY	2	4	2	2015
6	ANTIPODE	2	145	2	2005
7	AUSTRALIAN JOURNAL OF PUBLIC ADMINISTRATION	2	43	2	2006
8	CIVIL SZEMLE	0	0	2	2017

9	CRIMINOLOGY & CRIMINAL JUSTICE	2	24	2	2013
10	ENVIRONMENT AND PLANNING A-ECONOMY AND SPACE	2	36	2	2015

Although Antipode has 145 citations, it has h-index 2 based on the collected sample. So, from the global citation's perspective, Antipode, Voluntas, Critical Social Policy, Social Policy & Administration journals are among the top journals with published articles on third sector economy. However, regarding local citations, Voluntas remains at the top journal with 112 local citations in the field of the third sector (

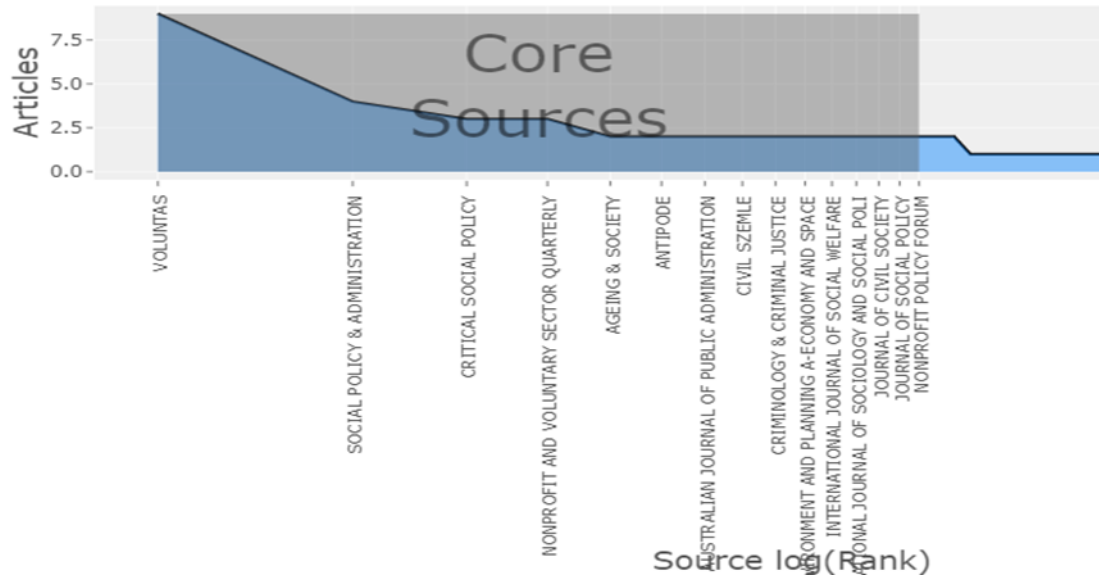


Figure 4 and **Hata! Başvuru kaynağı bulunamadı.**) Nonprofit Sector Research journal is at the 2nd position with 74 local citations.

Authorship Analysis Based on Countries

The country-specific scientific production analysis shows that the majority of the publications come from UK followed by the USA and Portugal. A total of 32 countries contribute to the publication of 118 documents out of which 66 come from the UK, 14 from the USA and 11 from Portugal. Australia and Spain have 9 publications each. Six countries have got one publication only.

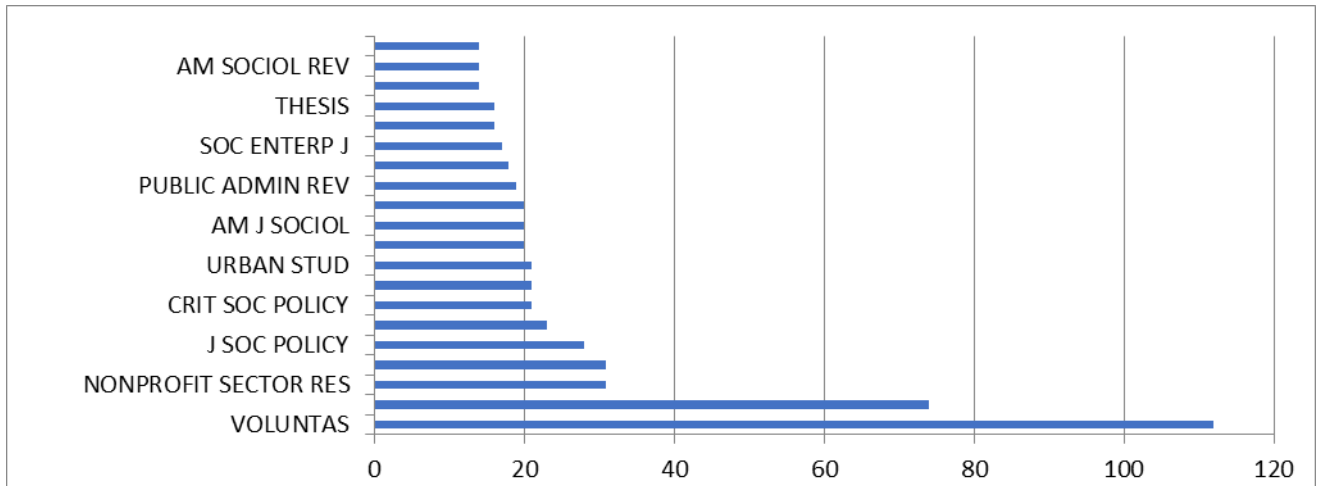


Figure 7: Local citations of sources

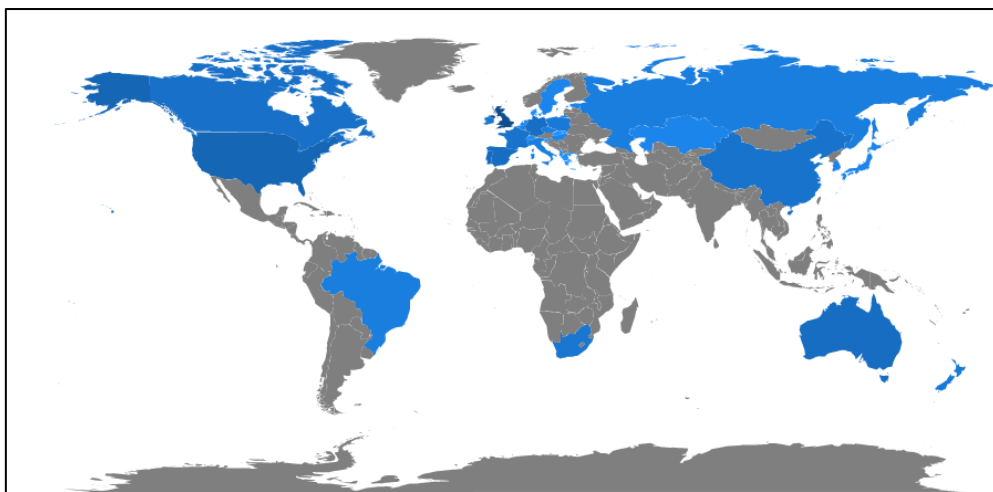


Figure 5: Country Specific Scientific Production

Intensity of blue color is proportional to number of publications.

However, there are some collaborative publications in each field. As in Figure 7, among the top 20 countries, UK is in the top position to have Single Country Publications (SCP) with an MCP (Multiple Countries Publications) ratio of 0.0488. More specifically, out of 41 corresponding authors' from the UK, only 2 publications have MCP collaboration. Out of a total of 11 publications from the USA, 7 are SCP and 4 are MCP. Eventually, the MCP ratio for the USA is 0.36. The MCP ratio is highest for Korea, out of only 2 publication, both are MCPs.

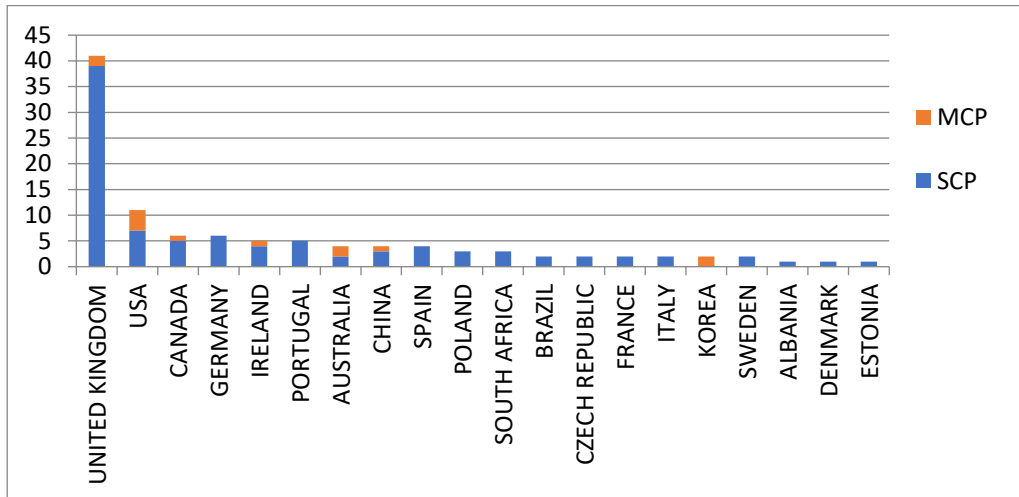


Figure 7: Most Relevant Countries by Corresponding Authors.

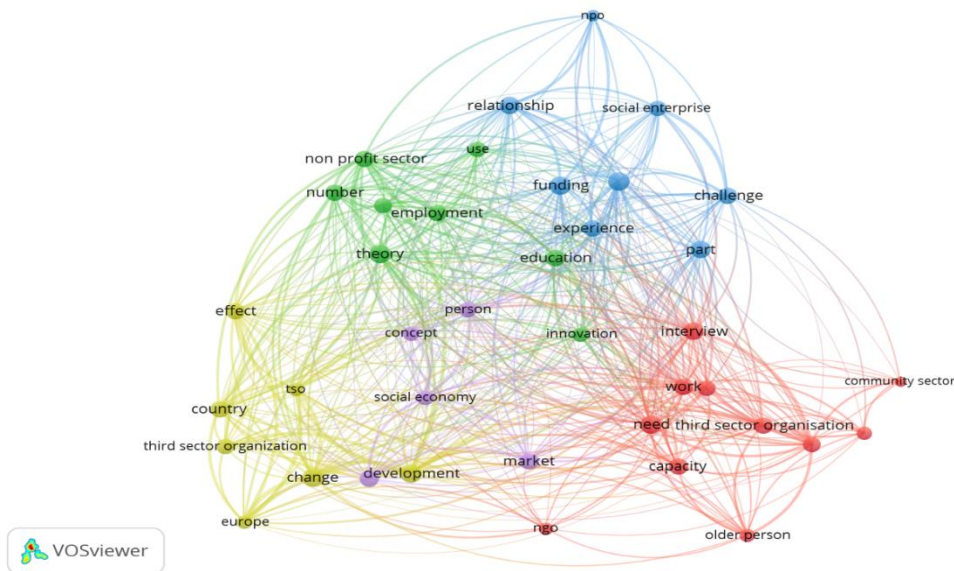


Figure 6: Keywords Co-occurrence Network

Keywords Co-occurrence Network

Keywords Co-occurrence Network displays the links among the keywords and the relative link strengths. In the co-occurrence network in Figure 6, the thickness of lines signifies the strength of the connections among keywords and the closeness of keywords.

However, the size of the node reflects the relative weight of a keyword. The keyword co-occurrence analysis here produces a total of five clusters that include 39 keywords, 523 links and the total link strength stood 3451.

The largest of these clusters (11 keywords) is coloured red and is led by the keywords ‘partnership’ followed by ‘need’, ‘interview’, ‘work’ and ‘third sector organization’. Most of

the keywords in this cluster are related to the structural issues of third sector organizations. The second-largest cluster of keywords (8 keywords) is coloured green and connected to the non-profit sector. This cluster is led by the keyword ‘non-profit sector’, which has the largest number of links and the total link strength is 321. The third highest cluster with 8 keywords is led by ‘research’ followed by ‘relationship’ and ‘funding’. This cluster is coloured blue and the majority of the keywords in this node are connected to research issues. The fourth cluster (seven keywords), led by the keywords: ‘development’ and ‘change’, is connected to concepts that are linked to the development of the third sector. Finally, the fifth cluster coloured purple has 5 keywords led by ‘social economy’.

Thematic Map Analysis

We can examine themes according to their position in the quadrants using the thematic map, a very instinctive plot. The upper-right, lower-right, lower-left, and upper-left quadrants represent motor-themes, basic themes, emerging or disappearing themes, and very specialized/ niche themes respectively (Cobo, López-Herrera, Herrera-Viedma, & Herrera, 2011). The thematic map analysis is depicted in Figure 8.

Based on 250 author’s keywords, the thematic map shows the motor themes are led by ‘social economy’. Other themes in the first quadrant are the voluntary sector, non-profit, European Union and social enterprise. The lower right quadrant presents six basic themes of which third sector and civil society are the major themes. As per the lower left quadrant, the emerging or declining themes include, ‘third sector organizations’, ‘governance’ and ‘austerity. However, there is no niche theme as shown by the fourth quadrant.

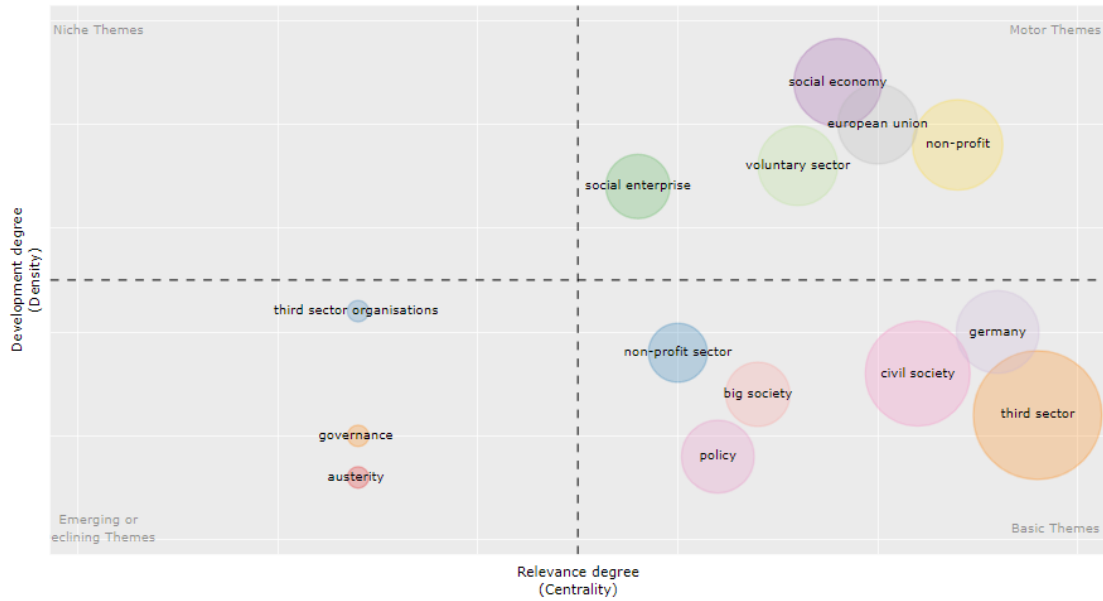


Figure 8: The Thematic Map Analysis

Three-fields Plot

The three-field plot is a dynamic science and graphic mapping tool that helps to summarize the entire bibliometric study in one figure and demonstrates proportionality among the contents. The three-field plot represents the linkage among three different meta-data. Figure 9 shows the three-field plot among keywords plus (left column), authors' keywords (middle column) and the sources (right column). There is a difference between authors keywords and keywords plus in the WOS database (Zhang et al., 2016). Author Keywords, those provided by the original authors, and Keywords Plus, those extracted from the titles of the cited references by Thomson Reuters. Keywords Plus, generated by an automatic computer algorithm, are words or phrases that appear frequently in the titles of an article's references and not necessarily in the title of the article or as Author Keywords (Garfield, 1990; Garfield & Sher, 1993).

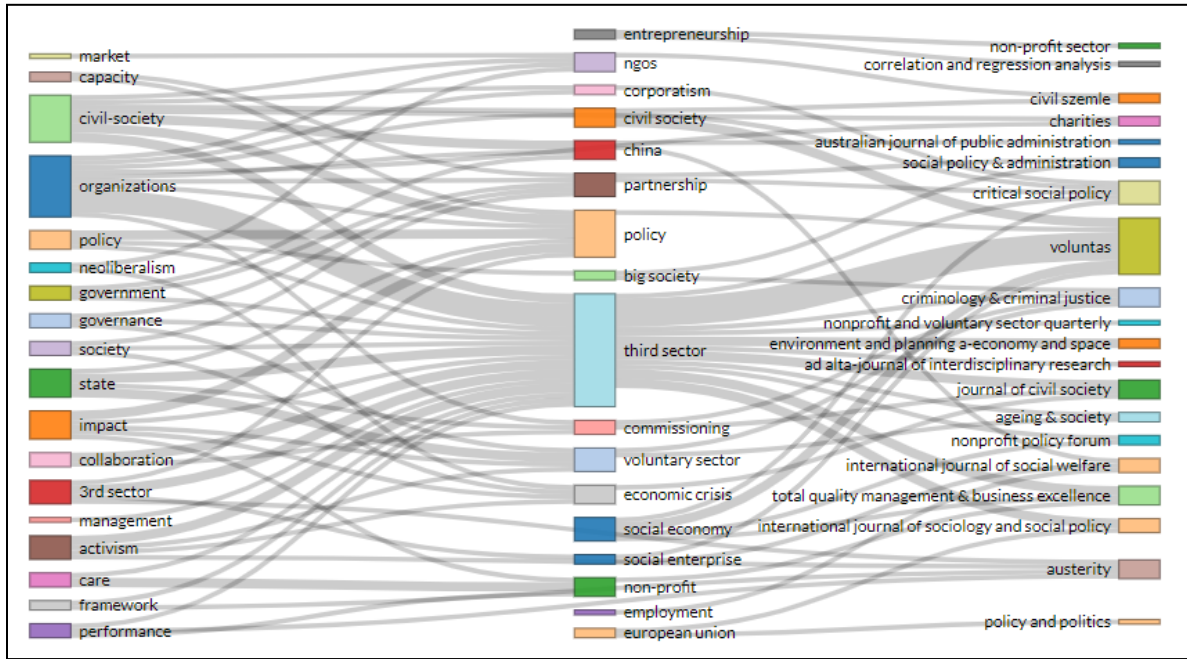


Figure 9: The Three-fields Plot

Among the authors' keywords, the 'third sector' is mostly used followed by 'policy', 'voluntary sector' and 'social economy'. However, keywords plus shows that 'organizations', 'civil-society', 'impact', 'state' and 'activism' are the widely used keywords. As discussed earlier, 'Voluntas' is the leading source in this field. From the economic perspective of the third sector, 'social economy', 'economic crisis', 'non-profit', 'employment' are some of the keywords used by the authors repeatedly. Likewise, among the sources, 'correlation and regression analysis' and 'environment and planning an economy and space' are relatively connected to economics. The three-fields plot thus identifies the major focus of the research publications in the third sector economy. The third sector consisting civil society organization is mostly studied from its organizational structure, functions, policy and social contribution perspective rather than economic aspects. Eventually, future research agenda in this field could relate to macroeconomic issues, entrepreneurship, employment, market failure aspects.

CONTENT ANALYSIS AND FUTURE RESEARCH DIRECTIONS

Categories of Third Sector Economy Literature

All the 118 publications under the third sector economy can be categorized into 13 different categories. **Hata! Başvuru kaynağı bulunamadı.** summarizes the categories with corresponding frequency distribution. Most of the publications (almost one-fourth) are related to various social issues.

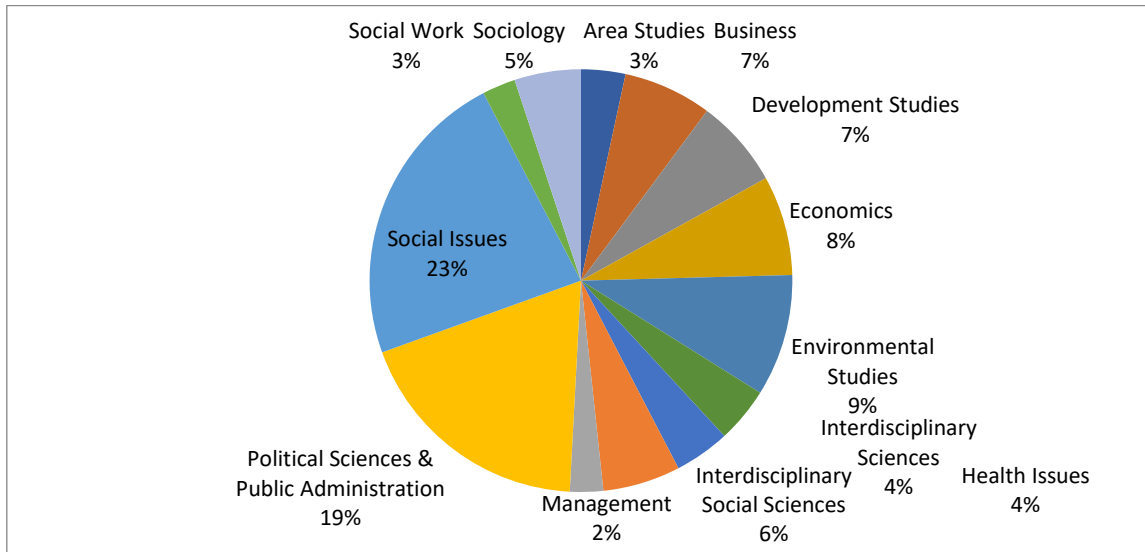


Figure 10: Sub-streams of Third Sector Economy Literature

Figure 10 shows the categories in percentage. Nearly one-fourth (23%) of the publications are related to various social issues. However, almost another one-fifth (19%) documents relate to political sciences & Public administration. Area studies, social work, health issues, interdisciplinary sciences and sociology cover 3%, 3%, 4%, 4% and 5% respectively.

The second-largest category is connected to the political science & public administration field having 22 publications (19 documents). On the contrary, environmental studies stood at the third position with 11 publications, far behind the top two categories. Economics, however, is at the fourth position with only 8 publications followed by business and development studies that have 7 publications each. Eventually, only insignificant research is related to economics.

Table 4: Various Streams of Third Sector Economy Literature

Publication Category	Number of Documents	Percentage	References
Area Studies	4	3%	(Jing, 2015), (Hasan, 2008),(Itcaina, 2019),(Spanova, Nakipova, Pestunova, Mukatay, & Jazykbayeva, 2020)
Business	8	7%	(Petrova, 2019), (Loosemore, 2015), (Vermeer, 2008), (Wiggill, 2014), (Sotos & Garcia, 2012), (Hodges & Howieson, 2017),(de Avila & Bertero, 2016),(Geok & Geok, 2018)
Development Studies	8	7%	(Valentinov, 2008), (Wallace & Cornelius, 2010), (Valentinov, 2012), (McMullin, 2019), (Rodger, 2012), (Aiken & Bode, 2009), (Harris, Harris, Hutchison, & Rochester, 2002), (Eden & Bear, 2010)
Economics	9	8%	(Gatskova & Gatskov, 2016), (Paiva & Carvalho, 2018),(Spicka, Arltova, Boukal, & Smrcka, 2017),(Dominowska, 2016),(Pevcin, 2012),(Haugh & Kitson, 2007),(Hulgard, 2014),(Neysmith & Reitsma-Street, 2000),(Bovaird, 2014)
Environmental Studies	11	9%	(Alexander & Smaje, 2008), (Kolcava & Bernauer, 2021), (Bezhani, 2015), (Cook & Inman, 2012), (Young, 2016), (Wainwright & Manville, 2017), (Halford et al., 2015), (Clifford, 2012), (Moulaert & Ailenei, 2005),(Bassel & Emejulu, 2018), (Lyth et al., 2017)
Health Issues	5	4%	(Rodnyansky & Yasnitskaya, 2017), (Grant, Goodenough, Harvey, & Hine, 2000), (Grieve & Olivier, 2018), (Zabdyr-Jamroz, 2017),(Crampton, Dowell, & Woodward, 2001)
Interdisciplinary Sciences	5	4%	(Valentinov, 2009), (Belzunegui-Eraso, Erro-Garces, & Pastor-Gosalbez, 2013), (Martinelli, Serrecchia, & Serrecchia, 2006), (Baxter & Fancourt, 2020), (Jasinska-Biliczak, 2019),
Interdisciplinary Social Sciences	7	6%	(Kenyon, Mason, & Rookwood, 2018),(Serra, Serneels, & Barr, 2011),(Maboya & McKay, 2019), (Chapman, 2017),(Lim & Endo, 2016),(Murdock, Shariff, & Wilding, 2013),(Van Til, 2009)
Management	3	3%	(Melao, Guia, & Amorim, 2017),(Nugroho, 2011),(Fredriksson, 2005)
Political Sciences & Public Administration	22	19%	(Lubienski & Perry, 2019), (N. R. Fyfe, 2005), (Prakash & Gugerty, 2010),(Body & Kendall, 2020), (Kalogeraki, 2020), (Archambault, 2017), (McCall & Williamson, 2000), (Hughes, 2019), (Carter, 2016), (Netto, Kamenou, Venugopal, & Asghar, 2012), (McCall & Itcaina, 2017), (Wollmann, 2018), (Myers, 2017), (Laszlo & Viktor, 2017), (Krasynska, 2015), (Ferreira, 2015), (Rees, 2014), (Wong, 2008), (Lyons & Passey, 2006), (Velazquez & Gallego, 2020), (Hardill & Dwyer, 2011), (Wong & Jun, 2006)
Social Issues	27	23%	(P. Tomczak & Bennett, 2020), (P. J. Tomczak, 2014), (Mythen, Walklate, & Kemshall, 2013), (Verdugo-Castro, 2019),(Pegg & Caddell, 2016), (Cahuas, 2019), (Hayashi, 2016), (Dalziel & Willis, 2015),(Hossein, 2017),(Kala, 2008), (Cunningham, 2010), (Salamon & Sokolowski, 2016), (Defourny, Gronbjerg, Meijs, Nyssens, & Yamauchi, 2016),(Gatskova & Gatskov, 2016),(Chaney, 2014), (Chaney, 2015), (Lund-Chaix & Gelles, 2014), (Thompson & Williams, 2014), (Parente, 2012),(Lacerda & Vieira, 2011), (Amendola et al., 2011), (Onyx et al., 2010), (Bode, 2003), (Corcoran, 2011), (N. Fyfe, Timbrell, & Smith, 2006), (Meade, 2005), (Baines, Charlesworth, Cunningham, & Dassinger, 2012),
Social Work	3	3%	(Chui, Jordan, & Wang, 2019), (Pentaraki & Dionysopoulou, 2019), (Hahn & McCabe, 2006)
Sociology	6	5%	(Sanghera, 2018), (Barman, 2016), (Halford et al., 2015), (Parente, 2016), (Pape et al., 2016), (Tesits, 2012)

Studies in the field of economics

In the field of economics, some studies (Gatskova & Gatskov, 2016) (Paiva & Carvalho, 2018) (Neysmith & Reitsma-Street, 2000) used survey data to show a relationship among some variables using a quantitative approach. However, some other studies used time-series data (Spicka et al., 2017) (Haugh & Kitson, 2007), cross-sectional (Pevcin, 2012) and panel data for econometric analysis.

Table 5: Summary of the studies in the fields of economics of the third sector

Author and year	Objective	Data and sample	Methodology	Findings
(Gatskova & Gatskov, 2016)	To explore the factors behind the limited civil society involvement	Survey data of the year 2010 and 2014 in Ukraine	Probit regression model	Lack of political identification, passivity, and reliance on informal networks inversely affect the people's propensity to participate in civil society organizations
(Paiva & Carvalho, 2018)	to investigate the relationship between accounting and management applications in the third sector organisations of a less developed country	Survey data collected from four provinces of Angola	Pearson Correlation Test	A relationship exists between the type of organisation and the origin of the resources obtained, the disclosure of financial statements, the use of operational plans and the use of budgets.
(Neysmith & Reitsma-Street, 2000)	To seek to expose the issues and complexity of volunteer work in poor communities	Data collected from Canadian Community Resource Centres	Monetary and experiential valuation of volunteering	Differences between funders, volunteers, and program planners originated from the differing social settings.
(Spicka et al., 2017)	To investigate variations in socioeconomic factors of the size of the non-profit sector	Panel data of Central European Region	ARDL and ECM	Different systems of care for the elderly, GDP per capita have significant impact on the size of non-profit sector.
(Pevcin, 2012)	To investigate the variations in the size of the non-profit sector among countries theoretically and empirically	A sample of 38 countries	Multiple and pooled data regression analysis	The ability to explain the differences in the size of the sector across countries is influenced by the selection of the measurement of sector size.
(Marcuello, 1998)	To analyse the supply and demand factors of the nonprofit organizations.	Non-profit sector data of Catalonia region from Spain	OLS estimation	Competition between NPO, characteristics of the population, market size, and the relationship with the government and private lucrative sector determines the size of the nonprofit sector.
(Haugh & Kitson, 2007)	To review the linkage between the third sector and the Labour's economic policy	UK data for the period of 1995-2004	Mostly descriptive analysis	Third sector has significant impact on the environment, social capital, poverty, measures of social exclusion, as well as GDP and employment

Among the studies directly related to the field of economics, three studies (Marcuello, 1998; Pevcin, 2012; Spicka et al., 2017) focused on the factors that determine the size of the nonprofit sector. However, the findings of the three studies are different from each other. Two other studies (Gatskova & Gatskov, 2016; Neysmith & Reitsma-Street, 2000) covered the labour market perspective of the third sector. Only one study (Haugh & Kitson, 2007) focused on the impacts of the third sector on the economic variables and another study (Paiva & Carvalho, 2018) covered the accounting and management practices in the third sector organizations.

Discussion and Research Gaps

Although diverse research has been conducted on the third sector economy, there still lies enough scope for additional research. From the perspective of economics, the earlier analyses indicate that fewer investigations have been performed in the third sector economy. Especially, from the macroeconomic viewpoint, extensive study is vital to discern how the contribution of the third sector could be incorporated into the mainstream calculation of various macroeconomic indicators. Moreover, from the microeconomic perspective, both theoretical and empirical analyses of third sector organizations are yet to be explored. Although some studies focused on the determinants of the size of the nonprofit sector, the findings of the studies are diversified that requires further investigation into the field. In addition, the contribution of the third sector to national income and development require specific definitions and tools for measurement. The maximization function of third sector firms is different from capitalist firms and requires rigorous theoretical analysis. Instead of conventional profit maximization, why entrepreneurs invest in the third sector needs scientific investigation. Moreover, how conventional utility maximization function changes in the case of people working in the third sector as volunteers is an area of further examination. All the studies from economics perspective reviewed in this paper were conducted in the developed countries. But the emergence of third sector in the developing countries might be based on some other variables that are different from the developed nations. Eventually, third sector in the developing countries require further focus. Since the existence of a third sector can be justified based on both market failure and government failure, the economic rationality of the existence of a third sector requires scientific discovery.

CONCLUSION

The study is based on 118 published documents in Web of Science (WOS) and reveals that the third sector receives research focuses from various stakeholders. Both research and the number

of citations of the published documents on this sector are growing. Although most of the researchers concentrating in this field are not specialized, there has been a rise in publications on third sector economy lately. Among the sources in this field, the journal *Voluntas* is the most reputable. Nonetheless, the publications in the third sector economy encompass a vast array of journals, books, and conference proceedings. It is evident that maximum researches in the sector have been conducted in the UK. Research collaborations with other countries have also been on the rise. On the contrary, the keyword analysis clarifies, that the major clusters are led by 'partnership', 'non-profit sector', 'research', 'development' and 'social economy'. But the thematic analysis reveals that the motor theme includes 'social economy'. Nevertheless, the three-field plot and content analysis depict that the future research agenda in this field could be related to macroeconomic issues, entrepreneurship, employment, and market failure aspects. Since the study covers only the WOS database, further research could be conducted through SCOPUS and other standard databases. Mainstream economics researchers can focus on the determinants of the size of the voluntary sector both in developing and developed countries.

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**2018-2023 YILLARI ARASINDA TÜRKİYE’DE MÜZİK EĞİTİMİ ALANINDA
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Özet

Müzik, insan hayatının içinde yer alan, duygu ve düşüncelerimizi ifade etmemizi sağlayan, yaratıcılığımızı ortaya koyabildiğimiz ve ruhsal gelişimimize katkı sağlayan önemli sanat dallarından birisidir. Eğitim, bireylerin davranışlarda istenilen yönde davranış değişikliği geliştirme sürecidir. Müzik eğitimi bireylerin duygusal, sosyal ve akademik gelişimlerini desteklemektedir. Bireyler okul hayatlarına ilk adımı attıkları andan itibaren müzik eğitimi almaya başlamaktadır. Müzikal becerilerini geliştirmek isteyen ve bu alana ilgisi olan bireyler müzik eğitimlerini profesyonel olarak devam ettirmek amacıyla mesleki müzik eğitimi olarak bu alanda gelişimlerine devam edebilmektedirler. Ancak her sanat alanında olduğu gibi müzik alanında eğitim gören bireyler de performanslarını sergilerken sahne korkusu, özgüven sorunu, heyecanı kontrol edememe vb. nedenler sebebiyle kaygı yaşamaktadır. Bu durum, bireylerin performanslarının olumsuz etkilenmesine yol açabilmektedir. Bu çalışma, Türkiye’de müzik eğitimi alan öğrencilerin performans kaygılarına yönelik 2018-2023 yılları hazırlanan lisansüstü tezlerin incelenmesini amaçlamaktadır. Araştırma nitel araştırma yöntemiyle hazırlanmıştır. Araştırma kapsamında elde edilen veriler doküman analizi yöntemiyle elde edilmiştir. Araştırmanın verilerini, YÖK Ulusal Tez Merkezi’ne “müzik, kaygı ve performans” anahtar kelimeleri kullanılarak elde edilen lisansüstü tezler oluşturmaktadır. Toplamda 10 teze ulaşılmıştır. Bunlar sırasıyla; (f=1) sanatta yeterlik, (f=4) doktora, (f=5) yüksek lisans tezi şeklindedir. Elde edilen tezlerin tamamı araştırma kapsamına alınmıştır. Araştırma sonucunda, Türkiye’de müzik eğitimi alan öğrencilerin performans kaygılarına yönelik lisansüstü tezler incelendiğinde, çeşitli değişkenlerin bireylerin kaygı düzeylerini azaltmada yardımcı olduğu yönelik bulgular tespit edilmiştir.

Anahtar Kelimeler: Müzik eğitimi, performans, kaygı.

**A REVIEW OF POSTGRADUATE DISSERTATIONS PUBLISHED IN 2018-2023 ON
THE PERFORMANCE ANXIETY OF MUSIC EDUCATION STUDENTS IN
TÜRKİYE**

Abstract

Music is one of the important branches of art in human life which allows us to express our feelings and thoughts, reveals our creativity, and contributes to our spiritual development. Education, on the other hand, is the process of invoking changes in individuals' behaviors in the desired direction. Music education supports the emotional, social, and academic development of individuals. Individuals start to receive music education from the moment they take their first step into school life. Individuals who want to improve their musical skills and are interested in this field can continue their development in this field by receiving vocational music education to continue their music education professionally. However, as in every field of art, individuals studying in the field of music also experience anxiety due to reasons such as stage fright, self-confidence problems, inability to control excitement, etc. while performing. This situation can lead to negative effects on individuals' performances. This study aims to examine the postgraduate dissertations published between 2018 and 2023 on the performance anxiety of music education students in Turkey. The research was designed using a qualitative research method. The data obtained within the scope of the research were retrieved by the document analysis method. The data of the study consisted of graduate dissertations obtained through the use of the keywords, "music, anxiety, and performance" in the National Thesis Center of the Council of Higher Education. As a result, a total of 10 dissertations were reached. These were Doctor of Arts (f=1), doctorate (f=4), and master's (f=5) theses, respectively. In conclusion, upon examining the postgraduate dissertations on the performance anxiety of music education students in Turkey, it was found that several variables help to reduce the anxiety levels of individuals.

Keywords: Music education, performance, anxiety.

Giriş

İnsan sosyal bir varlık olduğu için, sosyal hayatın her noktasında yaşadığı durumlar karşısında çeşitli duygularla tepki verebilmektedir. Bu duygular; üzüntü, sinir, mutluluk, öfke ve kaygı vb. şekilde çoğaltılabilir. Bireyin yaşamını etkileyen duygulardan birisi olan kaygı, günümüz dünyasında bireylerin sıklıkla yaşadığı bir duygudur. Bireylerin yaşantılarında karşılaştıkları stresli olaylar karşısında vücudun kendisini savunmak için verdiği psikolojik ve fizyolojik tepkiler kaygı olarak tanımlanmaktadır (Moonesi ve Taghavi, 2015). Dolayısıyla, bireylerin bireysel olarak ön planda olduğu alanlarda kaygı durumları heyecana bağlı olarak artabilir. Bireyler eğitim hayatları boyunca kaygı duygusunu sık sık yaşayabilmektedir. Bireylerin eğitim alanında yaşadıkları kaygılara yönelik alanyazında yer alan çalışmalar incelendiğinde; Aygün (2015), öğrencilerin eğitim süreçlerinde yaşadıkları gelecek kaygısına yönelik hazırladığı çalışmasının sonucunda, bireylerin gelecek kaygılarına yaş, cinsiyet, okudukları okul türü vb. kriterlerin etki ettiğini vurgulamaktadır. Taşdemir (2015), ortaokul öğrencilerinin matematik dersine yönelik yaşadıkları kaygıyı ele alan çalışmasında, 5. sınıf öğrencilerinin 8. sınıf öğrencilerine göre kaygı düzeylerinin daha düşük olduğunu saptamıştır. Aydın vd., (2018) çalışmalarında, yabancı dil öğreniminde bireylerin yaşadıkları kaygının nedenlerini, kaygı süreciyle baş etme yollarını, yabancı dil öğrenme sürecinde kaygının öğrenme sürecine olan etkilerini incelemiştir. Araştırmanın sonucunda, yabancı dil öğrenim sürecinde sınav korkusunun süreci olumsuz etkilediğine değinmişlerdir. Aynı zamanda, çalışmalarında, kaygı duygusunun bireyin hatalarını fark etme sürecine katkı sağlaması sebebiyle olumlu etkilerinin de olduğuna yönelik görüşlere yer verdikleri görülmektedir.

Kaygı düzeyinin yüksek olduğu eğitim alanlarından birisi de müzik alanıdır. Müzik alanı, bireylerin sıklıkla bireysel/karma performans sergiledikleri dolayısıyla, stres, heyecan, kaygı vb. duyguları yaşanabileceği bir alandır. Kaygı durumu bireylerin performans sergilediği zamanlarda sahneleme öncesi, seyirci sayısı, hazırlanan etkinliği zorluğu vb. etkenler kaygı durumunu arttırmaktadır (Miller, 2004). Kaygı durumunun ortaya çıkmasındaki temel sebep genellikle strestir. Birey, korku yaşamamasını tetikleyecek bir durumla karşı karşıya kaldığında kaygı duygusunu yaşamaktadır (Ellis, 1994). Performans kaygısı; topluluk önünde konuşma yapan, sahne sanatlarının herhangi bir dalında performans sergileyen bireylerin zihinsel ve bedensel olarak vücudun verdiği tepki olarak tanımlanmaktadır (Cemali, 2017). Müzik alanında bireylerin özellikle sahne performansı sergilemelerini gerektiren durumlarda sıklıkla kaygı yaşadıkları görülmektedir. Müzik alanında performans kaygısı yaşayan bireylerde, konsantrasyon bozukluğu, endişe ve korku vb. duygular ortaya çıkmaktadır (Sabzehzar, 2020).

Müzik eğitimi alanında bireylerin performans kaygılarına yönelik alanyazında çeşitli çalışmalar bulunmaktadır. Tokinan (2014), müzik öğretmeni adaylarının performans kaygılarına yönelik hazırladığı çalışmanın sonucunda; kadın öğrencilerin kaygı düzeyinin erkek öğrencilere daha yüksek olduğunu, müzik alanı performans kaygısı ve özgüven arasında anlamlı bir ilişki olduğunu saptamıştır. Sarıkaya (2018), müzik eğitimi lisans öğrencilerinin mükemmeliyetçi bakış açılarının performans kaygılarını olumlu/olumsuz etkilediği sonucuna ulaşmıştır. Taner (2022) müzik alanı lisans öğrencileriyle yürüttüğü çalışmasının sonucunda aile, arkadaş çevresi ve öğretmenlerle performans kaygılarını paylaşmanın bireyleri rahatlatacağı sonucuna ulaşmaktadır. Ayayeter (2019) araştırmasının sonucunda, müzik öğretmenlerinin performans kaygılarının düşük olduğu sonucunu elde etmiştir. Ünalın (2023), müzik alanı lisans öğrencilerinin performans kaygılarının ve stres durumlarının azalmasında yoga yapmanın etkili olduğu sonucuna yer verdiği görülmektedir. Müzik alanında eğitim gören öğrencilerin performans kaygılarına yönelik olumlu/olumsuz pek çok veri olduğu saptanmıştır. Müzik alanında performans göstermenin önemi düşünüldüğünde bu alanda performans kaygısına yönelik çalışmaların literatüre katkı sağladığı yadsınamaz bir gerçektir.

Bu bağlamda, bu çalışmada, Türkiye’de müzik eğitimi alanında eğitim gören öğrencilerin performans kaygılarına yönelik 2018-2023 yılları arasında–lisansüstü tezlerin incelenmesi amaçlanmıştır. Bu amaca yönelik olarak, çalışmada şu soruların cevapları aranmıştır.

- ✓ Müzik eğitimi alanında eğitim gören öğrencilerin performans kaygılarına yönelik olarak lisansüstü tezlerin yıllara göre dağılımı nasıldır?
- ✓ Müzik eğitimi alanında eğitim gören öğrencilerin performans kaygılarına yönelik olarak lisansüstü tezlerin türlerine göre dağılımı nasıldır?
- ✓ Müzik eğitimi alanında eğitim gören öğrencilerin performans kaygılarına yönelik olarak lisansüstü tezlerde kullanılan yöntemle ilişkin dağılım nasıldır?
- ✓ Müzik eğitimi alanında eğitim gören öğrencilerin performans kaygılarına yönelik olarak lisansüstü tezlerde kullanılan örneklem gruplarına ilişkin dağılım nasıldır?

2. Yöntem

Bu çalışmada, nitel araştırma yöntemlerinden biri olan doküman analizi tekniği kullanılmıştır. Nitel araştırma; belirli bir olayı, davranışı, bulunduğu doğal ortamda derinlemesine inceleme sürecidir (Saban, 2010). Nitel araştırma yöntemi sürecinde çalışma konusunun belirlenmesi ve gerçekleştirilmesi sürecinde araştırmacı sınırları kendisi belirleyebilmektedir (Karataş, 2015).

Nitel araştırma yöntemleri içerisinde en sık görüşme, gözlem ve doküman analizi yöntemi kullanılmaktadır (Yıldırım ve Şimşek, 2016). Doküman analizi, araştırma kapsamında ele alınan konu ile ilişkili kitap, dergi, gazete vb. kaynakların analiz edilme sürecidir (Yıldırım ve Şimşek, 2016). Doküman analizi sürecinde, araştırma konusuna yönelik yazılı belgeler analiz edilmektedir (Aydın, 2019).

Çalışmanın verileri, YÖK Ulusal Tez Merkezi veri tabanında yer alan “müzik, performans ve kaygı” anahtar kelimeleri kullanılarak ulaşılan yüksek lisans, doktora ve sanatta yeterlik tezleri oluşturmaktadır. Bunlar sırasıyla; (f=1) sanatta yeterlik, (f=4) doktora, (f=5) yüksek lisans tezi şeklindedir. Müzik eğitimi ve performansla yönelik ilk çalışmanın 2018 yılında hazırlandığı görülmektedir. Araştırma kapsamında yapılan incelemede 15 lisansüstü teze ulaşılmıştır. Müzik eğitimi ile ilişkili olmayan tezler araştırma kapsamına alınmamıştır. Araştırmaya 10 lisansüstü tez dâhil edilmiştir.

Doküman analizi tekniği doğrultusunda verilerin analizinde betimsel analiz yöntemi kullanılmıştır. Betimsel analiz; gözlem, görüşme ve doküman analizi yöntemiyle elde edilen verilerin bütüncül bir bakış açısıyla yorumlanmasıdır (Yıldırım ve Şimşek, 2016). Betimsel analiz yönteminde, araştırılan konuya ait veriler belirli bir tema altında incelenir. Ardından araştırma kapsamında incelenen veriler bulgular başlığında ele alınarak yorumlanır (Altunışık vd., 2007).

3. Bulgular

Çalışmanın bu bölümünde, araştırma kapsamında ele alınan sorular doğrultusunda elde edilen bulgulara yer verilmiştir.

Tablo 1. Müzik Eğitimi Alanında Eğitim Gören Öğrencilerin Performans Kaygılarına Yönelik Olarak Lisansüstü Tezlerin Yıllara Göre Dağılımı

Tez Başlığı	Yılı	Tür
Konservatuvarda ortaokul ve lise düzeyinde öğrenim gören müzik öğrencilerinin müzik performans kaygı düzeyleri ile duygusal zekâ düzeylerinin çeşitli değişkenlere göre incelenmesi	2018	Doktora
Müzik öğretmeni adaylarının mükemmeliyetçilik ve öz-yeterlik inançlarına göre müzik performans kaygılarının yordanması	2018	Doktora
Müzik öğretmenlerinin müzik performans kaygılarının ve iş doyumlarının çeşitli değişkenler açısından incelenmesi	2019	Yüksek Lisans
Müzik öğretmeni adaylarının müzik performans kaygısı ile bireysel çalgı performans sınavı kaygısı arasındaki ilişkinin incelenmesi	2020	Yüksek Lisans
Mesleki çalgı eğitimi gören öğrencilerin müzik performans kaygısının giderilmesinde sinir dili programlama (NLP) yönteminin uygulanması	2021	Doktora
Müzik bölümü öğrencilerinin çalgı performans yönetimi özyeterlilik algıları performans kaygı düzeyleri ve aralarındaki ilişkinin incelenmesi	2021	Yüksek Lisans
Lisans düzeyinde çalgı eğitimi alan Konservatuvar Müzik Bölümü öğrencilerinin müzik performans kaygısına ilişkin görüşleri	2022	Yüksek Lisans
Müzik öğretmeni adaylarının çalgı performansı özyeterlilikleri ve müzik performans kaygılarının öğrenci başarısı üzerine etkisi	2022	Doktora
Müzik performans kaygısının korno sanatçıları örnekleme üzerinden nitel olarak incelenmesi	2022	Sanatta Yeterlik
Müzik öğretmeni adaylarının müzik performans kaygısı, algılanan stres, sürekli kaygı ve bilinçli farkındalık düzeylerine ilişkin düzenli yoga pratiklerinin etkisi	2023	Yüksek Lisans

Tablo 1 incelendiğinde, müzik eğitimi alanında öğrenim gören öğrencilerin performans kaygılarına yönelik olarak 10 lisansüstü tezin olduğu belirlenmiştir. 2018 ve 2021 yılında 2'şer lisansüstü tez, 2019, 2020 ve 2023 yıllarında 1 lisansüstü tez, 2022 yılında ise 3 lisansüstü tez bulunmaktadır. Hazırlanan lisansüstü tezlerin 5'i yüksek lisans tezi, 4'ü doktora tezi 1'i ise sanatta yeterlik tezi şeklindedir.

Tablo 2. Müzik Eğitimi Alanında Eğitim Gören Öğrencilerin Performans Kaygılarına Yönelik Olarak Lisansüstü Tezlerin Türlerine Göre Dağılımı

Tez	f	%
Yüksek Lisans Tezi	5	50
Doktora Tezi	4	40
Sanatta yeterlik	1	10
Toplam	10	100

Tablo 2 incelendiğinde, lisansüstü tezlerin 5'inin yüksek lisans tezi, 4'ünün doktora tezi, 1'inin ise sanatta yeterlik tezi olduğu ortaya çıkarılmıştır.

Tablo 3. Müzik Eğitimi Alanında Eğitim Gören Öğrencilerin Performans Kaygılarına Yönelik Olarak Lisansüstü Tezlerde Kullanılan Yönteme İlişkin Dağılım

Tez Başlığı	Yöntem
Konservatuvarda ortaokul ve lise düzeyinde öğrenim gören müzik öğrencilerinin müzik performans kaygı düzeyleri ile duygusal zekâ düzeylerinin çeşitli değişkenlere göre incelenmesi	Nicel
Müzik öğretmeni adaylarının mükemmeliyetçilik ve öz-yeterlik inançlarına göre müzik performans kaygılarının yordanması	Nicel
Müzik öğretmenlerinin müzik performans kaygılarının ve iş doyumlarının çeşitli değişkenler açısından incelenmesi	Nicel
Müzik öğretmeni adaylarının müzik performans kaygısı ile bireysel çalgı performans sınavı kaygısı arasındaki ilişkinin incelenmesi	Nicel
Mesleki çalgı eğitimi gören öğrencilerin müzik performans kaygısının giderilmesinde sinir dili programlama (NLP) yönteminin uygulanması	Karma
Müzik bölümü öğrencilerinin çalgı performans yönetimi öz yeterlilik algıları performans kaygı düzeyleri ve aralarındaki ilişkinin incelenmesi	Nicel
Lisans düzeyinde çalgı eğitimi alan Konservatuvar Müzik Bölümü öğrencilerinin müzik performans kaygısına ilişkin görüşleri	Nicel
Müzik öğretmeni adaylarının çalgı performansı özyeterlilikleri ve müzik performans kaygılarının öğrenci başarısı üzerine etkisi	Karma
Müzik performans kaygısının korno sanatçıları örneklemini üzerinden nitel olarak incelenmesi	Nitel
Müzik öğretmeni adaylarının müzik performans kaygısı, algılanan stres, sürekli kaygı ve bilinçli farkındalık düzeylerine ilişkin düzenli yoga pratiklerinin etkisi	Nicel

Tablo 3’de, hazırlanan çalışmaların 7’sinin nicel araştırma yöntemi ile hazırlandığı, 2’sinin karma yöntemle, 1’inin ise nitel yöntemle hazırlandığı görülmektedir.

Tablo 4. Müzik Eğitimi Alanında Eğitim Gören Öğrencilerin Performans Kaygılarına Yönelik Olarak Lisansüstü Tezlerde Kullanılan Örneklem Gruplarına İlişkin Dağılım

Çalışmanın Adı	Örneklem Grubu
Konservatuvarda ortaokul ve lise düzeyinde öğrenim gören müzik öğrencilerinin müzik performans kaygı düzeyleri ile duygusal zekâ düzeylerinin çeşitli değişkenlere göre incelenmesi	Ortaokul-lise Konservatuvar öğrencileri
Müzik öğretmeni adaylarının mükemmeliyetçilik ve öz-yeterlik inançlarına göre müzik performans kaygılarının yordanması	Müzik eğitimi lisans öğrencileri
Müzik öğretmenlerinin müzik performans kaygılarının ve iş doyumlarının çeşitli değişkenler açısından incelenmesi	Müzik eğitimi lisans öğrencileri
Müzik öğretmeni adaylarının müzik performans kaygısı ile bireysel çalgı performans sınavı kaygısı arasındaki ilişkinin incelenmesi	Müzik eğitimi lisans öğrencileri
Mesleki çalgı eğitimi gören öğrencilerin müzik performans kaygısının giderilmesinde sinir dili programlama (NLP) yönteminin uygulanması	Konservatuvar ve GSL öğrencileri
Müzik bölümü öğrencilerinin çalgı performans yönetimi öz yeterlilik algıları performans kaygı düzeyleri ve aralarındaki ilişkinin incelenmesi	Müzik eğitimi lisansüstü öğrencileri
Lisans düzeyinde çalgı eğitimi alan Konservatuvar Müzik Bölümü öğrencilerinin müzik performans kaygısına ilişkin görüşleri	Konservatuvar lisans öğrencileri
Müzik öğretmeni adaylarının çalgı performansı özyeterlilikleri ve müzik performans kaygılarının öğrenci başarısı üzerine etkisi	Müzik eğitimi lisans öğrencileri
Müzik performans kaygısının korno sanatçıları örneklemini üzerinden nitel olarak incelenmesi	Sanatçı
Müzik öğretmeni adaylarının müzik performans kaygısı, algılanan stres, sürekli kaygı ve bilinçli farkındalık düzeylerine ilişkin düzenli yoga pratiklerinin etkisi	Müzik eğitimi lisans öğrencileri

Tablo 4 incelendiğinde, 5 çalışmanın örneklem grubunu müzik eğitimi lisans öğrencilerinin oluşturduğu; 1'er tane olmak üzere ortaokul-lise konservatuar öğrencileri, konservatuar ve GSL öğrencileri, sanatçı, konservatuar öğrencileri, müzik eğitimi lisansüstü öğrencileri oluşturmaktadır.

Sonuç ve Öneriler

Araştırmanın sonucunda, müzik eğitimi alanında öğrenim gören öğrencilerin performans kaygılarına yönelik 10 lisansüstü tezin hazırlandığı görülmektedir. 2018 ve 2021 yılında 2 lisansüstü tez, 2019, 2020 ve 2023 yıllarında 1 lisansüstü tez, 2022 yılında ise 3 lisansüstü tez olduğu görülmektedir. Aynı zamanda, lisansüstü tezlerden 5'inin yüksek lisans tezi, 4'ünün ise doktora tezi, 1'inin ise sanatta yeterlik tezi olduğu belirlenmiştir.

Araştırmanın diğer sonuçları incelendiğinde, hazırlanan çalışmaların 7'sinin nicel araştırma yöntemi ile hazırlandığı, 2'sinin karma yöntemle, 1'inin ise nitel yöntemle hazırlandığı görülmektedir.

Bir başka araştırma sonucunda, lisansüstü tezlerin 5'inin örneklem grubunu müzik eğitimi lisans öğrencilerinin oluşturduğu, 1 tane olmak üzere ortaokul-lise konservatuar öğrencileri, konservatuar ve GSL öğrencileri, sanatçı, konservatuar öğrencileri, müzik eğitimi lisansüstü öğrencileri oluşturduğu tespit edilmiştir.

Araştırma sonuçları ışığında, şu önerilere yer verilmiştir:

- ✓ Çeşitli örneklem grubu ile ilgili çalışmalar bulunmakla birlikte, daha az gerçekleştirilen çalışmalara ağırlık verilebilir. Bu yönde, araştırmanın örneklem gruplarının müzik eğitimi alan ortaokul ve lise öğrencilerine yönelik olarak yapılabilir.
- ✓ Müzik alanı öğrencilerinin performans kaygılarının saptanabilmesi amacıyla deneysel çalışmaların artırılması faydalı olabilir.
- ✓ Müzik eğitimi alanında eğitim gören öğrencilerin kaygılarının sorunlarının betimsel olarak ele alınması amacıyla hazırlanacak nitel çalışmaların artırılması faydalı olabilir.
- ✓ Gelecek yıllarda müzik alanına yönelik lisansüstü tezlerin daha fazla artması alan yazına önemli katkılar sağlayabilir.
- ✓ Bu çalışma, lisansüstü tezler ile sınırlıdır. Bu konuyu ele alan yeteri kadar lisansüstü tezlerin olmadığı söylenebilir. Bu bakımdan, durumu daha detaylı ele alacak bu alana ilişkin diğer çalışmaların yapılması da önerilebilir.

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**ÇİN KUŞAK YOL PROJESİNİN KORİDORLARINDAN BİRİ OLAN ORTA
KORİDORUN TÜRKİYE İLE ÇİN ARASINDAKİ DIŞ TİCARET FAALİYETLERİ
ÜZERİNDEKİ ETKİLERİ: 2003-2022 DÖNEMİ**

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Özet

Çin kuşak yol projesi son dönemde adından sıkça bahsettiren ve önemli ekonomik sonuçları bulunan projelerden biridir. Çin devlet başkanı Xi Jinping'in 2013 yılında Kazakistan'da yapmış olduğu bir konuşmada dünya kamuoyunun gündemine gelen kuşak yol projesi ile ipek yolu ülkeleri arasındaki ticari ilişkilerin geliştirilmesi ve bu ülkeler arasındaki ekonomik ilişkilerin canlandırılması hedeflenmiştir. Proje, ipek yolu ekonomik kuşağı ve deniz ipek yolu şeklinde olmak üzere olarak ikili bir yapıya sahiptir. İpek yolu ekonomik kuşağı ise Çin - Hindini Yarımadası Ekonomik Koridoru, Çin - Pakistan Ekonomik Koridoru, Çin - Orta Asya - Batı Asya Ekonomik Koridoru, Bangladeş - Çin - Hindistan - Myanmar Ekonomik Koridoru, Çin - Moğolistan - Rusya Ekonomik Koridoru ve Yeni Avrasya Kara Köprüsü Ekonomik Koridoru şeklinde olmak üzere 6 koridor (güzergah)'dan oluşmaktadır. Bu koridorlar Çin'den Avrupa'ya kadar olan ülkeler birbirine bağlanmaktadır. Türkiye projenin Çin-Orta Asya- Batı Asya ekonomik koridoru (kısa adıyla orta koridor) üzerinde bulunmaktadır. Bu koridor Türkiye üzerinden Avrupa'ya ulaşılabilen bir koridordur ve bu koridor üzerinde Kazakistan, Kırgızistan, Türkmenistan, Özbekistan, Tacikistan ve Türkiye bulunmaktadır. Bu bağlamda kuşak yol projesinin Türkiye açısından önemli ekonomik sonuçlarının olabileceğini söylemek mümkündür. Hazırlanmış olan bu çalışma ile Türkiye ile Çin arasındaki dış ticaret faaliyetlerinin proje öncesi ve sonrası dönemdeki yapısı karşılaştırmalı olarak analiz edilecek ve projenin iki ülke arasındaki ticari faaliyetler üzerindeki etkisi ortaya konulmaya çalışılacaktır.

Anahtar Kelimeler: Çin Kuşak Yol Projesi, Çin, Orta Koridor, Türkiye, Dış Ticaret

EFFECTS OF THE CENTRAL CORRIDOR, ONE OF THE CORRIDORS OF THE CHINA BELT ROAD PROJECT, ON FOREIGN TRADE ACTIVITIES BETWEEN TURKEY AND CHINA: 2002-2022 PERIOD

Abstract

The China belt road project is one of the projects that has been frequently mentioned recently and has significant economic consequences. The belt road project, which came to the agenda of the world public in a speech made by Chinese President Xi Jinping in Kazakhstan in 2013, aimed to develop commercial relations between the Silk Road countries and revitalize the economic relations between these countries. The project has a two-way structure in the form of an economic segment of the Silk Road and a marine silk road. The Silk Road Economic Corridor consists of 6 corridors, including the China- Indochina Peninsula Economic Corridor, China-Pakistan Economic Corridor, China - Central Asia - West Asia Economic Corridor, Bangladesh - China - India - Myanmar Economic Corridor, the China - Mongolia - Russia Economic Corridor and the New Eurasia Land Bridge Economic Corridor. These corridors connect countries from China to Europe. Turkey is located on the China-Central Asia-West Asia economic corridor (shortly the middle corridor) of the project. This corridor is a corridor that can be reached to Europe via Turkey, and on this corridor there are Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan, Tajikistan and Turkey. In this context, it is possible to say that the belt road project may have important economic consequences for Turkey. With this prepared study, the structure of foreign trade activities between Turkey and China before and after the project will be analyzed comparatively and the impact of the project on commercial activities between the two countries will be tried to be revealed.

Keywords: China Belt Road Project, China, Central Corridor, Turkey, Foreign Trade

Giriş

Günümüzde dünya ticaretinin en önemli ülkelerinden biri Çin'dir. Dünya ticaretinin gelişimi açısından gerek altyapı gerekse de ulaştırmanın son derece önemli olduğunun bilincinde olan Çin, kuşak yol projesini geliştirmek ve uygulamak suretiyle küresel çapta bir ticari hakimiyet elde etme gayreti içerisinde. Kuşak yol projesi, temel olarak 65'den fazla ülkeyi ve dolayısıyla bu ülkeler arasındaki ticari faaliyetlerin önemli bir kısmını birbirine bağlamayı, bu yolla da ülkelerin karşılıklı iş birliği içerisinde ve sürekli bir şekilde gelişim göstermesini sağlamayı amaçlayan küresel nitelikli bir taşımacılık projesidir. Kuşak yol projesinin biri karadan, diğeri de denizden olmak üzere iki temel güzergâhı bulunmaktadır. Projenin kara güzergâhı "İpek Yolu Ekonomik Kuşağı", deniz yolunu ise "Deniz İpek Yolu" oluşturmaktadır. İpek Yolu yıllar boyunca güzergâhı üzerinde bulunan ülkeler arasındaki ticaret başta olmak üzere siyasi, ticari ve kültürel ilişkilerin gelişmesinde önemli katkılarda bulunmuştur ve günümüzde de hala önemini korumaktadır. Çin, Orta Asya, Rusya, Orta ve Doğu Avrupa ile Batı Avrupa'yı birbirine bağlamayı amaçlayan ipek yolu ekonomik kuşağında 6 koridor bulunmaktadır. Bu koridorları Çin - Hindçini Yarımadası Ekonomik Koridoru, Çin - Pakistan Ekonomik Koridoru, Çin - Orta Asya - Batı Asya Ekonomik Koridoru, Bangladeş - Çin - Hindistan - Myanmar Ekonomik Koridoru, Çin - Moğolistan - Rusya Ekonomik Koridoru ve Yeni Avrasya Kara Köprüsü Ekonomik Koridoru şeklinde sıralamak mümkündür. Bu koridorlar ile Çin'den Avrupa'ya kadar olan ülkeler birbirine bağlanmaktadır. Türkiye projenin Çin-Orta Asya-Batı Asya ekonomik koridoru (kısa adıyla orta koridor) üzerinde bulunmaktadır. Türkiye üzerinden Avrupa'ya ulaşılabilen bir koridor niteliğindeki bu koridor üzerinde Kazakistan, Kırgızistan, Türkmenistan, Özbekistan, Tacikistan ve Türkiye bulunmaktadır. Çin kuşak yol projesi ile güzergâh üzerindeki ülkeler arasında siyasi yakınlaşmaların sağlanması, ticari faaliyetlerin artması ve finansal kaynaklara ulaşımın kolaylaşması gibi birçok hedefin gerçekleştirilmesi amaçlanmaktadır. Bunlara ilaveten kuşak yol projesinin bir diğer önemli amacının da yine güzergâh üzerindeki ülkelerin ve de özellikle Avrasya'nın hem sosyal hem ekonomik hem de finansal olarak bütünleşmesini sağlamak olduğunu söylemek mümkündür. Bu bağlamda projenin diğer ülkelerde olduğu gibi Türk ekonomisi üzerinde de önemli ekonomik etkilerinin olacağını söylemek mümkündür. Bununla birlikte Türkiye, kuşak yol projesinin en önemli ülkelerinden biridir. Zira Türkiye dünya üzerinde sahip olduğu eşsiz konumu itibarıyla bu projenin en önemli geçiş noktalarından birini teşkil etmektedir. Kuşak yol projesi açısından bu denli önemli bir niteliğe haiz olan Türkiye'nin proje kapsamında önemli ticari kazanımlar elde etmiş olmasını beklemek mümkündür. Bu kazanımların sadece ulaştırma sektörüne ilişkin olarak değil ulaştırma sektörü ile ilgili diğer bütün sektörler ile ilgili olarak da

gerçekleşmesi söz konusudur. Zira kuşak yol projesi yapısı itibariyle proje kapsamındaki ve güzergâhtaki bütün ülkelerin ticari açıdan çok yönlü olarak gelişim göstermesini hedeflemektedir. Kuşak yol projesinin açıklandığı 2013 yılından sonraki dönemde Türkiye ile Çin arasındaki ticari faaliyetlerin hacminde de artışların beklenmesi muhtemeldir. Bu bağlamda, hazırlanmış olan çalışma ile kuşak yol projesinin açıklanmasından önceki 10 yıllık dönem ile sonraki 10 yıllık dönemde Çin ile Türkiye arasındaki dış ticaret faaliyetlerinin yapısı ve hacmindeki gelişmeler ortaya konularak kuşak yol projesinin iki ülke arasındaki dış ticaret hacmi üzerindeki etkisi ortaya konulmaya çalışılacaktır.

LİTERATÜR TARAMASI

Süleyman (2023), 2013 – 2019 dönemi içinde TÜİK’den elde ettiği mikro veri setlerle Kuşak ve Yol Projesi güzergâhında yer alan ülkelerin mesafeleri arasındaki yakınlaşmaların Türkiye dış ticareti üzerine etkisini Çekim Modeli ile tahmin etmiş, yapılan tahmin neticesinde, kuşak yol projesinin Türkiye’nin ihracatına belirli düzeylerde olumlu yansımaları olmasına karşın ithalatı daha fazla artırması nedeniyle dış ticaret açığına neden olacağı sonucuna ulaşmıştır.

Ece (2023), ilanından günümüze kadar geçen sürede Bir Kuşak Bir Yol (OBOR) Projesi’nin güçlü ve zayıf yönleri ile fırsatlar ve tehditlerini tespit etmek amacıyla hazırlanmış olduğu çalışmada SWOT analiz yönteminden yararlanılmış, yapılan analiz neticesinde Bir Kuşak Bir Yol (OBOR) Projesi’nin güçlü yönlerinin enerji kaynaklarına erişimi kolaylaştırması ve güzergâh üzerindeki ülkelerin ticaret hacmini artırması, zayıf yönlerinin Orta Asya ülkelerinin coğrafi yapısı ve alt yapı yetersizlikleri ile Çin’den ithal eden ürünlere uygulanan anti-damping uygulamaları olduğu, söz konusu projenin sağlamış olduğu başlıca fırsatların güzergâh üzerindeki ülkelerinin ulaşım ve enerji ağlarını birbirine bağlamak suretiyle bu ülkelerin ekonomilerinin yeniden canlanmasına olanak sağlaması, Çin ile Avrupa ülkeleri arasındaki ticaretin gelişmesine katkıda bulunması ve sanayileşmek suretiyle bölge ülkelerindeki refahı artırması iken projenin için başlıca tehditlerin güzergâh üzerindeki ülkelerde yaşanan siyasi istikrarsızlıklar, komşu ülkeler arasındaki sınır anlaşmazlıkları ve bu ülkelerin kendi aralarındaki sorunlar olduğu tespit edilmiştir.

Koçpınar ve Şeker (2022), Türkiye’nin, Kuşak Yol Projesi güzergahında bulunan ülkelere yönelik ihracat potansiyelini analiz etmek amacıyla hazırlanmış olduğu çalışmada, 2000-2019 dönemine ait veri setinden yararlanarak çekim modeli ile analiz gerçekleştirilmiştir. Yapılan

analiz neticesinde Türkiye'nin gayrisafi yurtiçi hasılasındaki artışların, ülkenin ihracatını da artırdığı, Kuşak Yol ülkelerinin gayrisafi yurtiçi hasılasındaki artışların ise yine Türkiye'nin ihracatını pozitif yönde etkilediği, Türkiye'deki nüfus artışlarının Kuşak Yol Projesi kapsamındaki ülkelere ihracatı önemli ölçüde artırdığı, Kuşak Yol Projesi kapsamındaki ülkelere olan mesafe artışlarının Türkiye'nin bu ülkelere olan ihracatını negatif yönde etkilediği, Kuşak Yol güzergahında bulunan ülkelerinin uyguladığı ortalama gümrük tarife oranlarındaki artışın Türkiye'nin Kuşak Yol ülkelerine ihracatını olumsuz yönde etkilediği ve son olarak Kuşak Yol Projesi güzergahında bulunan ülkelerin deniz yolu ile bağlantısının bulunmamasının Türkiye'nin bu ülkelere ihracatını olumsuz yönde etkilediği tespit edilmiştir.

Çakılcı (2021), Kuşak-Yol projesinin hedeflerine ilişkin bilgiler verdiği ve projenin kapsam dahilindeki ülkeler ile Türkiye'ye ne gibi avantajlar sağladığı ve projenin ne gibi dezavantajlara sahip olduğunu ortaya koymak amacıyla hazırlanmış olduğu çalışmada konuya ilişkin çeşitli incelemeler yapmış ve değerlendirmelerde bulunmuştur. Yapılan değerlendirmeler kapsamında Çin'in kuşak yol projesi kapsamındaki ülkelere borç vermek suretiyle bu ülkeleri finansal açıdan kendisine bağlı hale getirdiği ve projenin devamlılığını sağlaması açısından bu durum Çin için avantaj bir durum teşkil ettiği, ancak borç verilen ülkelerde yaşanan ekonomik sıkıntılar nedeniyle verilen borçların geri dönüşümünde sıkıntıların yaşanmasının Çin açısından dezavantajlı bir durumu teşkil ettiği tespit edilmiştir. Ayrıca Çin'in, proje kapsamındaki ülkelerle ticaretini geliştirmekte olduğu, bu ülkelerle arasındaki ihracat ve ithalatı arttırdığı ve diğer ülkeleri kendi ekonomik sistemine entegre etmek suretiyle ekonomik olarak yükseliş sürecindeki yavaşlamalara yeni bir hareketlilik kazandırabilmek için yeni pazarlar bulabildiği, bu sayede de Çin'in dışa açılma hedeflerine hız kazandırdığı ifade edilmiştir. Kuşak yol projesinin Türkiye'ye konumu itibarıyla önemli avantajlar sağladığı ve gerek Avrupa'ya gerekse de ekonomik açıdan son derece önemli pek çok bölgeye bağlantının sağlanabilmesi nedeniyle yeni yatırım ve istihdam alanlarının ortaya çıkmasına olanak sağladığı, turizm sektörüne olumlu yansımalarının bulunduğu ve hem enerji kaynaklarına ulaşımı kolaylaştırdığı hem de enerji bağımlılığının azalmasına olanak sağladığı ifade edilmiştir.

Algül (2020), kuşak yol projesinin Türk enerji sektörü açısından sahip olduğu önemi ve sunabileceği fırsatları değerlendirdiği çalışmada 3 önemli noktanın altını çizmiştir. Bu noktalardan ilkinin ekonomik büyüme açısından önemli bir ivme yakalamış olan Türkiye'nin bu büyüme hızının devam etmesi durumunda enerji ihtiyacının artış göstermesi ve bu ihtiyacın

kuşak yol projesi sayesinde ulaşılabilecek yeni enerji kaynakları ile karşılanabilmesi oluşturmaktadır. Projenin sağladığı bir diğer önemli fırsatın Türkiye'nin arz güvenliği açısından ortaya çıktığı belirtilmiş ve arz güvenliği açısından kaynak ülke çeşitlendirmesinin sağlayacağı avantajların önemi üzerinde durulmuş, son olarak mevcut durumda enerji açısından sadece bir geçiş ülkesi konumunda bulunan Türkiye'nin kuşak yol projesi sayesinde yeni enerji kaynaklarına ulaşabileceği ve bu kaynakları uluslararası piyasalarda pazarlamak suretiyle enerji arzı noktasında küresel bir merkez olabileceği ifade edilmiştir.

Akdağ (2019), açıklandığı tarihten 2019 yılına kadar olan dönemde kuşak yol projesinin Türkiye ile Çin arasındaki ilişkiler üzerindeki etkilerini ve projenin önemini inceleme ve değerlendirmeye yönelik olarak hazırlanmış olduğu çalışmada projenin iki ülkeye sağlayacağı fırsatlar ve tehditler üzerinde durmuştur. Yapılan değerlendirmeler neticesinde Türkiye'nin, Çin mallarının Avrupa pazarına taşınması sürecinde kritik bir öneme sahip olduğu, kuşak yol projesi sayesinde Türkiye'ye yönelik yatırımlarda artışların meydana geleceği, Türkiye'nin dış ticaret hacminde artışların meydana geleceği, Türkiye'nin de Asya pazarlarına daha hızlı, kolay ve ekonomik bir şekilde ulaşabilme fırsatını yakalayacağı ve Türkiye ile Çin arasındaki en önemli ekonomik sorunu teşkil eden dış ticaret açığının azaltılması noktasında önemli bir rol oynayacağı ve son olarak Türkiye'nin Çin başta olmak üzere Doğu Asya ülkelerinin önemli bir kısmı ile sürdürülebilir ve güçlü ekonomik ilişkiler kurmasına olanak sağlayacağı ifade edilmiştir.

KUŞAK YOL PROJESİ VE TÜRKİYE-ÇİN DIŞ TİCARET İLİŞKİLERİ

Kuşak yol projesi özünde bir ulaştırma projesi olmakla birlikte, ulaştırmaya bağlı pek çok sektörü doğrudan etkileyen bir projedir. 2013 yılının Eylül ayında Çin Devlet Başkanı tarafından dünya kamuoyuna tanıtılan kuşak yol projesi ile Çin, dünya ticareti açısından büyük bir öneme sahip Asya, Avrupa ve Afrika kıtalarını hem karayolu ile hem de deniz yolu ile birbirine bağlamak istemiştir. Bir diğer ifade ile kuşak yol projesi Asya, Avrupa ve Afrika kıtalarındaki altmış beş ülkeyi kapsayan, yatırım, ticaret, güvenlik ve lojistik konularında yeni bir küresel tedarik zinciri oluşturma ve ekonomik değer üretmeye yönelik bir projedir (Aybar, 2017). Projenin adında yer alan "Kuşak" kelimesi projenin karayolları, demir yolları, petrol ve doğalgaz boru hatları ve altyapı yatırımlarını kapsayan Kara güzergâhını ifade ederken "Yol" kelimesi projenin kapsamında yer alan Deniz yollarını ifade etmektedir (Yılmaz, 2020: 5276). Bu proje sayesinde Çin, dünya ticaretine yeni bir ivme kazandırmak ve projenin hem kara hem

de deniz güzergâhında bulunan ülkelerin ticari faaliyetlerinde artışlar sağlamak suretiyle çeşitli ekonomik kazanımlar elde etmeyi hedeflemiştir. Zira Çin dışındaki ülkelerin refahındaki ve ticari faaliyetlerindeki artışların Çin'in ekonomik gelişimine dolaylı katkıları da olabilecektir. Hem Çin hem güzergâh üzerindeki ülkeler hem de dolaylı olarak dünya ekonomisi için son derece önemli olan kuşak yol projesinin temel amacını proje kapsamındaki ülkelerin ulaşım altyapılarını iyileştirmek ve hem ulusal hem de bölgesel kalkınma planlarını koordine etmek şeklinde ifade etmek mümkündür (Çelik vd. 2022:1127). Kuşak yol projesinin kara güzergâhı altı koridordan oluşmaktadır. Bu koridorları, Çin-Moğolistan-Rusya Ekonomik Koridoru, Türkiye'nin de içinde yer aldığı Çin-Orta Asya-Batı Asya Ekonomik Koridoru, Çin-Hindini Yarımadası Ekonomik Koridoru, Yeni Avrasya Kara Köprüsü Ekonomik Koridoru, Bangladeş-Çin-Hindistan-Myanmar Ekonomik Koridoru ve son olarak Çin-Pakistan Ekonomik Koridoru şeklinde sıralamak mümkündür. Projenin deniz güzergâhında ise sadece Güneydoğu Asya Ülkeleri Birliği (ASEAN) ile değil Batı Asya, Güney Asya, Kuzey Afrika ve Avrupa ekonomilerini birbirine bağlayacak ekonomik bir koridordan oluşmaktadır (Yılmaz, 2020: 5276). Kuşak yol projesi kapsamında karayolu, demiryolu, liman altyapı projeleri ile enerji sektörleri, kamusal hizmetler, ulaştırma, lojistik ve inşaat faaliyetleri ayrıca finansal piyasalar, teknolojik gelişmeler, telekomünikasyon, medya ve bilgi teknolojileri yer almaktadır (Çelik vd. 2022: 1127).

Türkiye'nin de dahil olduğu Çin-Orta Asya-Batı Asya Ekonomik Koridoru kuşak yol projesinin en önemli güzergâhlarından birini teşkil etmektedir. Çin-Orta Asya- Batı Asya Ekonomik Koridoru olarak bilinen Çin'in Orta Koridoru, Avrasya'dan geçmek suretiyle tarihi İpek Yolu'nun ana bağlantılarını oluşturan Asya, Kafkaslar ve Orta Doğu yoluyla ekonomik iş birliğini teşvik etme yanında, Avrupa ve Çin'in uzak pazarlarını birbirine bağlamak suretiyle eski bir güç, kültür ve ticaret bağı yeniden canlandırmayı hedeflemektedir (Çatal, 2019: 104). Orta koridor üzerinde bulunan Türkiye, gerek coğrafi konumu, gerek ekonomik yapısı ve gerekse de ticari ilişkileri itibariyle kilit rol oynayan ülkelerden biridir. Bu bağlamda Türkiye ile Çin arasında ticari ilişkilerde önemli gelişmeler yaşandığını söylemek mümkündür. Özellikle Türkiye'nin coğrafi konumu, proje açısından Türkiye'nin önemini son derece artırmaktadır. Zira Türkiye ekonomik açıdan önemli pazarların geçiş noktası üzerinde bulunmaktadır. Bu özelliği itibariyle de Çin'den Avrupa'ya ve birçok stratejik bölgeye uzanan önemli bir bağlantı noktası olma niteliğine sahiptir. Bu yapısı itibariyle Türkiye'nin, Çin-Orta Asya-Batı Asya güzergâhındaki ülkeler ile ticari bağlantılarının ve ilişkileri güçlenmesine

katkıda bulunmakta, bu gelişmeler ise Türkiye’de yeni yatırımların yapılmasına ve istihdam artışlarına olanak sağlamaktadır. Bununla birlikte Çin’i, Türkiye üzerinden Avrupa’ya bağlayacak olan Orta Kuşak Koridoru, genelde güzergâh üzerindeki ülkelerin, özelde ise Türkiye-Çin ilişkilerin daha fazla gelişim göstermesi açısından önemli bir ortam sağlamaktadır. Bu süreçte Orta Kuşak Koridoru, güzergâh üzerindeki tüm ülkeler arasında hem ticaretin artmasına hem de bu ülkeler arasındaki ekonomik entegrasyonu gerçekleşmesine olanak sağlamaktadır. Ayrıca bu süreçte projenin tamamlanmasıyla birlikte Çin mallarının Avrupa’ya ulaştırılması noktasında Türkiye’nin kilit bir rol oynayacağını söylemek mümkündür (Akdağ, 2019: 82). Bununla birlikte Kuşak yol projesi sürecinde Türkiye ile Çin arasındaki ticari ilişkilerin sadece bir transit ülke formasyonunda olmadığını, kuşak yol projesinin Çin ile Türkiye arasındaki ticari ilişkilerin gelişmesine de önemli katkılarda bulunduğunu ifade etmek gerekir. Bununla birlikte iki ülke arasındaki ticaretin gelişimi Kuşak yol projesinin açıklanmasından hemen sonraki dönem de değil, çok daha sonraki yıllarda gerçekleşmiştir. Tablo 1 de yer alan veriler, iki ülke arasındaki ticarete incelenen dönem boyunca Türkiye’nin net ihracatçı konumunda olduğunu göstermektedir. Aynı tabloda Türkiye’nin Çin’e ihracatının 2013 yılında 3.7 milyar dolar olduğu ancak sonraki dönemde Türkiye’nin Çin’den elde ettiği ihracat gelirlerinin sürekli olarak 3 milyar doların altında gerçekleştiği görülmektedir. Türkiye’nin Çin’e ihracatından elde ettiği gelir 2021 yılında yaklaşık 3.6 milyar olarak gerçekleşmek suretiyle 2013 yılındaki seviyesini ancak yakalayabilmiş, 2022 yılında da bu seviye korunarak Çin’e yaklaşık 3.2 milyar dolarlık ihracat gerçekleştirilmiştir. 2017 yılında Çin’e yapılan ihracatta metal cevherleri ağırlık bir paya sahiptir. Çin’e satılan ürünlerin başında mermer, traverten, ekosin, su mermeri ve kireçli taşlar gelmektedir. Bu ürünleri krom cevheri, tabii barotlar, kıymetli metal cevherleri, kurşun cevherleri takip ederken, radyatör, yün ve yapağı da önemli ihracat ürünleri arasında yer almaktadır (Çatal, 2019: 108). 2021 yılında ise Çin’e ihracat edilen ürünler yine mermer ve traverten, diğer kıymetli metal cevherleri ve konsantreleri, kurşun, krom, bakır, demir, çinko, tabii borat cevherleri, bor oksitleri ve borik asitlerden oluşmuştur. Bu ürünlere ilaveten Türkiye’den Çin’e meyve, hayvansal ve bitkisel katı ve sıvı yağ, antepfıstığı, hububat, un, nişasta ve müstahzarları, su ürünleri ve süt ürünleri ihracatı (Dışişleri Bakanlığı, 2021). Bu bilgiler doğrultusunda hem ürün çeşitliliği hem de ihracat gelirleri açısından çok önemli değişikliklerin olmadığını ve kuşak yol projesinin Türkiye’nin Çin’e yönelik ihracatına olumlu yönde bir katkısının bulunmadığını söylemek mümkündür. Konuya ithalat açısından baktığımızda ise durum biraz farklılık göstermektedir. Tablo 1 de yer alan verilere bakıldığında

kuşak yol projesinin açıklanmasından sonraki 4 yıllık süreçte (2013-2016 dönemi) Türkiye'nin Çin'den gerçekleştirdiği ithalat için yaptığı ödemelerde neredeyse hiçbir değişiklik olmamış ve 2013 yılında 25,2 milyar dolar olarak gerçekleşen ithalat harcamaları 2016 yılında 25,4 milyar dolar olarak gerçekleşmiştir. Ancak sonraki 3 yılda Çin'den gerçekleştirilen ithalat azalmaya başlamış ve 2017 yılında 23,3 milyar dolara gerileyen ithalat harcamaları 2019 yılında daha da gerileyerek 19,1 milyar dolar olarak gerçekleşmiştir. Ancak 2019 yılından itibaren Türkiye'nin Çin'den gerçekleştirdiği ithalatta yıllar itibariyle önemli artışlar yaşanmış ve 2019 yılında 19,1 milyar dolar olan ithalat harcamaları sırasıyla 2020 yılında 23 milyar dolara, 2021 yılında 32,2 milyar dolara ve son olarak 2022 yılında 41,3 milyar dolar olarak yükselmiştir. Bu gelişme, ihracatın sabit kaldığı bir ticari ilişki içerisinde Türkiye'nin Çin ile olan dış ticaretinde açık vermesine neden olmuştur. Bu bağlamda Kuşak yol projesinin Türkiye ile Çin arasındaki ticarete gecikmeli olarak ve Çin'in lehine olacak şekilde bir gelişme gösterdiğini söylemek mümkündür. 2022 yılında Çin'den elektronik aksamli makine ve makine parçaları, manyetik veya optik okuyucular, telefon ve TV başta olmak üzere çok sayıda elektrikli ve elektronik makine ile teçhizatlar, demir-çelik ürünleri, otomotiv yedek parçaları, makine sanayi, organik kimyasallar ve plastik sanayi başta olmak üzere pek çok sektör için hammadde ve yarı mamul ithal edilmiştir (Alan 2023). Tablo 1. de yer alan veriler incelendiğinde Türkiye'nin Çin'e olan ihracatının son derece sınırlı düzeylerde gerçekleştiği görülmektedir. İncelen dönemin başı itibariyle Türkiye'nin Çin'e olan ihracatı toplam ihracatın sadece % 0.11'i kadar iken bu oran sonraki yıllarda artış göstermiş olmakla birlikte yine de son derece düşük düzeylerde gerçekleşmiştir. 1. alt dönem olan 2003-2012 döneminde Türkiye'nin Çin'e ihracatının 2011 yılı hariç oransal olarak artış eğiliminde olduğu ve 2012 yılında % 1,86 olarak, incelen alt dönem itibariyle en yüksek ihracat oranının ise 2010 yılında % 1,99 olarak gerçekleştiği görülmektedir. Başlangıcını kuşak yol projesinin açıklandığı tarih oluşturan ikinci alt dönemde (2013-2022) ise Türkiye'nin Çin'e ihracatında oransal olarak çok büyük dalgalanmalar olmamış ve ortalama olarak % 1.60 oranında gerçekleşmiştir. İncelen ikinci alt dönem (2013-2022) boyunca en yüksek oransal değere kuşak yol projesinin açıklandığı yıl olan 2013 yılında ulaşılmış ve Türkiye'nin Çin'e ihracatı % 2,33 olmuştur. En düşük oransal değer ise 2022 yılında % 1,29 olarak gerçekleşmiştir. Bu veriler doğrultusunda, projenin ilan edildiği yıl hariç son 10 yıllık dönemde kuşak yol projesinin Türkiye'nin Çin'e olan ihracatını çok da fazla etkilemediği ve dönemin genelinde istikrarlı bir yapının geçerli olduğu anlaşılmaktadır. 2013 yılındaki sıçramayı ise kuşak yol projesinin doğurduğu ticaret artırıcı beklentiye bağlamak mümkündür. 2013-2022 yıllarını kapsayan 2. alt dönemi 2003-2012 yıllarını kapsayan 1. alt dönem ile

karşılaştırdığımızda ise 1. dönemdeki Türkiye'nin Çin'e olan ihracatındaki oransal artış eğiliminin 2. dönemde belli bir ortalama düzeyde durağanlaştığı görülmektedir. Bir diğer ifadeyle kuşak yol projesinden önceki dönemde Türkiye'nin Çin'e olan ihracatı oransal olarak artış eğiliminde iken kuşak yol projesinin açıklanmasından sonraki dönemde durağanlaşmış ve hatta 2022 yılı itibarıyla de önemli azalış göstermiş durumdadır. Bu değerlendirmeler kuşak yol projesinin Türkiye'nin Çin'e olan ihracatını çok da fazla olumlu yönde etkilemediğini göstermektedir.

Tablo 1. Türkiye ile Çin Arasındaki Dış Ticaret Verileri

Yıllar	Türkiye'nin Çin'e İhracatı (Dolar)	Türkiye'nin Toplam İhracatı (Dolar)	Türkiye'nin Çin'e İhracatının Toplam İhracat İçindeki Payı (%)	Türkiye'nin Çin'den İthalatı (Dolar)	Türkiye'nin Toplam İthalatı (Dolar)	Türkiye'nin Çin'den İthalatının Toplam İthalat İçindeki Payı (%)
2003	504,62	47,252,564	0,11	2,610,298	69,337,117	3,76
2004	391,585	63,167,153	0,62	4,476,076	97,537,611	4,59
2005	549,764	73,476,408	0,75	6,885,164	116,770,590	5,90
2006	693,038	85,534,462	0,81	9,669,100	139,571,710	6,93
2007	1,039,523	107,271,750	0,97	13,234,092	170,062,715	7,78
2008	1,437,204	132,027,196	1,09	15,658,210	201,963,574	7,75
2009	1,600,296	102,142,613	1,57	12,676,573	140,928,421	9,00
2010	2,269,175	113,883,219	1,99	17,180,806	185,544,332	9,26
2011	2,466,316	134,906,869	1,83	21,693,336	240,841,676	9,01
2012	2,833,255	152,461,737	1,86	21,295,242	236,545,141	9,00
2013	3,755,649	161,480,915	2,33	25,260,751	260,822,803	9,69
2014	2,970,633	166,504,862	1,78	25,732,865	251,142,429	10,25
2015	2,414,790	143,844,066	1,68	24,873,457	207,235,628	12,00
2016	2,329,371	142,606,247	1,63	25,440,454	198,601,934	12,81
2017	2,936,262	156,992,940	1,87	23,370,620	233,799,651	10,00
2018	2,912,539	167,923,862	1,73	20,719,061	223,046,879	9,29
2019	2,726,571	180,870,841	1,51	19,127,972	210,346,890	9,09
2020	2,866,389	169,657,940	1,69	23,040,812	219,514,373	10,50
2021	3,662,823	225,264,314	1,63	32,239,211	271,422,758	11,88
2022	3,281,120	254,171,899	1,29	41,353,932	363,710,987	11,37

Kaynak: Trademap.org (Erişim: 22.11.2023)

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c792%7c%7c156%7c%7cT

OTAL%7c%7c%7c2%7c1%7c1%7c1%7c2%7c1%7c1%7c1%7c1%7c1

https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c792%7c%7c156%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1

Türkiye'nin Çin'den olan ithalat değerlerine baktığımızda ise ihracatın aksine yüksek oranların söz konusu olduğu görülmektedir. Böyle bir durumun ortaya çıkmasında Türkiye'nin Çin'den gerçekleştirdiği Demir-Çelik ürünleri ithalatının önemli olduğunu söylemek mümkündür. Ayrıca Demir-Çelik ürünleri ithalatına son dönemlerde haberleşme ve ses kaydetme cihazlarının ithalatındaki artış da eklenince Türkiye'nin Çin'den gerçekleştirdiği ithalat için yaptığı ödeme miktarı hızlı bir şekilde arttığı, özellikle 2019 yılından sonraki dönemde bu artışların hızlandığı görülmektedir. Tablo 1 de yer alan verileri kuşak yol projesi açısından değerlendirdiğimizde ise ihracattakine benzer bir durumun söz konusu olduğunu söylemek mümkündür. Kuşak yol projesinin açıklanmasından önceki 1. alt dönemin (2003-2012) ilk yıllarında Türkiye'nin Çin'den gerçekleştirdiği ithalatın nominal değeri 2009 yılına kadar sürekli olarak artış göstermiş ve 2008 yılı itibariyle 15,6 milyar dolara kadar yükselmiştir. 2009 yılında ise 2008 küresel krizi nedeniyle keskin bir azalışın yaşandığı ve 12,6 milyar dolara kadar geriledikten sonra bir sonraki yıl yeniden hızlı bir artış gösterdiği ve 17, 1 milyar dolar olarak gerçekleştiği, kuşak yol projesinin açıklanmasından önceki iki yılda ise ithalat harcamalarını 21 milyar dolar seviyesinde gerçekleştirdiği görülmektedir. Bu veriler doğrultusunda Türkiye'nin Çin'den ithalatının kuşak yol projesi açıklanmadan önceki 10 yıllık dönemde 2008 yılındaki kriz yılı hariç genel olarak artış eğiliminde olduğu anlaşılmaktadır. Kuşak yol projesinin açıklanmasından sonraki 10 yıllık dönemde ise Türkiye'nin Çin'den ithalatının inişli çıkışlı bir seyir izlediği ve 2017 yılına kadar ortalama olarak 25 milyar dolar seviyesinde gerçekleştiği, 2017 yılından 2019 yılına kadar önemli miktarda gerilediği 2019 yılında 19,1 milyar dolar olarak gerçekleştiği görülmektedir. Ancak 2019 yılından sonraki 4 yıllık dönemde önemli bir artış ivmesi yakalamış olan ithalat harcamaları 2022 yılı itibariyle 41,3 milyar dolara kadar yükselmiştir. Bu veriler doğrultusunda Kuşak yol projesinden önceki 10 yıllık ve sonraki 10 yıllık dönemi karşılaştığımız zaman, 2003-2022 döneminde kriz yılı hariç Çin'den yapılan ithalatın düzenli olarak artış eğiliminde olduğu kuşak yol projesinin açıklanmasından sonraki ilk 4 yıllık dönemde ithalat açısından stabil bir sürecin yaşandığı, sonraki 3 yıllık dönemde keskin düşüşlerin yaşandığı ve son 3 yıllık dönemde ise önemli yükselişlerin meydana geldiği görülmektedir. Türkiye'nin Çin'den ithalatının toplam ithalat içindeki payına bakıldığında ise benzer bir durum ile karşılaşılmaktadır. Türkiye'nin Çin'den yaptığı ithalatın toplam ithalat içindeki payı, 2003 yılından 2009 yılına kadar hızlı bir şekilde artış göstermiş ve 2009 yılında % 9 olarak gerçekleşmiştir. 2009 yılından 2013 yılına kadar olan süreçte ise bu oranın korunduğu ve ortalama olarak % 9 civarında gerçekleştiği görülmektedir. Kuşak yol projesinin açıklanmasından sonraki 10 yıllık dönemde ise 2013 yılında 2016 yılına kadar Türkiye'nin

Çin'den ithalatının toplam ithalat içindeki payı artış göstermiş ve 2026 yılı itibariyle % 12,81 olarak gerçekleşmişti. Sonraki yıllarda ise bu oran ortalama olarak % 10-11 seviyelerinde gerçekleşmiştir. Bu bağlamda Türkiye'nin Çin ile olan dış ticaretin sürekli olarak Türkiye'nin aleyhine geliştiğini, kuşak yol projesinin etkilerinin, projenin açıklanmasından sonraki ilk 4 yılda (2013-2016) Türkiye'nin aleyhine olacak şekilde ciddi şekilde hissedildiğini ve Çin ile olan ticarete ilişkin olarak dış ticaret açıklarını artırdığını, sonraki dönemde ise yine Türkiye'nin aleyhine olacak şekilde istikrarlı bir yapıya kavuştuğunu söylemek mümkündür. Bütün bu değerlendirmeler neticesinde kuşak yol projesinin açıklanmasından önceki dönemde Türkiye'nin Çin ile olan dış ticaret faaliyetlerinin artış eğiliminde olduğunu, kuşak yol projesinin açıklanmasından sonraki 10 yıllık dönemde ise iki ülke arasındaki ticari faaliyetlerin hız kazandığını, bu bağlam kuşak yol projesinin dış ticaret açısından Çin lehine, Türkiye aleyhine sonuçlarının olduğunu söylemek mümkündür.

SONUÇ

Son dönemin en önemli ekonomik ve küresel nitelikli projelerinden biri olan Kuşak yol projesi, Çin merkezli ve finansmanı da yine Çin tarafından planmış olan bir projedir. Projenin temel amacı oluşturulmuş güzergâh ve koridorlar üzerindeki ülkeler arasında ekonomik iş birliğini geliştirmek, ticari canlılığı artırmak ve bu sayede proje kapsamındaki 65 ülkede refah düzeyini iyileştirmektir. Bu temel amaçlar yanında ticaretin en önemli unsurlarından biri olan taşımacılık faaliyetleri için ülkelerin ulaşım altyapılarını iyileştirmek ve bölgesel nitelikli kalkınma planlarını hayata geçirmek de projenin önemli amaçları arasında yer almaktadır. Kazan-kazan mantığına dayalı olarak ortaya atılmış olan kuşak yol projesinde amaca uygun faaliyetler ve girişimlerde bulunmuş olmasına karşın ağırlıklı olarak Çin'in önemli ekonomik kazanımlar sağladığı gözlemlenmektedir. Zira daha önce de ifade edildiği üzere Çin projenin planlayıcısı ve finansman kaynağı konumundadır. Bu durum nedeniyle de projenin uygulanma sürecinde belirlemiş olduğu kurallar çerçevesinde Çin'in dünya ticaretini dizayn etme gayret ve eğiliminde olduğu anlaşılmaktadır. Böyle bir gayretin temelinde ise Çin'in önemli miktarlarda hammaddeye, doğal kaynağa ve ucuz iş gücüne sahip olması nedeniyle üretim miktarındaki artışlar yatmaktadır. Zira sahip olduğu bu üretim faktörleri nedeniyle Çin, Dünya'nın net ihracatçısı konumundaki bir ülkedir ve üretilen ürünlerin ihraç edilebilmesi için çok sayıda ve büyük pazarlara ihtiyaç bulunmaktadır. Bu noktada kuşak yol projesi Çin'in bu amacına hizmet edecek önemli projelerden biri belki de en önemlisidir.

Kuşak yol projesinin gerek Çin gerekse de bölge ülkeleri açısından en önemli ülkelerinden biri Türkiye'dir. Türkiye gerek coğrafi konumu gerek tüketici nitelikteki genç nüfusu ve gerekse de

gelişim sürecinde, girişimci ve yeniliklere açık yapısıyla kuşak yol projesinin en kilit ülkelerinden biri konumundadır. Ayrıca Çin özelinde Türkiye, kuşak yol projesinin önemli parçalarından birini teşkil etmektedir. Zira Türkiye, kısa adıyla orta koridor olarak bilinen ve Çin'i Avrupa'ya bağlayan Çin-Orta Asya- Batı Asya ekonomik koridoru üzerinde bulunmaktadır. Bu niteliği ve coğrafi konumu itibarıyla Türkiye, Çin'in Avrupa'ya mallarını ulaştırabilmesin için güvenli bir geçiş ülkesi niteliğindedir. Ayrıca sahip olduğu genç nüfus nedeniyle Türkiye, Çin için mallarını satabileceği önemli bir pazar niteliğine sahiptir. Bu iki nitelik Türkiye'yi proje kapsamında diğer ülkelere kıyasla çok daha önemli hale getirmektedir. Doğal olarak bu proje kapsamında Türkiye'de bir takım ekonomik kazanımlar elde etmektedir. Özellikle güzergâh üzerindeki yakın ülkelerle yapılacak ticaretler sayesinde ihtiyaç duyulan ürünler çok daha kolay temin edilebilmekte ve bu ülkelere ihracatta artışlar söz konusu olabilmektedir. Ama bu durum Çin ile Türkiye arasındaki dış ticaret ilişkileri için söz konusu değildir. Yapılan inceleme ve değerlendirmeler neticesinde Türkiye'nin Çin ile olan ticaretinde Çin'in Türkiye karşısında net ihracatçı ülke konumunda olduğu ve bunun karşılığında doğal olarak Türkiye'nin Çin'e karşı sürekli olarak ve büyük miktarlarda dış ticaret açığı verdiği anlaşılmaktadır. Bunun temelinde ise Türkiye'nin tüketici niteliği ağır basan genç bir nüfusa sahip olmasının etkili olduğunu söylemek mümkündür. Zira Çin'den gerçekleştirilen ithalatta elektronik aksamli makine ve makine parçaları, telefon ve TV başta olmak üzere çok sayıda elektrikli ve elektronik makine ile teçhizatları, Demir-Çelik ürünleri, otomotiv yedek parçaları önemli bir paya sahiptir. Özellikle son yıllarda Türkiye'nin Çin'e olan ihracatında herhangi bir artış söz konusu olmazken Çin'den ithalatında çok hızlı bir artışın gerçekleşmiştir, ki bu da Türkiye'nin Çin ile olan dış ticaretinde çok büyük açıklar vermesine neden olmaktadır. Bu bağlamda kuşak yol projesinin hareket noktası olan kazan-kazan mantığı Türkiye ile Çin arasındaki dış ticaret için geçerli değildir. Bu bağlamda hem küresel nitelikteki hem de Çin özelindeki bağımlılıktan kurtulmak için mutlak surette teknoloji ve elektronik sektörüne yönelik yatırımlara ağırlık verilmeli, üretim maliyetlerini düşürmeye yönelik tedbirler alınmalı, milli girdiler kullanılmak suretiyle kendi üretimimizi gerçekleştirmeye yönelik girişimlerde bulunulmalı ve beşerî sermayenin gelişimine daha kaynak ayrılmalıdır.

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BİRLEŞTİRİLMİŞ SINIFTA SİMÜLASYONUN ELDESİZ TOPLAMAYA ETKİSİ

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Özet

Bu araştırmanın amacı birleştirilmiş sınıflı ilkokullardaki 2. sınıf öğrencilerine simülasyon destekli öğretimin matematik dersi başarısına etkisini araştırmaktır. Bu araştırmanın yöntemi nicel araştırma yöntemlerinden yarı deneysel araştırma yöntemidir. Araştırmanın modeli ön test-son test kontrol gruplu yarı deneysel araştırma modelidir. Araştırmanın örneklemini Kahramanmaraş ili Onikişubat İlçesi ile Mardin İli Savur ilçesinde bulunan toplam 4 farklı birleştirilmiş sınıflı ilkokulun 2.sınıfında okuyan öğrencilerden toplam 4 farklı şube oluşturmaktadır. Her gruba araştırma öncesinde Millî Eğitim Bakanlığı'nın yayınlamış olduğu ders kitabı ve çalışma soruları kitaplarında bulunan geçerliliği ve güvenilirliği test edilmiş çoktan seçmeli 10 adet sorudan oluşturulan bir ölçek (Eldesiz Toplama İşlemi Başarı Testi), ön test olarak uygulanmıştır. Hazırlanan başarı testi uzman bir sınıf öğretmeninin görüşleri doğrultusunda MEB kitaplarındaki sorulardan seçim yapılarak oluşturulmuştur. Ön test sonucunda aritmetik puan ortalaması diğer gruba göre daha düşük olan Kahramanmaraş ili Onikişubat ilçesinde seçilen sınıfların bir şubesi ve Mardin ili Savur ilçesinde seçilen sınıfların bir şubesi toplam 2 şube deney grubu olarak belirlenmiştir. Aritmetik puan ortalaması daha yüksek olan diğer iki şube ise kontrol grubu olarak belirlenmiştir. 'Toplamları 100'e kadar olan doğal sayılarla eldesiz toplama işlemi yapar' adlı kazanımını deney grubunda simülasyon yöntemi ile, kontrol grubunda ise müfredatın önerdiği öğretim yöntemi kullanılmıştır. Başarı testi (Eldesiz Toplama İşlemi Başarı Testi) çalışma gruplarına bir hafta arayla tekrar uygulanmıştır. Veriler SPSS programı ile analiz edilmiş olup araştırma sonucunda simülasyon materyali ile öğrenim gören deney grubunun başarısının, müfredatın önerdiği yöntem ile öğrenim gören kontrol grubunun başarısına göre anlamlı düzeyde daha yüksek olduğu görülmüştür. Bu bulgular sonucunda MEB'in müfredatına simülasyon destekli materyal kullanımının eklenmesi önerilmektedir.

Anahtar kelimeler: Birleştirilmiş Sınıf, Simülasyon, ilkokul, eldesiz toplama, matematik

THE EFFECT OF SIMULATION ON HANDLESS ADDITION IN A COMBINED CLASSROOM

Abstract

The purpose of this research is to investigate the effect of simulation-supported teaching on mathematics course success for 2nd grade students in primary schools with multigrade classes. The method of this research is the semi-experimental research method, one of the quantitative research methods. The model of the research is a quasi-experimental research model with a pretest-posttest control group. The sample of the research consists of a total of 4 different students studying in the second grade of 4 different multi-grade primary schools in Kahramanmaraş province Onikişubat District and Mardin Province Savur district. Before the research, a scale consisting of 10 multiple-choice questions whose validity and reliability were tested in the textbooks and study question books published by the Ministry of National Education was applied to each group as a pre-test. The prepared achievement test was created by selecting questions from the Ministry of Education books in line with the opinions of an expert classroom teacher. As a result of the pre-test, one branch of the classes selected in Onikişubat district of Kahramanmaraş province, whose arithmetic score average was lower than the other group, and one branch of the classes selected in Savur district of Mardin province, were determined as the experimental group, for a total of 2 branches. The other two branches with higher arithmetic score averages were determined as the control group. The learning outcome named 'Performs addition without carrying with natural numbers whose sum is up to 100' was used with the simulation method in the experimental group, and the teaching method recommended by the curriculum was used in the control group. The achievement test (Non-Carry Addition Achievement Test) was re-applied to the study groups with an interval of one week. The data were analyzed with the SPSS program, and as a result of the research, it was seen that the success of the experimental group, which learned with the simulation material, was significantly higher than the success of the control group, which learned with the method recommended by the curriculum. As a result of these findings, it is recommended to add the use of simulation-supported materials to the curriculum of the Ministry of Education.

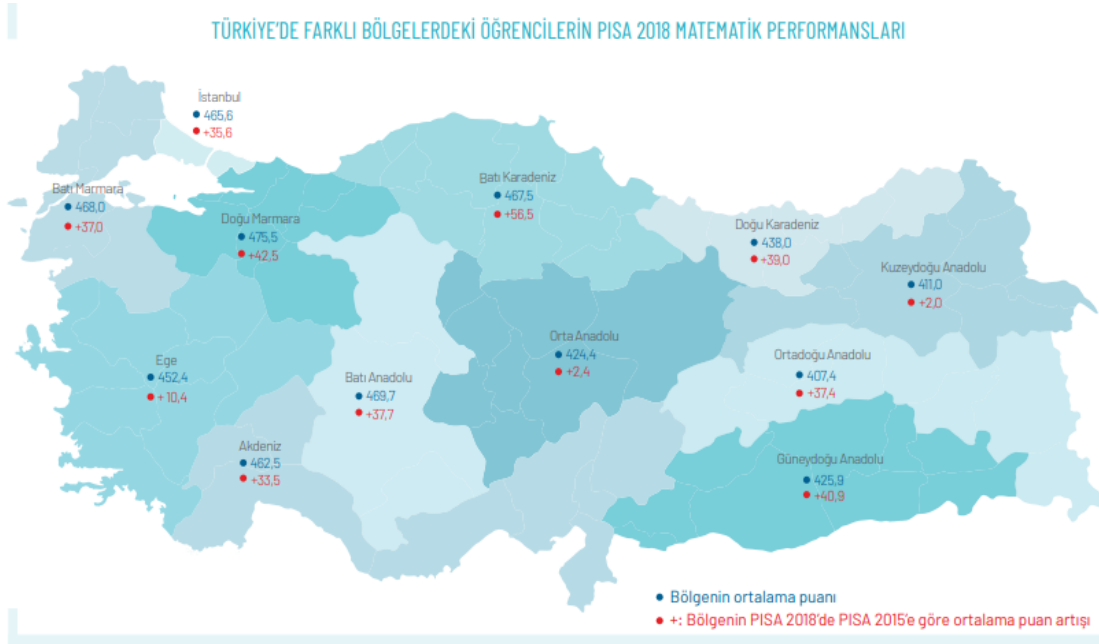
Keywords: Multigrade Class, Simulation, primary school, addition without carrying, mathematics.

Giriş

Matematik dersi, öğrenciler tarafından pek can atılmayan, derste büyük bir ilgiyle dinlenilmeyen ve daha ders başlamadan ön yargıyla yaklaşılın, öğretmenler tarafından ise öğretilmesinde güçlükler yaşanan ve öğrencinin ilgisini çekmenin güç olduğu bir ders olarak görülmektedir (Öcalan, 2004; Peker ve Mirasyedioğlu, 2003). Bulduğumuz ülkede öğrencilerin büyük bir çoğunluğu matematik dersinde başarısız olacaklarını düşünerek kaygılanmakta, bu sebeple de bu derse karşı negatif bir tutum göstermektedirler. Kavramların soyut olması öğretmen için anlatımını öğrenci için anlaşılmasını güçleştirir (Baykul,2005).

PISA 2018 Türkiye ön raporuna göre ortaya çıkan en önemli sorunlardan biri okullar ve bölgeler arasındaki başarı farkıdır (şekil 1). Sadece bu raporda değil daha önceki üç PISA araştırmasında da MEB'in yayınladığı raporlarda okullar ve bölgeler arasındaki farklılıklar göze çarpmıştı. Bu sorunların hala devam ettiği 2018 raporunda da görülmektedir.

Şekil 1. Türkiye’de Farklı Bölgelerdeki Öğrencilerin PISA 2018 Matematik Performansları



MEB bu konuda İYEP (ilkokullarda yetiştirme program) gibi birçok proje yapmıştır. Bu başarı farkını daha da aza indirmek, bireylerin 21. yüzyılın maharetlerine sahip olmasını sağlamak ve onların daha fazla teknolojiden yararlanmasını sağlamak için MEB, FATİH (Fırsatları Arttırma ve Teknolojiye İyileştirme Hareketi) projesini başlatmış ve bunu kırsallara kadar indirebilmiştir. Ülkemizde eğitime olan teknolojik yatırımlar son zamanda ivme kazanmış, sınıflar bu

teknolojik aletlerle donatılmış ve çocukların bu yeni cihazlar, teknolojiler ile tanışmasına olanak sağlamıştır. FATİH (Fırsatları Arttırma ve Teknolojiye İyileştirme Hareketi), bunu destekleyen bir projedir (MEB,2018). Öğretim programlarında da yer alan “dijital yetkinlik” ismiyle tayin edilen yetkinlikle, öğretmen adaylarının teknolojiyi verimli kullanmaları beklenmiştir. Buradan da anlaşılıyor ki MEB, öğretmenlerin teknolojiyi verimli bir şekilde kullanmaları ve çağa ayak uydurup öğrencileri de ona göre yetiştirmeleri için çaba sarf etmiştir (MEB, 2013 akt. Önal,2022).

Hızla gelişen teknolojinin eğitime de yedirilmesi gerektiği kaçınılmaz bir gerçektir (Güven & Sülün, 2012). Eğitimde teknolojiyi kullanmanın faydalarına değinmek gerekirse; öğrenmeyi kolay ve eğlenceli hale getirme, ilköğretim çocuğunun anlayabileceği şekilde dersi daha somut hale getirme, olabildiğince çok duyu organına hitap edebilme, basamaklı öğrenmenin temelini sağlamlaştırma vb. olarak sıralayabiliriz (Yaylacı ve Yaylacı, 1999). Teknolojik materyallerle desteklenen matematik dersi, çocukların öğrenme stillerine daha çok hitap eder ve çoklu zekayı destekleyen bir ortam sunar (Duran, Özden, & Yeşilyurt, 2023), (Akyıldız, Uçan, & Yeşilyurt, 2023), (Çelikçi, Karabacak, & Yeşilyurt, 2023).

Çalışmanın Varsayımları ise aşağıdaki gibidir;

- 1.Kontrol altına alınan veya alınamayan farklı değişkenlerin kontrol grubu ve deney grubunu aynı şekilde ve aynı oranda etkilediği,
- 2.Çalışmada deney grubuna uygulanan simülasyon destekli eğitimin amacına uygun olduğu,
- 3.Öğrencilerin başarı testinde yer alan sorulara içtenlikle cevap verdiği varsayılmıştır.

ARAŞTIRMA

Bu bölümde araştırmanın modeli, amacı, problemi, evreni, örnekleme, veri toplama aracı ve verilerin analizi bulunmaktadır.

Araştırmanın Modeli

Yapılan araştırmada nicel araştırma yöntemlerinden, Ön Test-Son Test kullanılarak kontrol ve deney grubu belirlenerek, yarı deneysel desen araştırma yöntemi kullanılmıştır. Yarı deneysel araştırma modeli, araştırmada deney ve kontrol grubunu yansız bir şekilde seçilen ve bir değişkenin sebep-sonuç ilişkisini belirlemek için kullanılan bir modeldir (Özmen & Karamustafaoğlu, 2019, s. 210).

Araştırma deseninde kullanılan bağımsız değişken "simülasyon ile desteklenen öğretim yöntemi - geleneksel öğretim yöntemi" iken, bağımlı değişken ise "birleştirilmiş sınıf

öğrencilerinin eldesiz toplama işlemi başarı düzeyi"dir. Araştıranlar tarafından yapılan seçkisiz atama yöntemi ile belirlenen şubelerden yapılan ön test sonucunun ortalamasının daha düşük olduğu şube, deney grubu; ön test sonucunun daha yüksek olduğu şube kontrol grubu olarak belirlenmiştir(Tablo 1).

Tablo 1. Ön Test Ortalamaları

<i>Okul</i>	<i>Gruplar</i>	<i>Ön Test</i>	<i>N</i>	<i>X</i>
<i>Onikişubat/ Kahramanmaraş</i>	<i>Kızılseki İlkokulu</i>	<i>Başarı Testi</i>	<i>3</i>	<i>43,33</i>
	<i>Ö İlkokulu</i>		<i>2</i>	<i>45,00</i>
<i>Savur /Mardin</i>	<i>Bengisu İlkokulu</i>	<i>Başarı Testi</i>	<i>4</i>	<i>44,00</i>
	<i>M İlkokulu</i>		<i>5</i>	<i>47,50</i>

Kontrol grubunda yapılan öğretim Milli Eğitim Bakanlığı Talim Terbiye Kurulunun müfredatına uygun olarak gerçekleştirilmiştir. Deney grubunda yapılan öğretim, öğrencilerin aktif bir şekilde katılması gözetilerek akıllı tahtadan etkileşimli olarak Okulistik desteği ile gerçekleştirilmiştir. Araştırma için izlenen yol Tablo 2’de belirtilmiştir.

Tablo 2. Araştırma İçin İzlenen Yol

<i>Okul</i>	<i>Gruplar</i>	<i>Öğretim Öncesi</i>	<i>Öğretim Yöntemi</i>	<i>Öğretim Sonrası</i>
<i>Onikişubat /Kahramanmaraş</i>	<i>Deney Grubu N=3</i>	<i>Zihinden Toplama Başarı Testi (Ön Test)</i>	<i>Simülasyon Destekli Öğretim</i>	<i>Zihinden Toplama Başarı Testi (Son Test)</i>
	<i>Kontrol Grubu N=2</i>		<i>Müfredata Uygun Öğretim</i>	
<i>Savur /Mardin</i>	<i>Deney Grubu N=5</i>	<i>Zihinden Toplama Başarı Testi (Ön Test)</i>	<i>Simülasyon Destekli Öğretim</i>	<i>Zihinden Toplama Başarı Testi (Son Test)</i>
	<i>Kontrol Grubu N=4</i>		<i>Müfredata Uygun Öğretim</i>	

Araştırmanın Amacı

2.sınıf matematik dersindeki doğal sayılar ünitesinden seçilen “Toplamları 100’e kadar olan doğal sayılarla eldesiz toplama işlemini yapar.” konusunun simülasyon destekli teknolojik materyallerle yapılan öğretimin öğrencilerin akademik başarıları üzerindeki etkisini belirlemektir.

Araştırmanın Problemi

Araştırmanın problemi, ilkokulda birleştirilmiş sınıfta öğrenim gören 2. sınıf öğrencilerinin simülasyon destekli teknolojik materyallerle yapılan öğretim programının eldesiz toplamaya etkisi incelenmek istenmiştir. Araştırmanın alt problem cümlesi; Simülasyon destekli teknolojik materyallerle yapılan bir öğretim yönteminin uygulandığı deney grubu öğrencileri ile müfredatın önerdiği anlatım yönteminin uygulandığı kontrol grubu öğrencilerinin matematik dersinde eldesiz toplama konusuna ilişkin akademik başarıları açısından farklılık var mıdır?

Bu araştırma; ilkokul 2. sınıf Matematik dersi “Doğal Sayılar” ünitesi, “Toplamları 100’e kadar olan doğal sayılarla eldesiz toplama işlemini yapar.” konusu deney grubunda kullanılmak üzere teknolojik öğretim materyali ve 2023-2024 öğretim yılı, Kahramanmaraş İli Onikişubat İlçesi ile Mardin İli Savur ilçesinde bulunan toplam 4 farklı birleştirilmiş sınıflı ilkokulun 2. sınıfında okuyan öğrencilerden toplam 4 farklı şube oluşturmaktadır. Etik nedenlerden dolayı okul isimleri açıkça belirtilmemiştir.

Araştırmanın Örneklemi

Araştırmada çalışma grubu, 2023-2024 Eğitim Öğretim yılı içerisinde Kahramanmaraş İli Onikişubat İlçesinde bulunan ve devlet okulunda öğrenim gören 5 tane birleştirilmiş sınıflı okulda öğrenim gören 2. sınıf öğrencisi ve Mardin ili Savur ilçesinde bulunan ve devlet okulunda öğrenim gören 9 tane 2. sınıf öğrencisi olmak üzere, birleştirilmiş sınıfta öğrenim gören toplam 14 öğrenciden oluşmaktadır. Örneklem, araştırmaya hız ve kolaylık sağlaması için kolay ulaşılabilir örnekleme yöntemi olarak belirlenmiştir.

Veri Toplama Aracı

Araştırmada belirlenen veri toplama aracı 2023-2024 Eğitim Öğretim yılında kullanılan MEB’in öğrencilere uygun görmüş olduğu EBA sisteminde bulunan tarama testlerinden ve matematik ders kitaplarında bulunan “Toplamları 100’e kadar olan doğal sayılarla eldesiz toplama işlemini yapar.” kazanımına uygun görülen sorulardan, geliştirilen 10 maddelik

“Eldesiz Toplama İşlemi Başarı Testi” hazırlanmıştır. Hazırlanan testte her doğru cevap 10 puan, yanlış cevaplar 0 puan olacak şekilde puanlandırma yapılmış ve başarı testine ilişkin başarı verileri elde edilmiştir. Bu puanlama doğrultusunda testten alınabilecek en yüksek puan 100 olurken en düşük puan 0 olarak hesaplanmıştır. Araştırmada uygulanan ön test ve son testler aynı sorulardan oluşmaktadır. Testler belirlenen kontrol ve deney gruplarına araştırmacılar tarafınca uygulanmıştır.

Verilerin Analizi

Araştırmada elde edilen veriler SPSS20.0 programı ile analiz edilmiştir. Ön test ve son test uygulanarak, deney ve kontrol gruplarından elde edilen verilerin arasındaki farkın bağımsız olarak analiz edilmesi için veriler Bağımsız Örneklem T testi uygulanarak analiz edilmiştir. Anlamlılık düzeyi 0.05 olarak belirlenmiş, deney ve kontrol gruplarından elde edilen verilerin arasında anlamlı bir fark olup olmadığı P değeri ile belirlenmiştir.

BULGULAR

Araştırma doğrultusunda elde edilen bulgular tablo halinde belirtilmiş ve tablolardaki verilere göre yorumlanmıştır.

Deney ve kontrol grubu öğrencilerinin ön test değişkenli t testi sonuçları Tablo 3’de verilmiştir.

Tablo 3. Ön Test T Testi Sonuçları

<i>Okullar</i>	<i>Değişken</i>	<i>Gruplar</i>	<i>N</i>	<i>X</i>	<i>SS</i>	<i>t</i>	<i>df</i>	<i>p</i>
<i>Onikişubat /Kahramanmaraş</i>	<i>Ön test</i>	<i>Deney</i>	3	43,33	5,773	-	3	,789
		<i>Kontrol</i>	2	45,00	7,071	-	,277	
<i>Savur /Mardin</i>	<i>Ön test</i>	<i>Deney</i>	5	44,00	11,401	-	7	,589
		<i>Kontrol</i>	4	47,50	5,000			

Tablo 3. incelendiğinde, deney ve kontrol grupları ortalamaları arasında çok da büyük bir fark olmadığını, yani düzeylerinin benzer olduğunu görüyoruz. P değerinin 0,05’den büyük olması

da deney ve kontrol grupları arasında anlamlı bir fark bulunmadığı tespit edilmiştir ($p=,789$, $p=,589$). Bu durum öğrencilerin ön bilgileri açısından ciddi oranda bir farklılık göstermediğini belirtmiştir. Deney ve kontrol grubu öğrencilerinin son test değişkenli t testi sonuçları Tablo 4'te verilmiştir.

Tablo 4. Son Test T testi Sonuçları

<i>Okullar</i>	<i>Değişken</i>	<i>Gruplar</i>	<i>N</i>	<i>X</i>	<i>SS</i>	<i>t</i>	<i>df</i>	<i>p</i>
<i>Onikişubat /Kahramanmaraş</i>	<i>Son test</i>	<i>Deney</i>	<i>3</i>	<i>76,66</i>	<i>5,773</i>	<i>3,873</i>	<i>3</i>	<i>,030</i>
		<i>Kontrol</i>	<i>2</i>	<i>60,00</i>	<i>0,0</i>			
<i>Savur /Mardin</i>	<i>Son test</i>	<i>Deney</i>	<i>5</i>	<i>76,00</i>	<i>5,477</i>	<i>2,679</i>	<i>7</i>	<i>,032</i>
		<i>Kontrol</i>	<i>4</i>	<i>62,50</i>	<i>9,574</i>			

Tablo 4. incelendiğinde, deney ve kontrol grupları son test puanları arasında anlamlı bir fark olduğu görülmektedir ($p=,030$, $p=,032$). Bu durum Tablo 3 ile karşılaştırıldığında yapılan deneysel çalışmanın deney grubunda eldesiz toplama kazanımında akademik başarı gösterildiğini belirtmektedir.

Deney ve kontrol grubu öğrencilerinin son test değişkenli Anova testi sonuçları Tablo 5'da verilmiştir.

Tablo 5. Son Test Değişkenli Anova Testi Sonuçları

<i>Değişken</i>	<i>Varyansın Kaynağı</i>	<i>Kareler Toplamı</i>	<i>df</i>	<i>Kareler Ortalaması</i>	<i>F</i>	<i>p</i>	<i>η^2</i>
<i>Son Test</i>	<i>Gruplar Arası</i>	<i>738,333</i>	<i>3</i>	<i>246,111</i>	<i>5,331</i>	<i>,019</i>	<i>0,615</i>
	<i>Gruplar İçi</i>	<i>461,667</i>	<i>10</i>	<i>46,167</i>			
	<i>Toplam</i>	<i>1200</i>	<i>13</i>				

Tablo 5 incelendiğinde, deney ve kontrol gruplarındaki öğrencilerin son testten aldıkları puanlar arasında anlamlı bir fark bulunmuştur. Bu durum teknolojik materyal kullanmanın

öğrencilerin eldesiz toplama kazanımı konusunda akademik başarıları üzerinde orta düzeyde (0,5 ile 0,8 arası) bir fark görüldüğünün göstergesidir($\eta^2=0,615$).

TARTIŞMA, SONUÇ VE ÖNERİLER

Bu araştırmada birleştirilmiş sınıflı ilkokulda öğrenim gören 2. sınıf matematik dersi eldesiz toplama konusunun öğretiminde, simülasyonun öğrencilerin akademik başarılarına etkisi incelenmiştir. Dört sınıf arasından belirlenen deney ve kontrol grupları arasında yapılan ön test puanları arasında anlamlı fark bulunamamıştır. Bu durum öğrencilerin düzeylerinin birbirine yakın olduğunu ifade etmektedir. Deney ve kontrol grupları arasında yapılan son test puanları arasında anlamlı bir fark bulunmuştur. Bu durum ise eldesiz toplama işlemi kazanımını öğrencilerin kazandığını göstermektedir. Ayrıca alanyazındaki bulgularda da simülasyonun öğrencilerin akademik başarısına olumlu etkisi olduğunu belirten ifadeler yer almaktadır.

Matematik dersi soyut olduğu için teknolojik materyallerle desteklendiğinde, soyut olan konular somutlaşmaya başlar. Özellikle somut işlem döneminde bulunan ilkokul öğrencilerine kavram ve konular simülasyon destekli materyallerle sunulduğunda öğrencilerde kalıcı öğrenmeye olumlu katkı sağlar. Ayrıca simülasyon destekli öğretim çoklu zeka öğrenme kuramına da uygundur. Matematik kazanımlarını somut işlemler döneminde bulunan ilkokul çağındaki çocukların daha kolay ve istekli şekilde öğrenmesi için bazı farklılıkların olması önemli bir gerekliliktir. Bunlar çizgi filmler, simülasyonlar, etkileşimli uygulamalar, matematiksel oyunlar veya materyaller olabilir. Bu yöntemler çocuklarca anlaşılması zor görünen kavramların daha kolay öğrenilmesine olumlu olarak ve önemli ölçüde katkı sağlar. Yani derslerin çeşitli teknolojik materyaller ile sunulmuş olması, çocukların bu alandaki başarısını doğru orantılı olarak desteklediği alanyazında bulunmaktadır (Duran, Özden, & Yeşilyurt, 2023), (Elmas, Doğan, & Yeşilyurt, 2023), (Çelikçi, Karabacak, & Yeşilyurt, 2023).

Araştırmada elde edilen sonuçtan yola çıkarak; birleştirilmiş sınıflarda sınıf öğretmenlerinin öğrencilerine ders sırasında müfredatın önerdiği yöntem ile ders anlatmasının yanı sıra simülasyon destekli teknolojik materyal kullanarak ders anlatması öğrencilerin akademik başarılarını olumlu etkilemekle birlikte öğrencilerin derse aktif katılmalarına ve güdülenmelerine destek olabilir.

Öğrenciler için ise teknolojik materyal kullanarak ders çalışmak kendi kendilerine öğrenme düzeylerine katkı sağlayabilir.

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MATEMATİK EĞİTİMİ ALANINDA YAYIMLANAN GÜNCEL ÇALIŞMALARIN EĞİLİMLERİ: ÖRNEKLEM YÖNTEM VE DÜZEYİ

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Özet

Bu araştırmanın amacı, farklı dizinlerde yayımlanan matematik eğitimi ile ilgili çalışmaların örneklem yöntemleri ile düzeylerini belirlemektir. Bu amaç doğrultusunda Web of Science, ERIC ve TR Dizin dergi veri tabanlarıyla beraber ProQuest, ve YÖK Tez Merkezlerinde yer alan, 2018-2023 yılları arasında yayınlanmış 287 adet bilimsel çalışma araştırma kapsamına dahil edilmiş ve incelenmiştir. Doküman analiz yönteminin kullanıldığı bu çalışmada verilerin analizi sürecinde içerik analizi yapılmıştır. İçerik analiz yapılırken çalışmaların yayınlandığı dizin, kullanılan örneklem türü ve örneklem düzeyleri dikkate alınmıştır. Elde edilen veriler, tablo ve grafikler aracılığıyla araştırmacılara sunulup frekans ve yüzdelere göre yorumlanmıştır. Araştırma bulgularına göre, bilimsel yayınlar örneklem türü olarak en çok amaçlı örneklem türünün tercih edildiği, kartopu örneklem türünün ise hiç kullanılmadığı tespit edilmiştir. Çalışmalardaki örneklem türünün ise çoğunlukla öğrencilerden oluştuğu ve daha çok ortaokul öğrencileri ile üniversite öğrencilerine yer verildiği belirlenmiştir. Araştırma sonunda, bu alanda yapılacak çalışmaların örneklem türü ve düzeyi olarak çeşitlendirilmesi gerektiğine vurgu yapılarak, araştırmacılara olağan eğilimle ilgili birtakım önerilerde bulunulmuştur.

Anahtar Kelimeler: Matematik eğitimi, örnekleme yöntemi, örneklem düzeyi, güncel araştırmalar.

**TRENDS OF CURRENT STUDIES PUBLISHED IN THE FIELD OF
MATHEMATICS EDUCATION: SAMPLING METHOD AND LEVEL**

Abstract

The aim of this study is to determine the sampling methods and levels of studies on mathematics education published in different databases. For this purpose, 287 scientific studies published between 2018-2023 in Web of Science, ERIC and TR Index journal databases, ProQuest, and YÖK Thesis Centres were included in the scope of the research and examined. In this study, where document analysis method was used, content analysis was used in the process of data analysis. During the content analysis, the index in which the studies were published, the type of sampling used and the sampling levels were taken into consideration. The data obtained were presented to the researchers through tables and graphs and interpreted according to frequencies and percentages. According to the research findings, it was determined that purposive sampling was mostly preferred as the sampling type in scientific publications, and snowball sampling was never used. It was determined that the samples in the studies mostly consisted of students and mostly secondary school students and university students were included. At the end of the research, it was emphasised that the studies to be conducted in this field should be diversified in terms of sample type and level, and some suggestions were made to the researchers about the usual tendency.

Keywords: Mathematics education, sampling method, sampling level, current research.

Giriş

Bilimsel alandaki teknik gelişimler ve değişimler, insanların varoluşundan sonra kaliteli yaşam isteğinin sonuçları arasında yer almakta olup belli bir sistematiklik çerçevesinde meydana gelmektedir. Matematik, en genel ifadeyle soyutlanmış bir yaşam biçimi olarak tanımlanmakta olup bu disiplin bilimsel ve teknik alanlardaki değişimlerin ve gelişmelerin öncüsü olarak ifade edilmektedir (Altun, 2006). İnsanlar doğada kalmayı sağladıktan ve yaşama alıştıktan sonra, hayatlarındaki soyutlamayı matematiğe entegre ederek yaşam şartlarını üretme boyutuna getirebilmiştir (Özkan, 2006). İnsanoğlunun bu üretebilme süreci temelde öğrenme kavramı ile genel anlamda ise eğitim kavramıyla yaşantımızda karşılığını bulmaktadır. Eğitimin ve öğretimin ana çerçevesi insan olup, bilim insanları tarafından bu konuda birçok tanımlama yapılmıştır (Gül, 2004). Yaşantısal farklılaşmalardan yola çıkılarak uzlaşa sağlanan tanım ise bireyin davranışlarında kendi yaşantısı yoluyla kasıtlı ve istendik yönde davranış değişikliği meydana getirme süreci şeklindedir (Fidan, 1986). Bu sürecin istendik olması ve davranışlarda kalıcı izli değişiklik meydana getirmesi, eğitimin en genel amacı olup bu durum matematik eğitimi alanı için de geçerlidir.

Türkiye’de matematik eğitimi alanı, evrensel boyutta yaşanan değişimlere paralel olarak 2005 yılından itibaren matematiğin anlamlı öğrenilmesini sağlamaya yönelik amaçlar oluşturmuştur (Bozkurt & Dülger, 2021). Bu değişimler eğitimin her aşamasında temel eğitimden başlayarak yüksek öğretime kadar devam etmektedir. Yaşanan bu değişim ile öğretme-öğrenme sürecinde öğretmenler bilgiyi doğrudan aktarandan rehber konumuna gelirken, öğrenciler ise pasif alıcı konumundan sorgulayan ve araştıran konumuna yönelmiştir (Millî Eğitim Bakanlığı [MEB], 2005). Yani öğretmen rolü kolaylaştırıcı, öğrenci ise süreçte daha aktif ve katılımcı bir yer edinmiştir. Matematik eğitiminde gerçekleşen bu değişimler, çağın gereklerine ayak uydurarak öğrenme süreçlerinin yürütülmesini gerekli kılmaktadır (National Council of Teachers of Mathematics [NCTM], 2011). Bu değişimlerin gerekçesi ise bireylerin günlük yaşamında farklı problemler veya sorunlarla karşı karşıya kalması gösterilmektedir (Kaya, 2022). Bunun yanı sıra değişimler aracılığıyla öğrenen bireylere yansıtıcı, yaratıcı ve eleştirel düşünme gibi üst düzey düşünme becerileri kazandırmak hedeflenmektedir (Işık, 2021). Öğrenen bireylerin öğrenme-öğretme sürecinde, bu üst düzey düşünce becerilerini kazanması ile günlük hayatla ve diğer disiplinlerle ilişkilendirmeler yaparak matematiksel becerilere sahip olması ve karşılaştığı problemleri çözebilme yetisine sahip olması sayesinde zorlukların üstesinden gelebilecekleri ifade edilmektedir (Çalışkan-Dedeoğlu & Eğerci, 2021). Bu çerçeveden bakıldığında, alanyazında matematik eğitiminin yadsınamaz bir yeri olduğu söylenebilir.

Alanyazında son zamanlarda yapılan çalışmaların, eğitim ve öğretim süreçlerini biçimlendirmede önemli bir katkısının olduğu görülmektedir (Korkmaz vd., 2022). Öğretim sürecinin geliştirilmesine yönelik yayınlanan çalışmalarda son yıllarda dikkate değer bir şekilde artış yaşanmaktadır. Yayınlanan bu çalışmaların bir kısmı eğitim alanına yönelik yeniliklere zemin hazırlarken, diğer bir kısmı ise önceden yapılmış konu ya da konular ile ilgili çalışma sonuçlarının betimlenmesi aracılığıyla güvenilirliğini veya içeriğini tespit etmeye çalışmaktadır (Karadağ, 2009). Hangi tür çalışma olursa olsun amaç itibarıyla, yapılan bu araştırmalar eğitimin kalitesini ve işlevselliğini arttırmaya yönelik düşünülebilir (Yavuz, 2016). Matematik eğitimi tarih boyunca birçok değişime uğramış olup, ülkemizdeki son zamanlardaki en köklü değişim 2005 yılında öğretim programları, materyalleri ve sürecinin yapılandırmacı yaklaşıma geçmesi ile olmuştur (İlhan & Aslaner, 2019). Yapılandırmacı eğitim yaklaşımı ile öğrenen bireyler merkeze alınmış olup, bu bireylerden birtakım üst düzey yeterlik ve yetkinlikler (akıl yürütme, problem çözme vb.) çerçevesinde öğretim sürecini takip etmeleri amaçlanmaktadır (MEB, 2005).

Günümüz dünyasında bilim ve teknoloji alanlarıyla beraber eğitimde yaşanan hızlı değişimler göz önüne alındığında belirli zaman aralıklarıyla yapılacak izleme ve değerlendirme araştırmalarına her geçen gün daha fazla ihtiyaç duyulduğu ifade edilmiştir (Kaya, 2022). Ayrıca, yapılan araştırmalarda 2005 yılından bu yana ciddi bir artışın olması da matematik eğitimi alanı için alınacak kararların kalite ve yeterliliğin değerlendirilmesinde bu ve buna benzer çalışmaların yapılmasını gerektirmektedir (Çiltaş vd., 2012). Dolayısıyla matematik eğitimi için yaşanan gelişmeler ve yeniliklerin detaylarının zaman zaman ortaya konularak bu alanda yapılan araştırmaların genel çerçevesinin çizilmesinin önemli olacağı düşünülmektedir (Kaya, 2022). Matematik eğitimi alanı ile ilgili yürütülen bilimsel araştırmalarda son yıllarda görülen artışa yönelik çalışmalarda, yöntemsel yönelim ve eğilimlerin değerlendirilip geleceğe dair tahminlerde bulunulması gerektiği belirtilmektedir (Çalık & Sözbilir, 2014). Diğer bir ifadeyle, yapılan her bir araştırma sonradan yapılacak çalışmalara rehberlik etmesi bakımından önem arz etmektedir. Daha önce yapılan çalışmalar genellikle yurtiçi yayınlanmış çalışmaların genel eğilimlerini belirlemeye dönük olup (Aldemir & Tatar, 2014; Kaya & Aydoğdu, 2022; Tatar, vd., 2013; Tereci & Bindak, 2019) bu çalışmanın ölçütleri ve içeriğine göre farklılık göstermektedir. Bu noktada çalışmada yurtiçinde ve yurtdışında farklı dizinlerde yayınlanan hem tez hem de makale gibi farklı türde yayınlanmış çalışmalar incelenmiş, önceki araştırmalara göre daha kapsamlı ve güncel bir çerçevede yapılandırılmıştır. Alan yazında matematik eğitimi ile ilgili yapılan araştırmalar değerlendirilmiş, 2018 yılından bu yana son beş

yıllık süreci bu çalışmadaki gibi betimleyen bir çalışmaya rastlanmamıştır. Bu sonuçtan yola çıkarak araştırmanın çerçevesi 2018-2023 yılları arasında ulusal ve uluslararası veri tabanlarında yer alan ve araştırma ölçütleri doğrultusunda ulaşılan bilimsel çalışmalardan oluşmaktadır. Yapılacak çalışmanın, matematik eğitimi alanında çalışma yapmak isteyen araştırmacılara rehberlik etmesi bakımından önemli olacağı düşünülmektedir.

Araştırmanın Amacı ve Alt Problemler

Bu araştırma kapsamında, alan yazına matematik eğitiminde yapılan çalışmalarda kullanılan örnekleme yöntemleri ve katılımcı düzeyleri hakkında veriler sunulmaya çalışılmıştır. Bu amaç doğrultusunda yanıt aranan araştırmanın alt problemleri şu şekildedir:

Araştırma kapsamına dahil edilen çalışmalar;

1. Kullanılan örneklem yöntemlerine göre nasıl bir dağılım göstermektedir?
2. Dizinlendikleri veri tabanlarına göre örneklem yöntemleri nasıl bir dağılım göstermektedir?
3. Tercih edilen örneklem düzeylerine göre nasıl bir dağılım göstermektedir?
4. Dizinlendikleri veri tabanlarına göre örneklem düzeyleri nasıl bir dağılım göstermektedir?
5. Dizinlendikleri veri tabanlarına göre nasıl bir dağılım göstermektedir?

YÖNTEM

Araştırmanın Deseni

Bu çalışmada araştırma kapsamına dahil edilen dizinlerde 2018-2023 tarihleri aralığında yayınlanan matematik eğitimi ile ilgili bilimsel çalışmalar (tezler ve makaleler) doküman incelemesi yöntemi ile değerlendirilmiştir. Bu yöntem, bilimsel çalışma kapsamında araştırılan konu ya da konular ile ilgili bilgiler barındıran yazılı belgelerin veya dokümanların incelenmesi ile veri sağlanması olarak ifade edilmektedir (Yıldırım & Şimşek, 2006). Bilimsel dokümanlar incelenirken, konuyla ilgili belgeler belirlenen amaç ya da amaçlar doğrultusunda analiz edilerek belli görüşleri açığa çıkaracak bir senteze gidilmesi hedeflenmektedir (Uysal, 2021). Bu çalışmada matematik eğitimi alanında yapılmış ve araştırma kapsamına dâhil edilmiş olan dizinlerdeki araştırmaların bir araya getirilerek birlikte incelenip düzenlenmesi ve bu araştırmalardaki örneklem türleri ile birlikte örneklem düzeylerindeki eğilimlerin bir bütün olarak değerlendirilmesi amaçlandığından bu yöntemin kullanılmasının uygun olacağına karar verilmiştir.

Araştırmanın Veri Kaynakları

Bu çalışmada örnekleme yöntemi olarak seçkisiz olmayan örnekleme yöntem türlerinden biri olan amaçlı örnekleme yöntemi tercih edilmiştir. Amaçlı örnekleme yöntemi, seçkisiz olmayan bir örnekleme türü olup araştırmanın amacına yada amaçlarına bağlı olarak bilgi bakımından zengin durumların seçilerek derinlemesine bir şekilde çalışma yapılmasına olanak sunmaktadır (Büyüköztürk vd., 2013). Bu örnekleme yönteminde temel görüş araştırmacının çalışmanın amaçları doğrultusunda en iyi bilgiyi nereden alacağına ilişkin yargılarıdır (akt. Arastaman, 2021). Çalışmanın amacı doğrultusunda belirlenen ölçütler ışığında uygun yayınlara erişebilmek ve farklı disiplinlerde yayınlanan çalışmaları kapsam dışında tutabilmek için bu yöntemle başvurulmuştur. Bu kapsamda ölçütler kapsamında ulaşılan 287 bilimsel çalışma (makale ve tez) içeriği analiz edilmiştir.

Veri Toplama Araçları

Bu çalışmada veri toplama aracı olarak alan yazındaki benzer çalışmalardan yararlanarak araştırmacılar tarafından oluşturulmuş “Yayın Sınıflandırma Formu” kullanılmıştır. Bu form araştırmanın problemlerine göre dört kategoriden oluşan bir Microsoft Excel tablosudur. Formu oluşturan bu kategoriler: çalışmanın künyesi, yayınlandığı dizin (veri tabanı), kullanılan örnekleme yöntemi ve örnekleme düzeyi şeklindedir. Araştırma kapsamında literatür taraması bu form çerçevesinde gerçekleştirilmiştir.

Veri Toplama Süreci

Araştırmada incelenecek ve değerlendirilecek bilimsel çalışmaların belirlenmesinde ölçüt örnekleme yöntemi kullanılarak şu ölçütler dikkate alınmış ve bilimsel çalışmalar seçilmiştir:

Araştırma kapsamına dahil edilecek bilimsel çalışmanın;

- ✓ ProQuest, YÖK Tez Merkezi, TR Dizin, ERIC veya Web of Science veri tabanlarının herhangi birinde yayınlanmış olması,
- ✓ Başlığında veya anahtar kelimelerinde “Matematik Eğitimi” veya “Math Education” sözcüklerinin birini içermesi,
- ✓ Matematik dersine ya da öğretim süreçlerine ilişkin olması,
- ✓ Tam metnine erişim izninin olması,
- ✓ Türkçe veya İngilizce dillerinden herhangi birinde yayınlanmış olması,
- ✓ 2018-2023 yılları aralığında yayınlanmış olması,
- ✓ Örnekleme yönteminin araştırmanın yöntem kısmında net bir şekilde ifade edilmiş olması,

- ✓ Örneklem düzeyinin arařtırmada net bir řekilde ifade edilmiř olması gerekmektedir.

Yapılan alan yazın taraması sonucu 349 bilimsel arařtırmaya ulařılmıř, ancak bu ölçütler çerçevesinde 287 bilimsel çalıřma (makale ve tez) arařtırma kapsamına dahil edilmiřtir.

Verilerin Analizi ve Yorumlanması

Arařtırmada, toplanan verilerin analiz edilmesinde içerik analiz yöntemi tercih edilmiřtir. Bu analiz yöntemi ile arařtırmanın problemine ve alt problemlerine karşılık gelen verilere ulařılmaya çalıřılmıřtır. Bu noktada gerçekleştirilen süreç, birbirine benzeyen verileri belirli terim ve temalar etrafında bir araya getirmek, sonrasında bu verileri anlaşılır olması için organize edip yorumlamak ve en sonunda okuyucuya sunmak şeklinde ifade edilmektedir (Yıldırım & Şimşek, 2006). Dolayısıyla bu arařtırmada elde edilen verilerin incelenmesinde, belirlenen amaç ya da alt amaçlar doğrultusunda ve arařtırma problemlerine göre kategoriler oluşturulmuřtur. Ayrıca çalıřmada meydana gelen kategorilere ait frekanslar ve yüzdeler hesaplanmıř, hesaplanan bu veriler yorumlanmaya çalıřılmıřtır. Böylece arařtırmanın bulguları şekillendirilmiřtir.

Arařtırmanın Geçerlik ve GüvenirliđiBu çalıřmada güvenilirlik kavramı; aktarılabirlik, tutarlılık ve teyit edilebilirlik ölçütlerine bakılarak sađlanmaya çalıřılmıřtır. Bu kavramlardan aktarılabir ölçütünü sađlamak için arařtırmaya dâhil edilen çalıřmaların dâhil edilme süreçleri ayrıntılı bir şekilde betimleme yöntemi kullanılarak ifade edilmiřtir. Diđer bir kavram olan tutarlılıđı sađlamak için veri toplama işleminin kaydedildiđi yayın sınıflama formunun içeriđi ile çalıřmalardaki örnekleme yöntemi ve örneklem düzeyleri bulunduđu biçimde herhangi bir yorum katılmadan verilmiřtir. Verilerin analizinde yanlı davranmamak amacıyla literatürdeki benzer çalıřmalarda bulunan analiz süreçlerinden yararlanılmıřtır. Teyit edilebilirlik kavramı için ise incelenen arařtırmaların listesi oluşturulmuř ve veriler istenildiđinde sunulmak üzere arřivlenmiřtir. Ayrıca çalıřmada arařtırmacılar arası kodlayıcı uyumuna bakılmıřtır. Bunun için Miles & Huberman (1994) tarafından önerilen kodlayıcılar arası güvenilirlik formülü kullanılmıřtır. Bu formüle göre [güvenirlik katsayısı = görüş birliđi / (görüş birliđi + görüş ayrılıđı)] çalıřmanın kodlayıcılar arasındaki güvenirliđi %99.3 olarak belirlenmiřtir. Anlaşmazlık bulunan arařtırmalardaki sınıflandırma tutarlılıđını artırmaya yönelik olarak, bu arařtırmalar arařtırmacılar tarafından birlikte incelenerek anlaşmazlıklar çözüme kavuşturulmuřtur. Böylece arařtırma kapsamına dahil edilen bilimsel çalıřmaların örnekleme yöntemleri ve örneklem düzeylerine iliřkin verilerin analizi sonunda elde edilen bulgular, frekans ve yüzde deđerlerine göre her bir kategoride sayısallařtırılacak şekilde okuyucuya

sunulmuştur.

Çalışmaya İlişkin Etik Hususlar

Bu araştırma Yükseköğretim Kurumları Bilimsel Araştırma ve Yayın Etiği Yönergesinde belirtilen tüm kurallara uygun bir şekilde yürütülmüştür. Yönergenin ikinci bölümünde yer alan “Bilimsel Araştırma ve Yayın Etiğine Aykırı Eylemler” kısmında belirtilen ifadelerden hiçbiri gerçekleştirilmemiştir. Araştırma çalışmaları insan veya hayvan gibi herhangi bir canlı üzerinden gerçekleştirilmediğinden etik kurul izni gerekmemektedir. Bu nedenle araştırma için herhangi bir etik kurul belgesi alınmamıştır.

BULGULAR

İlk olarak araştırma kapsamına dâhil edilen bilimsel yayınlarda kullanılan örnekleme yöntemlerinin nasıl bir dağılım gösterdiği araştırılmıştır. Bu doğrultuda elde edilen bulgular Tablo 1’de sunulmuştur.

Tablo 1. Çalışmaların Örneklem Yöntemine Göre Sınıflandırılması

Örneklem Çeşitleri	Örneklem Yöntemleri	ERIC		WOS		ProQuest		YÖK Tez		TR Dizin	
		f	%	f	%	f	%	f	%	f	%
Seçkisiz Örneklem	Basit rastlantısal (Seçkisiz)	6	15.4	1	4.8	6	14.3	6	7.1	5	5
	Tabakalı	-	-	-	-	1	2.4	-	-	-	-
	Küme	1	2.6	-	-	-	-	1	1.2	1	1
Seçkisiz Olmayan Örneklem	Kota Örneklem	1	2.6	-	-	-	-	-	-	-	-
	Gelişigüzel (Kazara) Örneklem	3	7.7	6	28.6	1	2.4	10	11.8	7	7
	Amaçlı (Yargısal) Örneklem	26	66.7	12	57.1	34	81	66	77.6	87	87
	Uzman Örneklem	2	5.1	1	4.8	-	-	2	2.4	-	-
Karma Örneklem	Kartopu Örneklem	-	-	-	-	-	-	-	-	-	-
	Sistemik Örneklem	-	-	1	4.8	-	-	-	-	-	-
Toplam		39	100	21	100	42	100	85	100	100	100

Tablo 1 incelendiğinde, araştırma kapsamına dahil edilen matematik eğitimi ile ilgili farklı dizinlerde yayınlanan çalışmalarda en çok amaçlı örneklem (f=225, %78.4) ile gelişigüzel örneklem türünün (f=34, %11.8) tercih edildiği, kartopu örneklem yönteminin ise hiçbir çalışmada kullanılmadığı görülmektedir. Bunun yanı sıra araştırma kapsamındaki çalışmalarda tabakalı örneklem (f=1, %0.3) yönteminin de çok tercih edilmediği belirlenmiştir.

Dizinlere göre örnekleme yöntemleri incelendiğinde; ERIC veri tabanında yayınlanan 39 çalışmanın 26'sında (%66.7), Web of Science dizininde yayınlanan 21 çalışmanın 12'sinde (%57.1), ProQuest'te yayınlanan 42 çalışmanın 34'ünde (%81), YÖK Tez merkezinde yayımlanan 85 çalışmanın 66'sında (%77.6), TR dizininde yer alan 100 çalışmanın ise 87'sinde (%87) amaçlı örnekleme yöntemlerinin tercih edildiği görülmektedir. Bunun yanı sıra gelişigüzel örnekleme yönteminin amaçlı örnekleme yöntemlerinden sonra en çok tercih edilen örnekleme yöntemi olduğu da dikkat çekmektedir.

Sonrasında araştırma kapsamına dâhil edilen bilimsel yayınlarda kullanılan örnekleme düzeylerinin nasıl bir dağılım gösterdiği araştırılmıştır. Bu doğrultuda elde edilen bulgular Tablo 2'de sunulmuştur.

Tablo 2. Çalışmaların Örnekleme Düzeyine Göre Sınıflandırılması

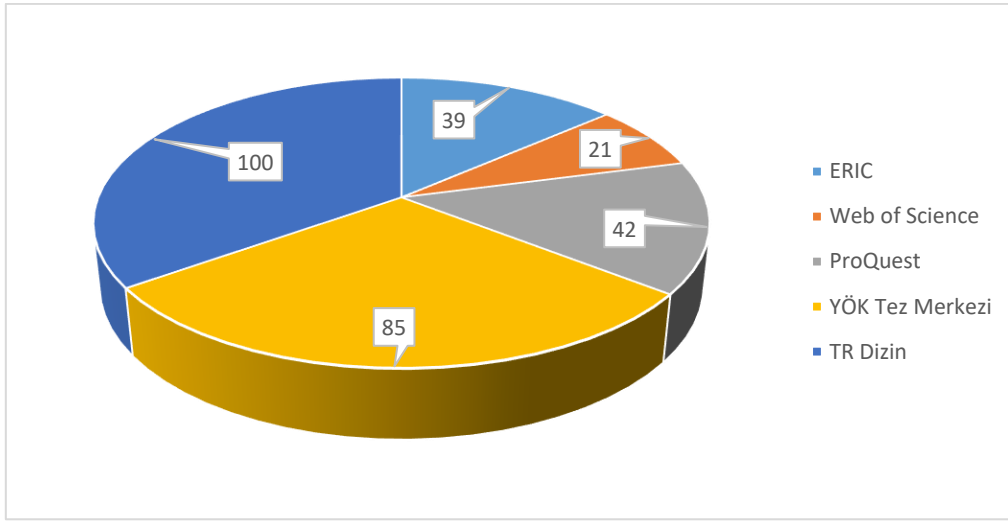
Örnekleme düzeyi	ERIC		WOS		ProQuest		YÖK Tez		TR Dizin	
	f	%	f	%	f	%	f	%	f	%
Okul öncesi	2	5.1	1	4.8	-	-	1	1.2	1	1
İlkokul	-	-	3	14.3	8	19	9	10.6	6	6
Ortaokul	12	30.8	10	47.6	11	26.2	33	38.8	29	29
Lise	-	-	-	-	2	4.8	5	5.9	6	6
Üniversite	6	15.4	5	23.8	6	14.3	5	5.9	26	26
Öğretmen	7	17.9	2	9.5	11	26.2	11	12.9	11	11
Öğretim Elemanı	2	5.1	-	-	3	7.1	2	2.4	-	-
Veli	1	2.6	-	-	-	-	3	3.5	-	-
Doküman (makale ve tez ders kitapları, öğretim programı)	9	23.1	-	-	1	2.4	16	18.8	21	21
Toplam	39	100	21	100	42	100	85	100	100	100

Tablo 2'de, bu araştırma kapsamında sürece dahil edilen matematik eğitimi ile ilgili farklı dizinlerde yayınlanan çalışmalarda örnekleme düzeyi olarak en çok ortaokul öğrencileri (f=95, %33.1) sonrasında üniversite öğrencileri (f=48, %16.8) ve doküman incelemesinin tercih edildiği (f=47, %16.4), okul öncesi öğrenciler (f=5, %1.7) ile velilerin (f=4, %1.4) örnekleme grubu olarak çok fazla tercih edilmediği görülmektedir.

Dizinler tek tek incelendiğinde; ERIC dizininde yayınlanan 39 çalışmada 12'sinde (%30.8), Web of Science dizininde yayınlanan 21 çalışmanın 10'unda (%47.6), ProQuest'te yayımlanan

29 çalışmanın 8'inde (%27.6), YÖK Tez Merkezi'nde yayımlanan 85 çalışmanın 33'ünde (%38.8), TR Dizin'inde yer alan 100 çalışmanın 29'unda (%29) örneklem düzeyi olarak ortaokul öğrencileri tercih edilmiştir.

Çalışmada son olarak araştırma kapsamına dâhil edilen bilimsel yayınların dizinlendikleri veri tabanlarına göre nasıl bir dağılım gösterdiği araştırılmıştır. Araştırma kapsamındaki çalışmalar ERIC, Web of Science, YÖK Tez, ProQuest ve TR Dizin olmak üzere toplamda 5 farklı veri tabanından alınmıştır. Bu doğrultuda elde edilen bulgular Grafik 1'de sunulmuştur.



Grafik 1. Çalışmaların Yer Aldığı Veri Tabanlarına Göre Dağılımı

Grafik 1 incelendiğinde araştırma kapsamında incelenen çalışmaların 100 tanesi (%35) TR Dizin'de, 85 tanesi (%30) YÖK Tez Merkezi'nde, 42 tanesi (%15) ProQuest dizininde, 39 tanesi (%13) ERIC veri tabanında ve 21 tanesi de (%7) Web of Science dizininde yer aldığı görülmektedir.

SONUÇ, TARTIŞMA VE ÖNERİLER

Sonuç ve Tartışma

Bu çalışmada ERIC, Web of Science, ProQuest, TR Dizin ve YÖK Tez veri tabanlarında yer alan 2018-2023 yılları arasında yayınlanmış ve araştırmanın ölçütleri göz önüne alınarak seçilmiş 287 bilimsel araştırmanın örnekleme yöntemi ve örneklem düzeyini belirlemek amaçlanmıştır. Verilerin analizinde içerik analiz yöntemi kullanılmış, elde edilen bulgular tablo ve grafiklerle gösterilip frekans ve yüzdelere göre yorumlanmıştır. Araştırma kapsamına alınan bilimsel yayınlar ilk olarak kullanılan örnekleme yöntemlerine göre değerlendirilmiştir. Sonuçlar matematik eğitimindeki bilimsel araştırmalarda en çok amaçlı örnekleme yöntemi ile gelişigüzel örneklemin kullanıldığını göstermektedir. Kartopu örnekleminin ise hiçbir

çalışmada kullanılmadığı sonucuna ulaşılmıştır. Tabakalı örnekleme yönteminin de benzer şekilde çok fazla tercih edilmediği belirlenmiştir. Amaçlı örnekleme oransal olarak en çok TR Dizin'deki çalışmalarda en az Web of Science'daki çalışmalarda tercih edilmiştir. Bu sonuçların sebepleri amaçlı örnekleme yöntemi ile gelişigüzel örneklemin matematik eğitimi alanındaki çalışmalara daha uygun olması olabilir. Mandev ve Yavuz (2022), ile Kanadlı ve Akay'ın (2019) yapmış oldukları çalışmalarında da araştırmanın sonuçlarına paralel sonuçlara ulaşılmıştır. Yine Kalıncara ve Özek (2021) çalışmasında gelişigüzel örnekleme yönteminin en fazla tercih edilen örnekleme yöntemi olduğunu, rastgele örnekleme yöntemi ve amaçlı örnekleme yönteminin de benzer şekilde çok tercih edildiğini ifade etmiştir.

Araştırma kapsamına alınan bilimsel yayınlar örneklemin düzeylerine göre değerlendirilmiştir. İncelenen dizinlerdeki yayımlanan çalışmalarda en çok ortaokul öğrencilerinin (ilköğretim ikinci kademe) tercih edildiği görülmektedir. Ayrıca elde edilen sonuçlara göre en az velilerin tercih edildiği söylenebilir. Veri tabanı kapsamında ortaokul grubu oransal olarak değerlendirildiğinde en çok ERIC veri tabanında, en az ise TR Dizinde bulunan çalışmalarda örnekleme olarak tercih edildiği sonucuna ulaşılmıştır.

Araştırmada son olarak çalışma kapsamına alınan bilimsel yayınlar veri tabanlarına göre değerlendirilmiştir. Çalışma kapsamında matematik eğitimi alanında en çok TR Dizinde en az ise Web of Science da dizinlenen araştırma olduğu görülmüştür. İncelenen çalışmaların neredeyse yarısı yurtiçi veri tabanlarında (YÖK Tez Merkezi ve TR Dizin) kalan yarısı ise yurtdışı veri tabanlarında (ERIC, Web of Science ve ProQuest) dizinlenmiştir. Ulaşılan bu sonuçlar Kaya'nın (2022) çalışmasında elde ettiği sonuçlarla benzerlik göstermektedir. Benzer şekilde Ulutaş ve Ubuz (2008) çalışmasında alan yazındaki çalışmaların örneklemlerinde ilköğretim öğrencilerinin daha çok tercih edildiğini belirtmiş olup, ortaöğretim öğrencilerine ve öğretmenlere de örnekleme seçiminde yer verilmesi gerektiği vurgulamıştır. Öte yandan alanyazında bulunan farklı dönemlere ait içerik analizi araştırmaları değerlendirildiğinde çalışmadan farklı sonuçların olduğu da görülmüştür. İncikabı vd. (2017) çalışmasında, örneklemlerin dağılımında büyük bir payın lisans öğrencilerine (öğretmen adayı) yönelik olduğu sonucuna varmıştır. Yine Üztemur vd. (2021) ile Kalıncara ve Özek (2021) yaptıkları araştırmalarda örneklemlerin büyük çoğunluğunun üniversite öğrencilerinin ya da öğretmen adaylarının oluşturduğu sonucuna ulaşılmıştır.

Sınırlılıklar ve Öneriler

Araştırma belirlenen ölçütler kapsamında çalışma kapsamına dahil edilen bilimsel yayınlarla sınırlıdır. Ölçütler kapsamında oluşan sınırlılıkların önüne geçebilmek için veri tabanları

taranırken arařtırmacılar ayrı ayrı tarama yapmıř ve sonuçlar karřılařtırılmıřtır. Ayrıca yurt içinde ve yurt dıřında en çok yaygın olan bilimsel yayın veri tabanları kapsama dahil edilmiřtir. Bununla birlikte veri tabanlarında bulunan bilimsel yayınlara ulařabilmek için üniversitelerin ađ erişimleri kullanılmıř, böylece ücretli yayınlara ulařılabilme imkânı sađlanmıřtır. Bu dođrultuda ileride bu matematik eđitimi alanında çalıřmak isteyen arařtırmacılara řu önerilerde bulunulmuřtur. Teknoloji ve bilimdeki gelişim ve deđişim hızı göz önüne alındığında yapılacak yeni çalıřmalarda, ölçüt olarak daha uzun süreli bir veri seti üzerinde matematik eđitimi alanındaki arařtırmalar deđerlendirilebilir. Ölçütler belirlenirken farklı veri tabanları deđerlendirilerek arařtırma kapsamı geliřtirilebilir. Kitap bölümleri, bilimsel projeler ve sempozyumlar ile kongrelerin çıktılarına dönük matematik eđitimi alanında örnekleme yöntemleri ve örnekleme düzeyi kořulları deđerlendirilebilir.

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DEĞERLER EĞİTİMİ BAĞLAMINDA HÜKÜMLÜ VE TUTUKLULARA YÖNELİK UYGULANAN “Manevi Rehberliği Destekliyoruz” PROJESİ’NİN ÖNEMİ VE SONUÇLARI

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Özet

Bu tebliğde Yalova Üniversitesi İslami İlimler Fakültesi Öğretim Üyelerinin öncülüğünde Adalet Bakanlığı (Maltepe Ceza İnfaz Kurumu Müdürlüğü) ve (Diyanet İşleri Başkanlığı (İstanbul İl Müftülüğü) ile ortaklaşa hareket edilerek “Manevi Rehberliği Destekliyoruz” başlığıyla uygulanan projenin sonuç ve değerlendirilmesi yapılacaktır. Hükümlüler ve tutuklular da bir insan olduğuna göre onlar da nisanla ve hata ile malüdürlükler. Bu çerçevede hükümlü ve tutuklulara manevî rehberlik yapmak, rehabiliterine destek olmak toplumun onurlu birer üyesi olarak tekrar sosyal hayatın içerisine uyumlu fertler olarak katılmalarını sağlamak son derece önemlidir. Hükümlü ve tutukluların yeni bir tarz ve bilgilerle maddî ve manevî sorumlulukları açısından doğru değerlendiremedikleri hususları gündeme taşıyarak onların bilinç seviyelerini yükseltmek ve tekrar suça itilmelerini önlemek için bu proje düşünülmüş ve uygulamaya konulmuştur. Bu sebeple projemiz, Diyanet İşleri Başkanlığı ile Adalet Bakanlığı arasında yapılan protokol çerçevesinde Ceza İnfaz Kurumlarında yapılan Manevî Rehberlik çalışmalarına katkı sağlamaya yönelik olmuştur. Proje kapsamında şu konular hükümlü ve tutuklulara ilgili uzmanlar tarafından işlenmiştir. Birlikte Yaşama Tecrübesi: Doç. Dr. Hasan Gümüšoğlu, Arş. Gör. M. Vehbi Yavuz. İnsan Onuru: Doç. Dr. Ahmet Gökdemir. Vatan ve Millet Sevgisi: Doç. Dr. Yusuf Oktan, Arş. Gör. Ahmet Şaban Altınışik. Hz. Peygamber’in Güzel Ahlakı: Doç. Dr. Muhammet Beyler. Allah ve İnsan: Dr. Ahmet Gezek. Zaman Yönetimi: Server Akın (İstanbul Müftülüğü Cezaevleri ve DSM il Koordinatörü) ve Hoşgörü Kültürü: Dr. Öğr. Üys. İlyas Akyüzoğlu. Proje kapsamında uygulanmış olan ankette toplamda yüz mahkûma bu projenin faydalı olup olmadığının, amacına ulaşp ulaşmadığının anlaşılması adına sekizi çoktan seçmeli, ikisi de açık uçlu olmak üzere on soru yöneltilmiştir.

Anahtar Kelimeler: Eğitim, Hükümlü ve Tutuklu, Manevi Rehberlik, Rehabilitasyon,

**THE IMPORTANCE AND RESULTS OF THE "We Support Spiritual Guidance"
PROJECT IMPLEMENTED FOR CONVICTS AND DETAINEES IN THE
CONTEXT OF VALUES EDUCATION**

Abstract

In this study, will be made the results and evaluation of the project implemented under the title of "We Support Spiritual Guidance" under the leadership of Yalova University Faculty of Islamic Sciences Members in cooperation with the Ministry of Justice (Maltepe Penitentiary Institution Directorate) and the Presidency of Religious Affairs (Istanbul Provincial Mufti's Office). Within the scope of the project, the following topics were taught to convicts and detainees by relevant experts. Experience of Living Together: Assoc. Dr. Hasan Gümüőođlu, Res. See. M. Vehbi Yavuz. Human Dignity: Assoc. Dr. Ahmet Gökdemir. Love of Homeland and Nation: Assoc. Dr. Yusuf Oktan, Res. See. Ahmet Őaban Altınıőık. Morals of the Hz. Muhammed Prophet: Assoc. Dr. Mr. Muhammad. Allah and Man: Dr. Ahmet Gezek. Time Management: Server Akın (Istanbul Mufti's Office Prisons and DSM Provincial Coordinator) and Tolerance Culture: Dr. Lecturer member İlyas Akyüzođlu.

Giriş

Şerefli bir varlık olarak yaratılan insan; akıl, irade ve ilim gibi, özelliklerle donatılmıştır. Kendisine verilen bu özellikler sebebiyle insan, kâinattaki varlıkların hâkimi ve efendisi konumundadır. İlahî sanatın ve kudretin en belirgin bir tezahürü olan insan, maddî açıdan küçük olmakla beraber manevî açıdan akılları hayrete düşürecek derecede donanıma sahiptir. Kâinatın hülasası olan insan, bütün meziyetlerine rağmen zayıf ve aceleci bir tabiata sahiptir. İnsanın, maddî ve manevî yapısında, duygu, düşünce ve temayüllerinde bu zafiyetin izleri müşahade edilmektedir. İnsan hayatının her devresinde zafiyetin bu etkisi kendini açıkça göstermektedir. Söz konusu sebeple insan hata edip, suç işleyebilir. Hükümlüler ve tutuklular da bir insan olduğuna göre onlar da nisyarla ve hata ile malüdürlükler. Ancak bu noktada hatadan dönmek ve kesin bir pişmanlık hissi duymak önem arz etmektedir. Bu çerçevede hükümlü ve tutuklulara manevî rehberlik yapmak, rehabilitelerine destek olmak toplumun onurlu birer üyesi olarak tekrar sosyal hayatın içerisine uyumlu fertler olarak katılmalarını sağlamak son derece önemlidir. Hükümlü ve tutukluların yeni bir tarz ve bilgilerle maddî ve manevî sorumlulukları açısından doğru değerlendiremedikleri hususları gündeme taşıyarak onların bilinç seviyelerini yükseltmek ve tekrar suça itilmelerini önlemek için bu proje düşünülmüş ve uygulamaya konulmuştur. Bu sebeple projemizden beklenen fayda, Diyanet İşleri Başkanlığı ile Adalet Bakanlığı arasında yapılan protokol çerçevesinde Ceza İnfaz Kurumlarında yapılan Manevî Rehberlik çalışmalarına katkı sağlamaktır.

Kişinin doğal ortamı, içinde doğduğu ve içinde hürce yaşadığı toplumdur. Ancak çeşitli nedenlerle suça itilmiş ve neticede cezaevine düşmüş hükümlü ve tutuklulara manevi rehberlik çerçevesinde ulaşıp onları rehabilite ederek yeniden topluma kazandırmak, sosyal ve kültürel yönden gelişimlerini sağlamak büyük önemli bir konudur. Bilindiği gibi en değerli ve üstün etkinlik insana yapılan hizmettir. İnsan, Allah Teâlâ'nı şerefli kıldığı bir varlık olup kim olursa olsun, "Yaratılanı hoş gör yaratandan ötürü" ilkesi ile hareket edilerek hükümlü ve tutukluların suçlarına bakılmadan onlara yardımcı olmak, insan onuruna yakışan bir faaliyettir. Bununla birlikte insanın eğitim-öğretimi ve sosyal çevreye intibakı uzun bir zaman alabilmekte, hatta bilgi edinip ve kendini geliştirme süreci hayat boyunca devam etmektedir. Bu itibarla insanın, hangi seviyesinde ve konumda olursa olsun sürekli eğitime, öğretime ve bilinçlendirilmeye ihtiyacının olduğu bir gerçektir.

Söz konusu sebeple bu proje Yalova Üniversitesi İslami İlimler Fakültesi Öğretim Üyelerinin öncülüğünde Adalet Bakanlığı (Maltepe Ceza İnfaz Kurumu Müdürlüğü) ve (Diyanet İşleri Başkanlığı (İstanbul İl Müftülüğü) ile ortaklaşa hareket edilerek "Manevi Rehberliği

Destekliyoruz” başlığıyla hazırlanmıştır. Doç. Dr. Hasan Gümüőođlu’nun yürütücü olarak görev yaptığı proje, Yalova Üniversitesi öğretim üyeleri, İstanbul Müftülüğü ve Maltepe 2 Nolu L Tipi Ceza İnfaz Kurumu’nun koordinesi ile gerçekleştirilmiştir. Bu projenin planlanmasında hükümlü ve tutukluların moral değerlerini yükseltmek, onlara toplumun asli üyeleri olduklarını hatırlatmak, ayrıca devlet ve toplum olarak onlardan vazgeçilemediğini vurgulayarak mesuliyetlerini tekrar hatırlatma amacı etkin rol oynamıştır.

Projenin Amacı

Adalet Bakanlığı Maltepe 2 Nolu L Tipi Kapalı Ceza İnfaz Kurumu Hükümlü ve Tutuklulara yönelik Değerler Eğitimi (Ar-Ge- Projesi) çerçevesinde uygulanan projenin başlıca amaçları arasında hükümlü ve tutukluların temel değerler açısından daha doğru bilgi sahibi olması ve bu çerçevede kendilerini yenileme fırsatı bulması yer almaktadır. Proje, uygulandığı kişilere sorumluluklarını hatırlama, hatalarından dönme konusunda yardımcı olacak ve kendilerinde toplumun birer ferdi olarak yapmaları gerekenleri gözden geçirme fırsatı sağlayacaktır. Ayrıca geleceğe ümitle bakma duygusunun yeşermesine hizmet edecektir. Böylece toplumda güven ve istikrarın bozulmasına sebep olan yanlış davranışların asgarîye indirilmesine yardımcı olunacaktır.

Bir diğer önemli amaç, öğretim üyelerinin ve uzmanların katkıları ile birlikte yapılacak bu değerler eğitimi, hükümlü ve tutukluların muhtemelen daha önce alamadıkları ve kazanamadıkları bilgileri iktisap edinmelerine vesile olacaktır. Ayrıca, bu faaliyetler, üniversite-halk ilişkisinin gerçekleşmesine katkı sağlayacaktır. Diğer taraftan ilim adamlarının sosyal sorumluluklarını yerine getirmesine azımsanmayacak ölçüde katkı sağlayacaktır.

Proje Ekibi ve Görev Tanımları

Proje Yürütücüsü:

Doç. Dr. Hasan Gümüőođlu (Yalova Üniversitesi, İslam Mezhepleri Uzmanı)

Proje Araştırmacıları:

Doç. Dr. Muhammet Beyler (Yalova Üniversitesi, Hadis Uzmanı)

Doç. Dr. Ahmet Gökdemir (İstanbul Üniversitesi, Kıraat ve Tefsir Uzmanı)

Doç. Dr. Yusuf Oktan (Yalova Üniversitesi, Hadis Uzmanı)

Dr. Öğr. Üys. İlyas Akyüzöđlu (Yalova Üniversitesi, İslam Tarihi Uzmanı)

Server Akın Dr. Öğrencisi (İstanbul Müftülüğü Cezaevi İl Koordinatörü)

Dr. Ahmet Gezek (Yalova Üniversitesi Dil Uzmanı)

Arş. Gör. Mehmet Vehbi Yavuz (Yalova Üniversitesi, Mezhepler Tarihi)

Arş. Gör. Ahmet Şaban Altınıőık (Yalova Üniversitesi, Fıkıh)

Proje Kapsamında Yapılan İşler

Projenin hazırlık aşamasında üst yönetici Doç. Dr. Hasan Gümüsoğlu başkanlığında Doç. Dr. Ahmet Gökdemir, İl Müftülüğü cezaevi koordinatör vaizi Server Akın ve araştırma görevlisi Mehmet Vehbi Yavuz başkanlığında bir heyet ile Ocak 2023'de İstanbul İl Müftülüğüne ve Ceza İnfaz Kurumu Müdürlüğü ziyaret edilerek proje hakkında bilgi alış verişinde bulunulmuştur. İl Müftülüğüne gerekli resmi müracaatlar yapıp Adalet Bakanlığı Ceza ve Tevkifevleri Genel Müdürlüğü tarafından uygun görülmesinden sonra Maltepe 2 Nolu L Tipi Ceza İnfaz Kurumunda proje uygulamasına başlanmış ve planlandığı gibi on ayda tamamlanmıştır. Proje kapsamında aşağıdaki konular hükümlü ve tutuklulara ilgili uzmanlar tarafından işlenmiştir.

Birlikte Yaşama Tecrübesi: Doç. Dr. Hasan Gümüsoğlu, Arş. Gör. M. Vehbi Yavuz

İnsan Onuru: Doç. Dr. Ahmet Gökdemir

Vatan ve Millet Sevgisi: Doç. Dr. Yusuf Oktan, Arş. Gör. Ahmet Şaban Altınışik

Hz. Peygamber'in Güzel Ahlakı: Doç. Dr. Muhammet Beyler

Allah ve İnsan: Dr. Ahmet Gezek

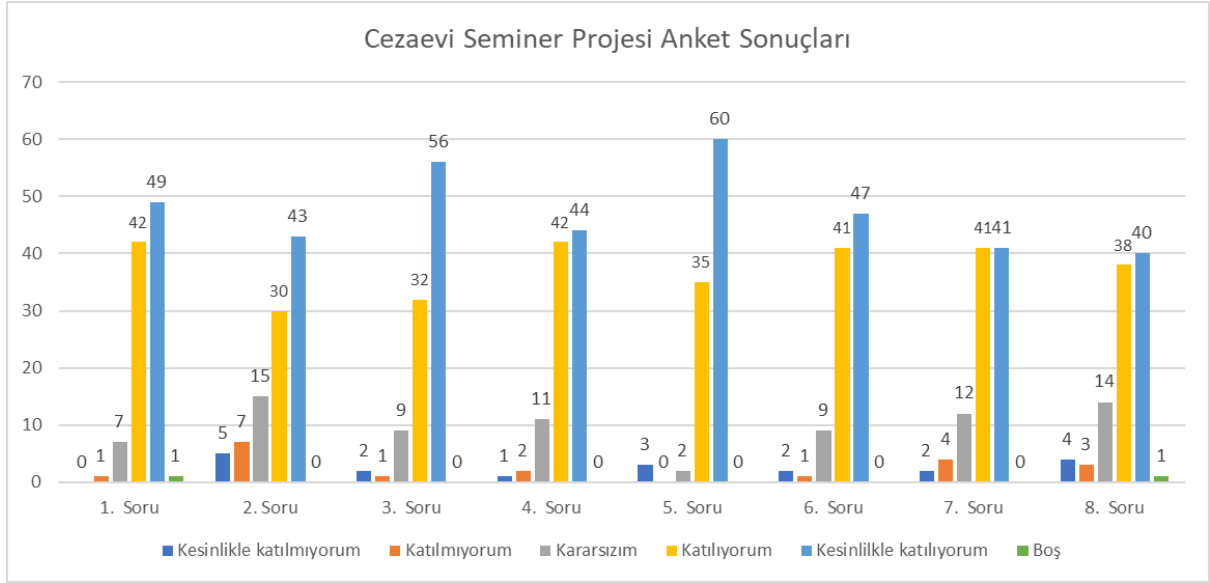
Zaman Yönetimi: Server Akın (İstanbul Müftülüğü Cezaevleri ve DSM il Koordinatörü)

Hoşgörü Kültürü: Dr. Öğr. Üys. İlyas Akyüzöglü

Anket Çalışmasının Değerlendirilmesi

Proje kapsamında uygulanmış olan ankette toplamda yüz mahkûma bu projenin faydalı olup olmadığını, amacına ulaşıp ulaşmadığının anlaşılması adına sekizi çoktan seçmeli, ikisi de açık uçlu olmak üzere on soru yöneltilmiştir. Çoktan seçmeli olanlara verilen cevaplar Tablo 1'de özetlenmiştir. Grafik haline getirilirken anketteki çoktan seçmeli soruların uzun uzadıya yazılması imkânı olmadığından soruların numaralandırılması ile iktifa edilmiş olup, soruların açık halleri şöyledir:

1. Konular anlaşılır şekilde sunulmuştur.
2. Sunulan konular yeterliydi.
3. Sunumlardan genel olarak memnun kaldım.
4. Eğitim sonucunda, konuyla ilgili yeterli bilgi aldım.
5. Bu çeşit eğitimleri gerekli görüyorum.
6. Eğitimden genel olarak memnun kaldım.
7. Eğitimin organizasyonu yeterliydi.
8. Eğitimden sonra bazı bakış açıları değişti.



(Tablo 1)

Ankette “Kesinlikle katılmıyorum”, “Katılmıyorum”, “Kararsızım”, “Katılıyorum” ve “Kesinlikle Katılıyorum” şeklinde beş şık sunulmuş ve anketi cevaplayanların bu şıklardan birini seçmeleri istenmiştir. Grafik haline getirilen sonuçlar göz önüne alındığında, hükümlü ve tutukluların katılım oranının en yüksek olduğu cevabın beşinci soru olduğu görülmektedir. Beşinci soruyu verilen cevabı katılım oranında üçüncü soruya verilen cevabın takip ettiği de dikkate alınırsa, projede hedeflenen amaçlar ile katılım sağlayan mahkûmların taleplerinin büyük ölçüde örtüştüğü ve projede sunulan içeriklerin katılımcıları memnun ettiği görülmektedir.

“Katılmıyorum” ve “Kesinlikle katılmıyorum” cevaplarının en yüksek olduğu ikinci ve sekizinci sorular dikkate alındığında ise mahkûmların, projenin faydalı olmakla birlikte yeterli olmadığı kanaatine sahip olduklarını göstermektedir. Nitekim açık uçlu sorulara verilen cevaplarda genel anlamda programdan memnun kalındığı, ancak daha farklı konuların detaylı ve daha sık işlenmesinin istendiği ortaya çıkmaktadır. (bk. Tablo 2, Tablo 3)

Mahkûmlara sorulan açık uçlu sorular ise şu şekildedir:

1. Sizlere verilecek eğitimde başka hangi konuların olmasını istersiniz?
2. Bu eğitimin geliştirilmesi için önerileriniz nelerdir? (Düşüncelerinizi yazınız.)

Yüz kişinin atıldığı ankette açık uçlu ilk soruya verilen cevaplar şu şekildedir:

1	Bu konular yeterli.
2	Bu konular yeterli.
3	Tarih ve coğrafya ile ilgili konuların olmasını çok isteriz.
4	Tarihlerle ve yaşantılarla ilgili konuların olmasını çok isterim.
5	Hayvanlarla ve ailelerle ilgili konuların olmasını isterim.
6	Ailelerle ve sağlıkla ilgili konuların olmasını isterim.
7	Ailelerle olan ilişkilerin geliştirilmesi, kuvvetlendirilmesi olabilirdi.
8	Dini konular ve gelişimimiz için
9	Aile ve tarihimiz ile ilgili konular
10	Bu tür eğitimlerin devam etmesi olabilir ve teknolojik aletleri kullanma fırsatı verilebilir.
11	Çok yararlı buldum böyle etkinliklerin artmasını istiyorum.
12	Aile ve çocukların dini eğitimi ile ilgili konferansların sıklaşmasını istiyoruz.
13	Kişisel gelişimle ilgili faaliyetler olması...
14	Bu konular yeterli.
15	Bu konular yeterli.
16	Dini bilgiler ile alakalı daha detaylı olmasını isterim.
17	Ailelerle olan ilişkilerin geliştirilmesi ve kuvvetlendirilmesi olabilirdi.
18	Hz. Ömer ve Peygamber Efendimizin hayatını öğrenmek isterdik.
19	Peygamberlerin hayatlarını detaylı dinlemek isterdik.
20	Bütün peygamber efendilerimizin hayatını öğrenmek
21	Duaları ve anlamlarını sizlerden öğrenmek
22	Psikiyatri alanında konu
23	İslam ve düzenli beslenme, psikolojik eğitim
24	İnsan gelişimi ve psikiyatri, sporla alakalı olabilir.
25	Bu konuların devamı
26	Şu anda cezaevinde olan ve ne hakları olduğunu bilmeyen, neden ve nedensizce yatan o kadar insan var ki. Bunlara TCK'yı ve yasal haklarını, söz sahibi olduğu tüm imkânların aydınlatılmasını, seminer verilmesini talep ederdim.
27	Teşekkürler...
28	Kul hakları hakkında videolu konferans verilmesini istiyoruz.
29	Bilgisayar kursu ve bunun gibi farklı, az değinilmiş ya da hiç uygulanmamış seminerlerin düzenlenmesi, üniversitelerden hocaların katılımıyla düzenlenmiş birliktelikler olabilir.
30	Tarihi konularda bilgilendirilmeyi isterdim.
31	Mahkûmiyet süreci sonrası aktif yaşama, topluma uyum sağlama problemlerinin nasıl üstesinden gelineceği işlenebilir.
32	Bu konular yeterli.
33	Manevi
34	Toplumsal aile ile ilgili konular
35	Dinimiz hakkında tarihi bilgiler.
36	İlkyardım ve temel trafik konuları. Dinimiz hakkında tarihçe bilgiler.
37	Sinema ve tiyatro gibi eğitimlerin olmasını

38	Saz kursu olmasını isterim.
39	Dinler tarihi daha detaylı anlatılabilirdi. Konuşan uzmanın alanı da İslamiyet'in tarihiydi ama hiç detay verilmeden üstünkörü geçildi.
40	Kafamızın dağılacağı konuların olmasını isteriz.
41	Dinimizin tarihi ile alakalı
42	Aile ve din ile alakalı her şey
43	Sizlerin verdiği konular zaten güzel.
44	Sosyal ilişkiler ile ilgili daha çok rehberlik yapılmasını isterim.
45	Dinimize yoğunlaşmak isterim.
46	Konular yeterliydi.
47	Dinimizin varoluşu.
48	Dini değerler
49	Hz. Peygamber Yusuf'un hayatı
50	Milli değerler
51	Bulduğumuz konum ve yaptığımız hataların düzeltilmesinde etkili olacak şeylerin ele alınması.
52	Kur'an okuma geliştirmeyi, dini sohbetleri, daha sık bilgiler
53	Bulduğumuz konum ve yaptığımız hataların düzeltilmesinde etkili olacak şeylerin ele alınması.
54	Milli ve manevi değerlerimiz ile toplumun yanlış bildiği nesnel yargılara değinilmesi
55	Değerlerimizin daha çok ayrıntılarının anlatılması
56	Melekler hakkındaki konular varoluşumuz hakkında ve de geçmiş ve gelecek hakkındaki konuların olmasını
57	Bütün peygamberlerimizin hayatlarını merak ediyorum. Bunun hakkında eğitim veya konuları öğrenmek isterim.
58	İslamiyet hakkında daha derin bilgiler almak istiyorum.
59	Eskiye anlatan, tarihi güzelliklerimizi açıklayıcı anlatılan konuların olmasını isterim.
60	Hz. Yusuf Peygamber efendimizin hayatını siz büyüklerimizden dinlemek isteriz.
61	Kişisel gelişim, insanlarla iletişim ve dini ve manevi değerlerimizin anlatılması
62	Bu tür konuların daha fazla gelmesini, daha fazla etkinlik yapmayı düşünüyorum.
63	Bu tür konuların daha sık olması, devamının gelmesini isterim.
64	Bu tür eğitimlerle alakalı konuların devamının gelmesini isterim.
65	"Haram ve haksız kazançtan uzak durmak" temalı kapsamlı konferanslar verilmesini istiyorum.
66	15 Temmuz Darbe Girişimleri, Hain Saldırıları
67	Peygamber Efendimiz'in hayatı ve darbe girişiminin hikâyesi
68	15 Temmuz Darbe Girişimi
69	Peygamberlerimizin hayatları, dini bilgiler
70	Tüm dini eğitimlerle ilgili bilgilendirici seminerlerin olmasını istiyorum.
71	Peygamber Efendimiz'in hayatı
72	Dini konular
73	Çeşitli konular...

74	Aile, toplumsal gelişim ve insan hakları konularında da eğitim ve oturumlar olsun isterim.
75	İnsanların davranışlarını düzeltme konusunda...
76	Çifte standardın olmadığı adil bir dünya düzenine nasıl kavuşulur, haksızlığa karşı yapmamız gerekenler konuları...
77	Tarih, insan zihni, psikiyatri eğitimleri
78	Bilişim, resim ve daha farklı kurs faaliyetlerinin yapılmasını isterim.
79	Fark etmez.
80	Sosyal alanda ve maneviyata dönük her konu olur.
81	Hz. Peygamber'in (s.a.v.) hayatının tamamını dinlemek.
82	Sevgi ve saygı, hoşgörü konu
83	Peygamberlerimizin yaşamları hakkında daha detaylı bilgilendirme yapılmasının gerektiğini belirtiyor ve de istiyorum.
84	Peygamberlerimizin hakkında detaylı bilgilendirme yapılmasını istiyorum.
85	İlk peygamberimiz Hz. Âdem hakkında bilgi verilmesini istiyorum.
86	Son peygamberimiz Hz. Muhammed Mustafa'nın hayatının daha detaylı anlatılmasını isterdim.
87	Çeşitli konular ve daha eğitici konuların olmasını.
88	Konular genişletilmeli.
89	Tarih
90	Eğitim faaliyetleri hakkında farklı konularda
91	İnsanlar arasında birbirine saygı ve sevgi ile ilgili konu ve İslami ahlak
92	Genel kültür ve tarih konuları da ele alınabilir.
93	Eğitimin konusunu beğendim.
94	Kişisel gelişim ve İslami eğitimler.
95	Güzeldi, konular yeterli oldu.
96	Peygamberlerimizin hakkında daha detaylı bilgilendirme yapılmasını isterim.
97	Hz. Ali hakkında daha detaylı bilgilendirme yapılmasını isterim.
98	Hocadan memnun kaldık. Bir dahaki sefer de gelmesini istiyorum.
99	İnsan gelişimi, spor önemi ve düzenli besin de anlatılmalı.
100	Kişisel gelişim üzerine konuların olmasını isterim.

(Tablo 2)

İkinci soruya verilen cevaplar da aşağıdaki tabloda görülebilir:

1	Devamlı böyle güzel konular olsun.
2	Devamlı yapılabilir böyle güzel seminerler.
3	Hayat ve yaşamla ilgili konuların olmasını çok isteriz.
4	Yiyecek ve çocuklarla ilgili konuların olmasını çok isterim.
5	Hayvanları daha çok çevremize sevdirmek ve korumak, aile bağlarımızı güçlendirmekle daha fazlasının olmasını isterim.
6	Çocuklarımız ve kardeşlerimizle diyalog kurmak için bu konuyla ilgili daha çok etkinlik görmek istiyoruz.
7	-
8	Sürekli olmasını isterim.
9	Sıklıkla olmasını isterim.

10	Devletimizin bu tür faktörlere imkânını yeterli buluyorum ama siz de biraz elinizi taşın altına koyup bize destek olabilirsiniz.
11	Bu tarz etkinliklerin geliştirilmesini ve ailelerimizle iletişimin güçlenmesini istiyoruz.
12	Daha sık ve çeşitli etkinlikler olmalı.
13	Daha çok faaliyetlerin olması ve kişilerin fikirlerinin alınması ve hayata geçirilmesi.
14	Devamı yapılan (?) böyle güzel seminerler
15	Devamı yapılan (?) böyle güzel seminerler
16	Bu tür eğitimlerin sürekliliğinin ve devamlılığının olmasını isterim.
17	Devamlı böyle şeyler görmek isterim.
18	Ayda değil haftada bizleri seminerlere çıkartmanız
19	Saatlerin uzatılmasını ve hocalarımızı daha fazla dinlemek isterdik.
20	Daha detaylı ve uzun olması
21	Seminerlerin devamlı olması
22	Seminerlerin devamlı olması
23	İslam'ın tarihi anlatılmalı
24	Cezaların anlatılması, suçu meslek haline getirenlerin eğitim alması ve iyilik, kötülük anlatılması, İslamiyet'in anlatılması
25	Bu gibi eğitimlerin devamının gelmesini isterim.
26	Profesyonel eğitim verilmeli, uzman kişilerce eğitim verilmelidir. Kolundan tuttuğunuzu hoca diye buraya getiriyorsunuz. Verdiği bilgilerin yarısı da kinayeli ve çelişkilidir.
27	Görseller olabilir. Slaytlar da olabilir.
28	Görseller ve videolarla desteklenebilir.
29	Kurumda bulunduğum süre içerisinde eğitim düzeyi düşük veya okuma yazma oranı çok düşük kişilerin bulunduğunu gözlemledim. Daha çok bu konuya eğilerek gerekli organizasyonlar yapılabilir.
30	Toplumda suç işlemenin maruz bırakılanlar üzerinde ne gibi etkilerinin olabileceği seminerler faydalı olabilir.
31	Toplum, birey ve suç ilişkilerinin işleneceği seminerler bu anlamda daha faydalı olacaktır.
32	Devamlı yapılabilir böyle güzel seminerler.
33	-
34	Sürekli hale getirilmesi ve alanında uzman kişiler tarafından bilgi verilmesi.
35	Daha sık yapılması ve uzman kişiler tarafından uzun tutulması.
36	Haftalık olarak sürekli yapılması
37	Daha çok seminerlere çıkmalıyız.
38	Ne eğitimi anlamadım.
39	Süre uzatılıp daha detaylı anlatımlara girilebilir ve soru--cevap kısmı daha belirginleştirilip uzatılabilir.
40	Öncelikle bu yapmış olduğunuz program hoşuma gitti. Daha derin konuları ilerleyen zamanlarda görmek isterim.
41	Her hafta olmasını isterim
42	Sürekli olmasını isteriz.
43	Bu konuları siz daha iyi bilirsiniz.
44	Eğitimlerin daha sık ve soru cevap niteliğinde güçlendirilmesini öneririm.

45	Sürekliлик.
46	Devamlılık olması daha iyi olur.
47	Allah razı olsun bir önerim yok.
48	Sık sık yapılması
49	Sunucuların hatalarını düzeltmesi
50	Sık sık yapılması
51	Daha sık olmasını isterim. Dini konuların daha kapsamlı ele alınmasını, söz hakkı verilerek sorulan soruların cevaplanmasını, dinleyicinin öğrenmek istediği konuların ele alınması daha etkili olacağını düşünürüm. Saygılarımla...
52	Daha sık olmasını isterim. Dini konuların daha kapsamlı ele alınmasını, söz hakkı verilerek sorulan soruların cevaplanmasını, dinleyicinin öğrenmek istediği konuların ele alınması daha etkili olacağını düşünüyorum. Saygılarımla...
53	Daha sık olmasını isterim. Dini konuların daha kapsamlı ele alınmasını, söz hakkı verilerek sorulan soruların cevaplanmasını, dinleyicinin öğrenmek istediği konuların ele alınması daha etkili olacağını düşünürüm. Saygılarımla...
54	Daha sık yapılarak konuların giriş, gelişme, sonuç olarak anlatılması
55	Eğitimin sık sık yapılması
56	Farklı hocaların yani farklı görüş açılarının olması çok daha iyi olur. Teşekkürler.
57	Sık sık yapılması yeterlidir. Konuların kafamızda sabit bir şekilde yer alması için sağ olun.
58	Size kalsın. Sağ olun.
59	Manevi rehberliğin daha çok sıklıkla yapılmasını ve daha açıklayıcı olmasını öneririm.
60	15 Temmuz'da yaşananları dinlemek isterim.
61	Daha sık yapıp detaylı anlatıma girilip sosyal konulara önem verilmesi
62	Daha fazla eğitim olması
63	Daha sık ve daha detaylı anlatım ve soru cevap olarak güçlendirilmesini isterim.
64	--
65	Video ve slayt görsellerine de yer verilmesi
66	Ayda bir cezaevlerinin gezilmesi, gençlerle sohbet edilmesi. Onlara daha çok elinizden geldiği kadar bilgi verilmesi.
67	Bence haftada bir ya da ayda bir cezaevlerini ziyaret etmeleri, bilgi verilmesi
68	Cezaevi ziyaretleri, gençlerle sohbet edilmeli.
69	Ayda bir cezaevlerinin ziyaret edilmesi, daha çok bilgi verilmesi
70	Daha sık eğitimlerin olmasını öneririm.
71	Daha sık bu tür konferansların olmasını isterim.
72	Daha sık konferansların olması
73	Tek konu üzerine olmaması
74	Daha sık yapılmalı. Sosyal aktivite olarak da insani gelişim adına da kıymetli.
75	Bir psikolog tarafından toplu eğitimler verilmesi mesela...
76	Daha sık aralıklarla yapılması. Katılımları artıracak teşvik edici puanlar zaten var, bir de telefon görüş ödülü verilmesi uygun olur diye düşünüyorum.
77	Tek konu olarak değil, çeşitli konularda olması
78	Eğitim ve okur-yazarlık konusunda zayıf olanlara eğitim verilmesi.
79	Daha çok yapılmalı.
80	Sık ve fazla olmalı.
81	Bizlerin bu seminere her hafta çıkartılması

82	Seminerlerin devamlı olması
83	Ayda iki defadan az tekrarlanırsa bir anlam ifade etmeyeceğini düşünüyorum.
84	Bu seminerlerin daha sıklıkla tekrarlanmasını istiyorum.
85	Ayda en az iki kere tekrarlanmasını istiyorum.
86	Sadece bir defalığına değil de ayda en az iki defa bu seminerin tekrarlanmasının gerektiğini düşünüyorum.
87	Kişisel gelişim hakkında eğitim verilmesi.
88	Sıklıkla konferans yapılmalı.
89	Devamlılık
90	Faaliyetlerin daha sık ve kapsamlı olması
91	Daha sık olmalı.
92	Düzenli olarak eğitim verilmesi
93	Düzenli olarak konferanslar olabilir.
94	Devamlılık.
95	Bu tarz konferanslar sürekli yapılmalı.
96	Sadece bir defalığına değil en az ayda iki defa bu seminerin tekrarlanmasının gerektiğini düşünüyorum.
97	Ayda en az iki defa bu seminerin yapılması gerekmektedir.
98	Farklı konuları dinlemeyi ve kısa zamanda bir seminer daha talep ediyorum.
99	İslam dininin düzenli olarak tarihi ve mucizeleri anlatılmalı.
100	Daha farklı ve geliştirici faaliyetlerin yapılması

(Tablo 3)

Projenin Sonunda Yapılan Çalıştay

Projenin bitiminin ardından 19 Ekim 2023 Perşembe günü Yalova Üniversitesi İslami İlimler Fakültesi'nde projeye katkı sunan öğretim elemanları ve cezaevi görevlilerinin katılımıyla bir çalıştay düzenlenmiştir. Bu çalıştayda, katılımcıların projenin uygulanmasına yönelik görüşlerini açıklamanın yanında cezaevindeki seminerlere katılan mahkûmlar tarafından cevaplanan anket değerlendirilmiş, bu minvalde projenin ne ölçüde başarılı olduğu, faydalı yönleri ile birlikte eksik kalan yanlarının neler olduğu, ilerleyen dönemlerde bu kapsamdaki çalışmaların nasıl geliştirilebileceği değerlendirilmiştir.

Çalıştay projenin yürütücüsü Doç. Dr. Hasan Gümüşoğlu'nun konuşmasıyla başlamıştır. Gümüşoğlu, projede emeği geçenlere teşekkür ettikten sonra katılımcılardan proje hakkındaki kanaat ve düşüncelerini ifade etmelerini istemiştir. Gümüşoğlu, konuşmasında söz konusu projenin gerek cezaevi personeli gerekse öğretim üyeleri tarafında büyük bir ilgiyle karşılandığını, özellikle böyle bir projede ilk defa yer alan öğretim üyelerinin çok farklı bir tecrübe yaşadıklarını ifade ettiklerine vurgu yapmıştır. Gümüşoğlu, projenin öğretim üyelerinin yanı sıra sunumlara iştirak eden cezaevi personeli ve mahkûmlar tarafından da ilgi ve merakla izlendiğine işaret etmiştir. Gümüşoğlu, projenin geliştirilmesi ve sonraki çalışmalara yön

verebilecek sonuçlara ulaşılması noktasında sürekli belirli bir kesime eğitim vermenin daha faydalı olacağını dile getirerek projede yer alan konuların aynı insanlara uygulanması durumunda daha sağlıklı bir ölçme-değerlendirme yapılabileceğini belirtmiştir.

Çalıştayda da söz alan Doç. Dr. Yusuf Oktan, genel olarak projeden memnun kaldığını dile getirmiş ve projenin başka cezaevlerine de teşmil edilemesin faydalı olabileceğini ifade etmiştir. Seminerlerin artırılmasının daha münasip olacağını dile getiren Oktan, sunumların iki haftada bir gerçekleştirilecek şekilde yapılmasını önermiştir. Çalıştayda, programların koşullarda gerçekleştirilmesinin daha faydalı olup olmayacağı konusu da müzakere edilmiş ve durumun hükümlülerin ve cezaevlerinin şartlarına göre değişebileceği ifade edilmiştir. Bu çerçevede her koşulda her hafta farklı hocaların vereceği dersler yoluyla dönüşümlü bir programın hazırlanmasının daha etkili olabileceği gündeme gelmiştir.

Dr. Öğr. Üyesi İlyas Akyüzoğlu ise, mahkûmların yanında, cezaevinde görev yapan manevi rehberlere yönelik destekleyici bir faaliyetin yürütülebileceğini gündeme getirmiş, bu noktada mahkûmların manevî rehberlere sordukları sorulara cevaplar verilmesi ve bu cevapların bir kitapçık haline getirilip “cezaevi rehberi” formatında yayımlanabileceği düşünülmüştür. Ayrıca bu minvalde atölye çalışmalarının yapılmasının münasip olduğu da gündeme getirilmiştir.

Çalıştayda gözlem ve önerilerini ileten İstanbul Müftülüğü cezaevleri koordinatörü Server Akın, kandiller gibi belirli dini günlerde sohbet, dua, musiki programlarına benzer faaliyetler yahut bunların bir arada bulunduğu paket programların üniversite ile birlikte düzenlenmesinin, mahkûmlar açısından oldukça faydalı olacağını belirtmiştir.

Maltepe cezaevi koordinatörü Abdülkadir Budak ise projenin faydalı olduğunda ve cezaevindeki görevli arkadaşlarının da kanaatinin bu yönde olduğuna işaret ettikten sonra başta Ceza İnfaz Kurumu Müdürleri olmak üzere, kurum öğretmenlerinin ve eğitime katılan hükümlü ve tutukluların memnuniyetlerini ifade etmişlerdir. Manevi değerler eğitimine çok ihtiyaç olduğunu dile getiren Budak, tutuklu ve hükümlülerin farklı kişileri dinlemenin önemine değinmişlerdir. Proje sunumlarında görsellerden faydalanılsa daha etkili olacağını ifade eden Budak, her oturuma farklı koşulların katılmasının projeden daha fazla kişinin istifade etmesine yönelik olduğunu belirlemekle birlikte konu hakkında neler yapılabileceğinin müzakere edilebileceğini açıklamışlardır. Budak ayrıca İlahiyat Fakültelerinin sahada olmasını önemsediklerini ve sorunları yerinde görmek, verilen eğitimlerin sonucunu gözlemlemek bakımından bu türden projelerin yaygınlaşması büyük önem arz ettiğine vurgu yapmışlardır.

Çalıştayda ankete verilen cevaplar gündeme getirilmiş, yapılan değerlendirmeler sonucunda genel olarak seminerlerin kapsamının genişletilip devam etmesi yönünde bir fikir oluşmuştur.

Ayrıca projenin geliştirilmesi noktasında cezaevindeki Selefilik, Kur'âncılık gibi çağdaş İslami hareketlere yönelik belirli çalışmaların yapılabilmesi fikri kuvvet kazanmıştır. Çalıştayda gündeme getirilen başka bir önemli mesele, projeye mali destek bulunması olmuştur. Proje ile ilgili bir başka önemli husus, çalışmaların bir makale haline getirilmesidir. Nitekim bu husus önemle vurgulanmış olup, seminerlerde sunulan konuların içeriklerinin metinleştirilip bir makale formatında yayımlanması kararlaştırılmıştır. Çalıştayın sonunda her konuşmacının, sunumunun iki yüz elli kelimelik bir özetini yazılıp bu özetlerin bir araya getirilmesi yoluyla bir özet kitapçığının oluşturulması önemli görülmüştür. Bu şekilde hem yapılan sunumların muhtevalarının kaybolmaması, hem de bir el kitapçığı formatında bu konulara ilgi gösteren başka kimselerin faydalanmasına imkân sağlanacağı değerlendirilmiştir.

Sonuç

Projenin gerek cezaevi personeli gerekse öğretim üyeleri tarafında büyük bir ilgiyle takip edildiği, özellikle bu nevi projede ilk defa görev alan öğretim üyeleri, farklı bir tecrübe yaşadıklarını ifade edilmiştir. Projenin aynı mahkûmlara sürekli eğitim verme şeklinde uygulanmasının ve bu nevi projelerin başka cezaevlerine de teşmil edilmesinin faydalı olacağı anlaşılmıştır. Ayrıca seminerlerin artırılmasının daha münasip olacağını mesela sunumların iki haftada bir gerçekleştirilmesi durumunda daha iyi netice alınacağı söylenmiştir.

Proje kapsamında programa iştirak eden hükümlülerin bazısına uygulanan ankete göre projede hedeflenen amaçlar ile katılım sağlayan mahkûmların taleplerinin büyük ölçüde örtüştüğü ve projede sunulan içeriklerin katılımcıları memnun ettiği görülmektedir. Ancak mahkûmların, projenin faydalı olmakla birlikte yeterli olmadığı kanaatine sahip olduklarını ve ilave konularla programın daha yoğun olarak uygulanmasını istedikleri anlaşılmıştır.

Açık uçlu sorulara verilen cevaplara da bakıldığında, genel anlamda programdan memnun kalınmakla birlikte çoğunlukla projede; İslâmiyet hakkında daha detaylı bilgiler, İnsanlar arasında birbirine saygı ve sevginin önemi, Dinimiz ve tarihimiz hakkında konular, Mezhepler ve çağdaş İslâmî hareketleri konusu, Helal ve sağlıklı beslenme, konularının yer alması istenilmiştir. Aynı şekilde Kul hakları, Peygamber Efendimiz ve sahabe-i kiramın hayatını, Aile hayatının önemi ve sorumluluk duygusu, Kur'an-ı Kerim okumayı geliştirme, Kişisel gelişim ve insanlarla iletişim gibi konuların da proje kapsamında işlenmesi talep olunmuştur. Ayrıca projelerde kandiller gibi belirli dini günlerde sohbet, dua, musiki programlarının bir arada bulunduğu paket programlara da yer verilmesinin mahkûmlar açısından faydalı olacağı kanaati oluşmuştur.

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**THE SOCIOMETRIC STATUS OF SYRIAN CHILDREN ATTENDING
PRESCHOOL EDUCATION IN TURKIYE**

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Abstract

This study aims to reveal the preference levels of preschool children for Syrian children in their classes. A qualitative study was designed to examine the peer relationships of Syrian children attending independent preschools with their classmates. The research was conducted in independent kindergartens affiliated with Kilis Provincial Directorate of National Education with 5-year-old children in the fall semester of the 2023-2024 academic year. The position of Syrian children in peer relationships and the level of preference of these children as friends were determined with the "sociometry technique". Sociograms were prepared from the data obtained from the sociometry tool and presented. As a result of the research, it was observed that Syrian children were preferred by their Turkish peers at a level almost negligible. Most of the Syrian children who were not preferred by their Turkish classmates were also not preferred by their Syrian classmates.

Keywords: Peer Relations, Sociometry, Syrian Children

Introduction

Due to the anti-regime protests that started in March 2011 and turned into a civil war, more than half of the Syrian population fled to neighboring countries or had to migrate within the country. Turkey hosts the largest number of Syrian refugees and has also become the country with the highest number of refugees in the world (Aktaş, 2018).

The city of Kilis, where the study was conducted, hosts a large number of Syrians under temporary protection status due to its location neighboring Syria and being a border city. According to the data of the General Directorate of Migration Management, the number of Syrians registered in Kilis as of 19.01.2023 is 87,408. The ratio of the number of Syrians in Kilis to the total number of people living in the province is 37.48. With this ratio, Kilis ranks first in Turkey.

The education of families and children who had to leave Syria for war and security reasons is both a fundamental human right and an important need for their integration into Turkey (Aytaç, 2021). The Association for Solidarity and Support for Refugees and Asylum Seekers (MSYD) (2017) stated that peer bullying and discrimination faced by migrants, refugees, or children under temporary protection is one of the biggest obstacles to their schooling. Studies conducted in Turkey have also revealed that peer acceptance is one of the main educational problems experienced by Syrian children (Kılıç & Toker-Gökçe, 2019; Külekçi-Akyavuz et al., 2020).

However, peer relationships are one of the most important factors in the development of school-age children. Being able to interact with peers is one of the important developmental goals of early childhood (Bakkaloğlu, Sucuoğlu, & Özbek, 2019). Friendship relationships established during this period have a positive impact on children's social, emotional, and cognitive development, and it is known that these relationships are closely related to children's social acceptance by their peers (Guralnick, Neville, Hammond, & Connor, 2007). Peer relationships can be a risk factor as well as a protective and developmental feature of children's mental health. Negative interactions with peers, which have an important place in children's lives, may cause children to encounter problems in interpersonal relationships and academic skills and may pave the way for the development of emotional/behavioral problems (Healy, Sanders, & Iyer, 2014; Keane & Calkins, 2004). In this regard, Cirit-Karaağaç and Güvenç (2019) stated that Syrian students under temporary protection experience difficulties in the education process due to their exclusion and exclusion by their peers, and as a result, students do not continue their education regularly.

Therefore, examining the peer relationships between Turkish and Syrian children and revealing the mutual perceptions of both Syrian students and Turkish children who share the same classroom and social environment with Syrian children can be used in a wide range of activities, from simple arrangements such as choosing the friends with whom Syrian students will sit in the same desk, to activities that increase Syrian students' school adaptation and belonging. Unlike studies conducted only on Turkish or Syrian students, since both groups of students were reached at the same time in this study, the information obtained from the examination of peer relationships may enable counselors and teachers to be more practical and effective (Sinan, 2019).

In studies on peer relations of preschool children in Turkey, the preference levels of children with special needs by their peers with normal development were mostly examined (Bakkaloğlu, Sucuoğlu, & Özbek, 2019; Karadağ, Yıldız-Demirtaş & Girli, 2014). Limited studies have been conducted to determine the level of acceptance of Syrian children by their peers and the factors affecting peer acceptance (Bozan, Akçay & Karahan, 2021; Üstündağ & Şenol, 2023). Hence, it is thought that this study will contribute to the field in terms of addressing the peer relations of Syrian and Turkish children.

This study aimed to examine the preference levels of Syrian children attending preschool education institutions in Turkey by their peers in their classrooms. For this purpose, the following question was sought to be answered:

What is the preference level of Syrian children by their Turkish peers?

METHOD

Study Design

A qualitative study was designed to examine the peer relationships of Syrian children attending independent preschools with their classmates. The data were collected with the interview technique from qualitative methods. The interview question was selected from the questions used in the sociometry technique based on peer selection.

Data collection tools

Sociometric measurements in the sociometry application in this study were conducted based on the peer selection technique for a given criterion. The criterion was "playing games" considering children's developmental characteristics and children's peer relations were evaluated based on this criterion. In accordance with the sociometric technique based on peer

selection, all children in the study were asked to indicate the names of the 3 friends they liked to play with the most in the classroom in order.

Analysis of Data

The data obtained from the interviews were analyzed with descriptive analysis, one of the descriptive research methods. As a result of the descriptive analysis, frequencies, and percentages of Syrian children being preferred by others in 1st, 2nd, and 3rd places were obtained and discussed. In addition, sociograms were created after the sociometry technique based on peer selection.

FINDINGS

The data obtained from the sociometry technique and semi-structured interviews are presented under the following headings.

Findings Related to the Data Obtained from the Sociometry Technique

Sociogram

The students participating in the study were asked to choose three friends to play games in the classroom. A sociogram was created in the sociometry tool with the data obtained.

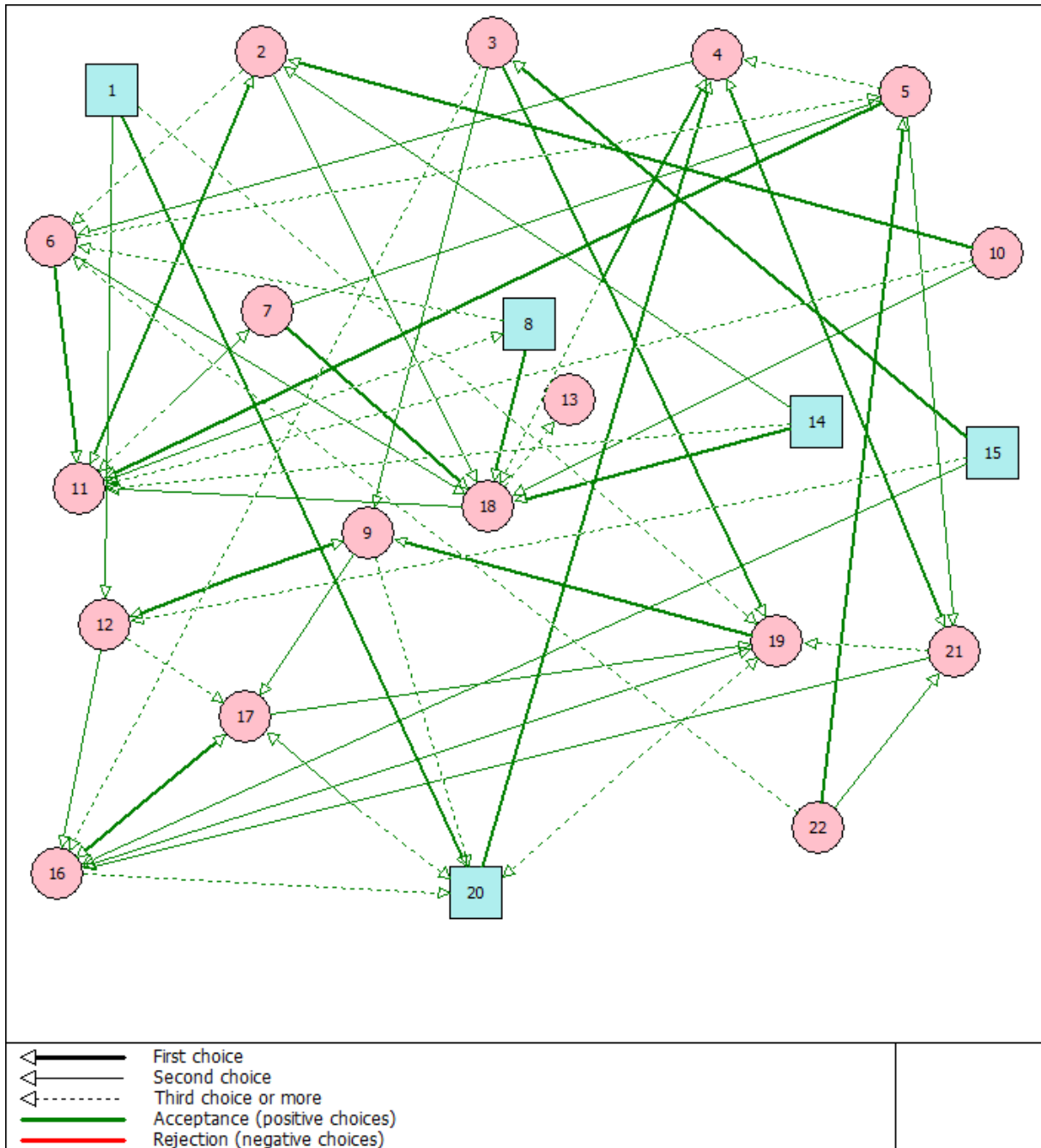


Figure 1. Sociogram for the class

As seen in the sociogram in Figure 1, there are a total of 22 children, 5 Syrian and 17 Turkish in the class. Thirteen of the children are girls and 9 are boys. According to Figure 1, although many Turkish children were selected by their peers, only one of the Syrian children was commonly selected by Turkish children.

Frequencies and percentages of Syrian children's level of preference by their Turkish peers

The order of preference of Syrian children by their Turkish peers is illustrated in Table 1.

Table 1. Frequency table for the preference of Syrian children

SC	Being Preferred from the First Place	Being Preferred from the Second Place	Being Preferred from the Third Place
	f	f	f
A1	-	-	-
A8	-	-	1
A14	-	-	-
A15	-	-	-
A20	-	-	4

SC: Syrian Children

The examination of Table 1 regarding the order of preference of Syrian children by their Turkish peers showed that the boy coded A20 was preferred by his 4 Turkish friends in the 3rd place. In addition, the boy A8 was preferred by his 1 Turkish friend in the 3rd place.

Table 2. Percentages regarding the preference levels of Syrian children

SC	Being Preferred from the First Place	Being Preferred from the Second Place	Being Preferred from the Third Place
	%	%	%
A1			
A8			5.8
A14			
A15			
A20			23.5

According to Table 2 regarding the percentage of Syrian children preferred by their Turkish peers, boy A20 was preferred by 23.5% of Turkish children in the 3rd place. In addition, the boy coded A8 was preferred by 5.8% of Turkish children in the 3rd place.

DISCUSSION AND CONCLUSION

This study examined the status of preschool children's peer relations with Syrian children in their classrooms. The collected data were presented with the findings obtained from the sociometry tool. The sociometry technique based on peer selection was used, and the preferences of Syrian children by their classmates were revealed.

The findings of the study revealed that Syrian children are hardly preferred by their Turkish peers. Similarly, Üstündağ and Şenol (2023) found that the preference level of Syrian children

attending preschool education institutions was between 1% and 3%. Sociograms obtained in a previous study conducted with primary school children also revealed that there is a problem of integration between Turkish and Syrian students (Bozan, Akçay, & Karahan, 2021).

As listed below, many factors are thought to have led to the emergence of these results.

It can be said that the language problem they experience has a significant effect on the non-selection of Syrian children. Language emerges as an important problem in all studies on the educational problems experienced by Syrian children (Kardeş & Akman, 2018; Özer, Komşuoğlu, & Ateşok, 2016). In the study conducted by Aydın and Kaya (2017), it was emphasized that refugee children should receive language education in order to receive healthy education in the same environment as their peers.

Social skills may also have affected Syrian children's order of preference by their classmates. In a study conducted by Dinçer et al. (2019), it was determined that children with inadequate social skills faced rejection/non-preference by their peers. Many studies on social skills have emphasized the importance of the relationship between these skills and peer relationships/peer acceptance (Gülay-Ogelman & Erten-Sarıkaya, 2010; Gülay-Ogelman & Erten-Sarıkaya, 2014).

These results may be due to the fact that teachers did not emphasize peer communication and acceptance and did not integrate children with each other sufficiently. However, it was highlighted that teachers should plan and implement appropriate activities for children who have to live in a foreign country to better communicate and integrate with their peers (Bozan, Akçay, & Karahan, 2021). For example, positive teacher approaches and accepting attitudes of parents are recognized as factors that increase the acceptance of children with special needs by their peers. Similar factors may also apply to Syrian children's peer acceptance.

RECOMMENDATIONS

In order to ensure that children with refugee status are minimally affected by the problems they face, it is very important to identify the factors that will increase their resilience against stressful situations and to support them accordingly.

It can be argued that peer relationships need to be strengthened in order for Syrian children to benefit from preschool education at the highest level. Educators have important duties in strengthening peer relationships. It may be useful for researchers to create programs to support

peer acceptance and for teachers to implement classroom activities that will positively affect this acceptance.

Future studies may examine the peer relations of Syrian children receiving preschool education in terms of different variables (age, socio-economic level, cognitive, emotional, and physical development, duration of preschool attendance, single-parent families, number of siblings, etc.).

Syrian children should be included in language education programs appropriate to their needs and needs.

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**PERFORMANCE OF EXCHANGE-CORRELATION FUNCTIONALS ON THE
STRUCTURAL AND ELECTRONIC PROPERTIES OF GaAs: A DENSITY
FUNCTIONAL THEORY STUDY**

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Abstract

The self-consistent full-potential linearized augmented plane wave approach (FP_LAPW) based on density functional theory (DFT) was used to study the structural and electronic properties of zincblende gallium arsenide (GaAs). Density functional theory (DFT) is a powerful and widely used computational quantum mechanical modeling method for investigating the electronic structure of atoms, molecules, and solids. The reliability of the computation depends on the implementation of appropriate exchange-correlation functionals. Choosing a suitable exchange-correlation functional is essential for predicting the material's behavior accurately. In this study, we investigated the impact of exchange-correlation functionals on the structural and electronic properties of GaAs employing the Wien2k software package. We systematically analyzed the performance of various functionals including local density approximation (LDA), and generalized gradient approximation (GGA). The modified Becke-Johnson (mBJ) exchange-correlation potential which is known to produce more accurate results for the band gap of many semiconductors and insulators was also applied. The effect of different functionals on lattice parameters, bulk modulus, band gaps, and density of states were calculated and analyzed. A detailed comparison was made with the existing experimental data as well as the results from the previous theoretical studies. It is found that by changing the exchange-correlation functionals, lattice parameters, band gap energy, and density of states were highly affected. According to the results, the optimized lattice constant obtained by LDA and GGA functionals is $a = 5.62 \text{ \AA}$ and $a = 5.74 \text{ \AA}$, respectively. Moreover, GaAs exhibits a direct band gap of 0.42 eV when LDA is applied, which is underestimated by 72% with the experimental findings. On the other hand, when mBJ-1 potential is added to the LDA, GaAs has a direct band gap of 1.76 eV with an overestimation of 15% based on the experimental findings. Overall, our findings indicate that the exchange-correlation functional does matter and that always be cautious during the first principle calculations of materials.

Keywords: Wien2k, DFT, GaAs, First-principles calculations.

Introduction

In recent years, theoretical and experimental studies to investigate the electronic and physical properties of semiconductor alloy III-V elements have attracted great attention. These alloys are technologically important semiconductor compounds with numerous applications in electronic and optoelectronic devices[1]. Gallium arsenide (GaAs) is of particular interest among III-V compounds due to its high electron mobility, high electron velocity, and direct bandgap, which make it suitable for high-frequency and high-speed applications [2]. First-principles calculations, which is based on the principles of density functional theory (DFT), enable these devices to be designed and optimized by tailoring GaAs properties (structural, optical, and mechanical) to the desired requirements. Correct knowledge of the structural, electronic, and optical properties of any materials is critical for determining their potential applications in technology. Although DFT-based computer simulations can calculate these fundamental properties in a short time and at a low cost, standard exchange-correlation functionals (LDA and GGA) are insufficient to reproduce the experimental findings [3, 4]. Because exchange-correlation functionals can have a significant impact on the accuracy and precision of these calculations, a proper choice of exchange-correlation functionals can overcome this problem. However, the choice of exchange-correlation functional in DFT can seriously affect the accuracy and precision of these calculations. First-principles calculations using various exchange-correlation functionals in the Wien2k [5] software package are one of the most powerful and versatile approaches in computational materials science [6]. Wien2k software is particularly appropriate for exploring the properties of crystalline materials like GaAs due to its use of full-potential linearized augmented plane wave (FP-LAPW) methods. Various exchange-correlation functionals can be used in the Wien2k software package within the framework of density functional theory (DFT), which allows researchers to investigate how these functionals affect the electronic properties, band structures, and optical responses of materials. The most commonly used exchange-correlation functionals in Wien2k are local density approximation (LDA) [7], generalized gradient approximation (GGA), and Perdew-Burke-Ernzerhof (PBE) [8] which is a specific form of GGA. Standard DFT functionals have some limitations in the context of semiconductors and insulators. To predict the electronic structure of the semiconductor and insulator, the mBJ potential was developed by Tran and Blaha [4].

In the present work, we perform first-principles calculations by using the Wien2k software package to investigate the effect of different exchange-correlation functionals on the electronic and structural properties of GaAs.

COMPUTATIONAL DETAILS

The Wien2k package was used to perform electronic structure calculations of GaAs using density functional theory (DFT). Our calculations are based on full potential density functional theory. The linearized augmented plane wave (LAPW) method with Perdew-Burke-Ernzerhof generalized gradient approximation (PBE-GGA) and local density approximation (LDA) exchange-correlation functionals are used. Recent studies have proven that mBJ methods are useful for more complete prediction of electronic bands in semiconductors. Here we used three types of mBJ potentials: mBJ-0, mBJ-1, and mBJ-3 for more accurate band structure calculations. Self-consistent area (scf) calculations were performed with a $14 \times 14 \times 14$ k-mesh according to the Monkhorst and Pack scheme. It represents 104 k-points in the irreducible Brillouin zone. The energy cutoff is set to -6 Ry (-81.63 eV) and the convergence threshold is less than 10^{-4} Ry. For Scf calculations, the plane wave cutoff point $R_{MT} \times K_{max} = 7$ and the Fourier expansion cutoff point $G_{max} = 12$ are used. For partial waves used in atomic spheres, the maximum l value (l_{max}) is kept at 10.

RESULTS AND DISCUSSION

The geometry was optimized using lattice constants acquired from earlier experimental research. The volume corresponding to the lowest energy was found as a result of the optimization, and the lattice constants were obtained. In Figure 1, the plots show the total energy versus volume for LDA and GGA exchange-correlation functionals for GaAs. The lattice constants corresponding to the minimum energy are 5.62 Å and 5.74 Å for LDA and PBE-GGA, respectively. Our findings for lattice constants are comparable with the previous experimental result of 5.64 Å [9]. It is clear that the lattice constant determined using LDA is

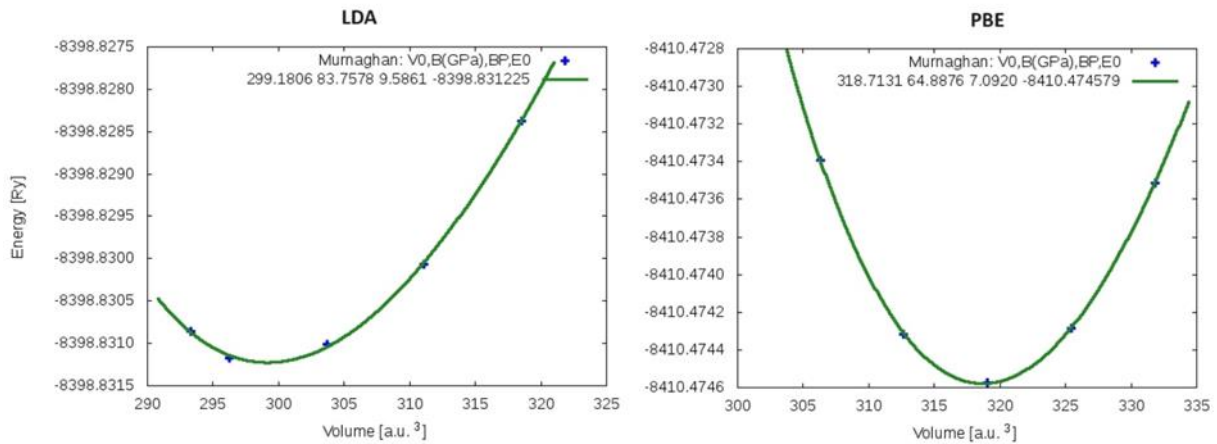


Figure 1. Total energy versus volume obtained by LDA and PBE-GGA functionals.

more consistent with the results of experiments. Furthermore, we compared calculated results with the previous theoretical studies. The calculated minimum volume, bulk modulus, and minimum energy with LDA and PBE-GGA are presented in Table 1. The results of previous experimental and theoretical studies are also shown in Table 1 to make better comparison. Figure 2. shows the electronic band structure of GaAs calculated using the LDA and PBE-GGA functionals. The fermi energy level has been set to 0 eV. The calculated band gaps and band gap types of GaAs has been presented in Table 2. The valence band maximum and the conduction band minimum are located at Γ high symmetry point for both LDA and GGA functionals, which indicates GaAs has a direct band gap. The bandgap energies for LDA and PBE-GGA are 0.42 eV and 0.19 eV, respectively. These findings are presented in Figure 2.

Table 1. The calculated volume optimization parameters of GaAs are compared to the experimental and other theoretical data available in the literature.

	$V_0(a.u.^3)$	$B(GPa)$	$E_0(Ry)$	Lattice constant (\AA) ($a = b = c$)
LDA	299.17	84.2677	-8398.831226	5.6181 ^{this work}
LDA	301.14			5.6300 ^{[10] theoretical}
LDA	294.06–305.74	72.6–75.5		5.5860–5.6590 ^{[11] theoretical}
LDA	299.44			5.6200 ^{[12] theoretical}
PBE	318.71	64.7383	-8410.474579	5.7379 ^{this work}
PBE	323.07			5.7640 ^{[13] theoretical}
PBE	319.32–329.85	59.1–62.0		5.7390–5.8040 ^{[11] theoretical}
Exp.	304.80	78.9		5.6532 ^{[14] experimental, T=300 K}
Exp.	302.92			5.6416 ^{[15] T=0 K}

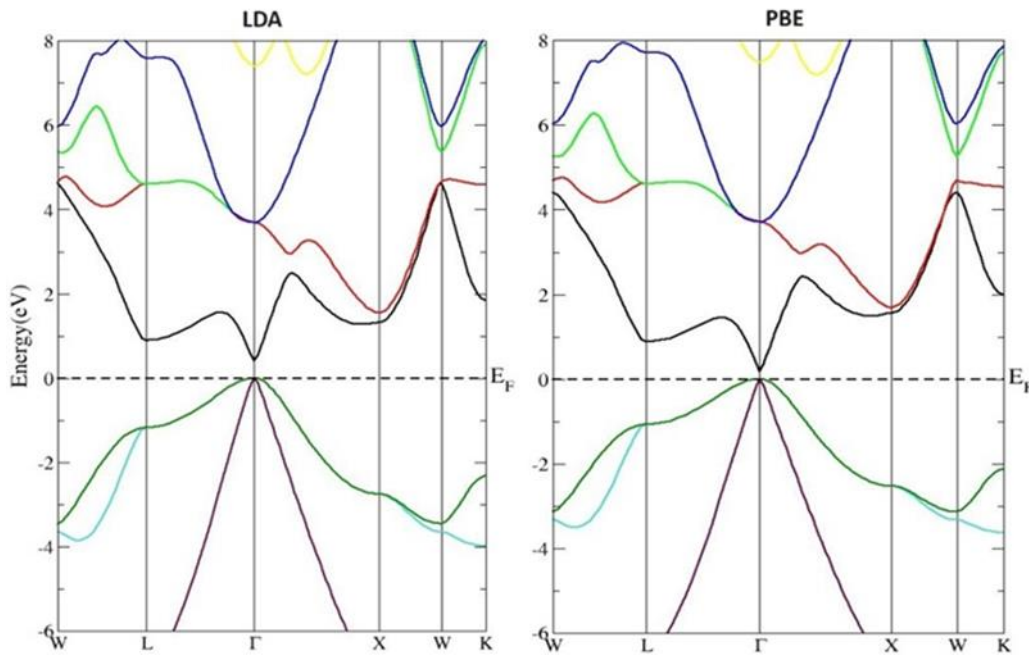


Figure 2. Band structure of GaAs obtained by LDA and PBE-GGA functionals.

Although LDA and PBE-GGA functionals successfully predict the bandgap type of GaAs, bandgap energies differ significantly from the experimental result of 1.52 eV [15]. The mBJ method is a well-known method that overcomes the shortcomings of the LDA and PBE-GGA functionals. Therefore, three different exchange-correlation functionals, mBJ-0, mBJ-1, and mBJ-3, have been applied to the LDA and PBE-GGA functionals to get more accurate bandgap energies. When we look at the Figure 3, Figure 4, and Figure 5, bandgap energies are 1.78 eV, 1.76 eV, and 0.88 eV for LDA + mBJ-0, LDA + mBJ-1, and LDA + mBJ-3, respectively. On the other hand, the calculated bandgap energies are 1.30 eV, 1.28 eV, and 0.42 eV when GGA + mBJ-0, GGA + mBJ-1, and GGA + mBJ-3 are used. These values are also shown in Table 2. If the results with only LDA and GGA are compared with the results when mBJ-0, mBJ-1, and mBJ-3 exchange-correlation functionals are applied, it is clearly seen that bandgap energies are improved. When all the results in Table 2 are compared, one can see that the closest band gap energy to the experimental value is obtained when GGA+mBJ-0 functional is used. According to the results, we can conclude that the choice of exchange-correlation functional is essential during the first principle calculation of GaAs.

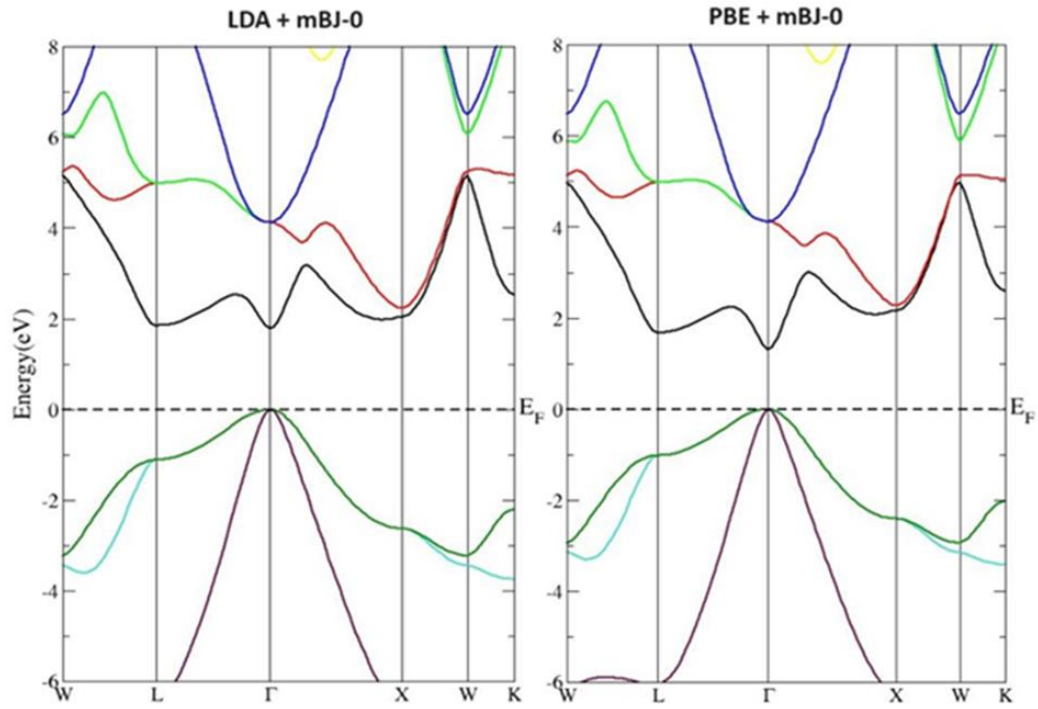


Figure 3. Band structure of GaAs obtained by LDA+mBJ-0 and PBE+mBJ-0 functionals.

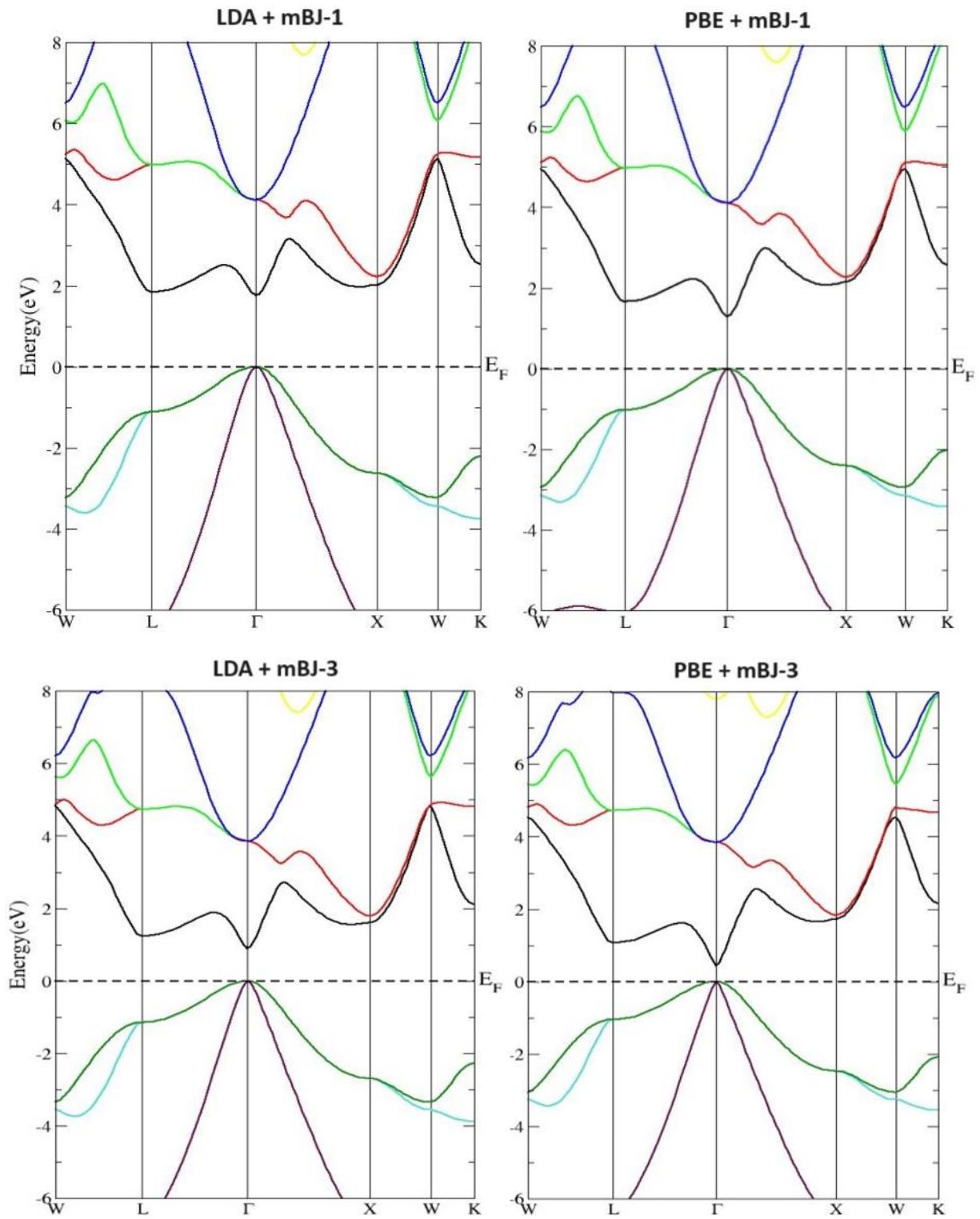


Figure 4. Band structure of GaAs obtained by LDA+mBJ-1 and PBE+mBJ-1 functionals

Table 2. Bandgap type and bandgap energies for different exchange-correlation functionals.

<i>Source</i>	<i>Bandgap Type</i>	<i>Bandgap (eV)</i>
Experimental ^[15]	Direct	1.52
LDA	Direct	0.42
LDA + mBJ-0	Direct	1.78
LDA + mBJ-1	Direct	1.76
LDA + mBJ-3	Direct	0.88
GGA	Direct	0.19
GGA + mBJ-0	Direct	1.30
GGA + mBJ-1	Direct	1.28
GGA + mBJ-3	Direct	0.42

CONCLUSIONS

We investigated the structural and electronic properties of GaAs using the full potential linear augmented plane wave method. Our primary purpose was to explore the performance of the different exchange-correlation functionals for determining the structural and electronic properties of GaAs. We first discussed geometry optimization and calculated the lattice parameters, as well as the bulk modulus and total energy for LDA and PBE-GGA functionals. The results showed that LDA and PBE-GGA functionals were successful in determining lattice parameters that were closer to previously obtained theoretical and experimental results. When different exchange-correlation functionals were utilized, we found a significant difference in bandgap energies. We determined that PBE+mBJ-0 exchange correlation functional is the most suitable one for the first principle investigations of GaAs. Finally, one can conclude that the choice of exchange-correlation functional is an important part of DFT calculations.

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SOKAKTA ÇALIŞAN ÇOCUKLAR VE BABALARI: DEĞİŞEN OTORİTELER ARASINDA BİR YOLCULUK

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Özet

Küreselleşme, kitle iletişim ve ulaşım araçlarının da etkisi ile bireyleri farklı yaşam tarzlarına maruz bırakan ve özellikle çocukları için potansiyel olarak yeni standartlara ulaşma mesajı vermesi ile göç ve kentleşme de hız kazandırmıştır. İnsan yaşamını ve yaşam standartlarını önemli ölçüde etkileyen bilimsel ve teknolojik ilerlemeler nedeniyle para ekonomisi giderek daha önemli hale gelmiş ve bu standartlar bir tercihten ziyade bir gerekliliğe dönüştürmüştür. Kent yaşamının maddi imkânlar olmadan neredeyse imkânsız hale gelmesi, ailelerin hayatta kalma mücadelesinin farklı boyutlara kaymasına, aile içi rollerin ve statülerin değişmesine yol açmıştır. Geleneksel yapılarda kadınlar ev işleriyle görevlendirilirken, erkekler geçim kaynaklarının sağlanması da dâhil olmak üzere hane dışındaki sorumlulukları üstlenirdi. Ancak kentleşme ve artan mali kaynak ihtiyacı bu düzeni değiştirmiştir. Böylece, çalışabilecek durumda olan aile üyeleri, ailelerinin hayatta kalma çabalarına etkin bir şekilde katkıda bulunmak için iş aramaya başlamıştır. Bu değişim, aile içindeki rol ve sorumlulukların yeniden tanımlanmasında önemli bir rol oynamıştır. Özellikle marjinal iş kollarında çocukların kolay iş bulup evin ekonomisine katkı sağlaması ile birlikte sokakta çalışan çocuk problemi de yaşanmaya başlanmıştır. Korunmaya muhtaç çocuklar üzerindeki bu ekonomik bağımlılık, çocukların erken yaşta sokak hayatının sert gerçekleriyle yüzleşmek zorunda kalmalarına neden olmakta ve böylelikle güçlü ve yaşam mücadelesine erken başlayan çocukların yetişmesinde etkili olmuştur. Bu sorunu kapsamlı bir şekilde ele almak için, babaların neden çocuklarının bu koşullar altında çalışmasına izin verdiklerini veya kendilerini buna mecbur hissettiklerinin anlaşılması gerekliliği bu çalışmanın ortaya çıkmasında etkili olmuştur. Bu çalışma, sokakta çalışan çocukların babalarıyla yapılan yarı yapılandırılmış görüşme verilerini sosyolojik bir mercekle değerlendirmeyi ve bu yaygın toplumsal endişeyi ele almak için potansiyel çözümler önermeyi amaçlamaktadır.

Anahtar Kelimeler: Sokakta çalışan çocuklar, Değişen aile içi roller, Babalık.

**STREET LABOURING CHILDREN AND THEIR FATHERS: A JOURNEY
THROUGH CHANGING AUTHORITIES**

Abstract

Globalisation has accelerated migration and urbanisation by exposing individuals to different lifestyles through mass communication and transportation. This has potentially given the message of reaching new standards, especially for their children. Due to scientific and technological advances that significantly affect human life and living standards, the money economy has become increasingly important. These standards have become a necessity rather than a preference. Urbanisation has led to a shift in the struggle for survival of families and a change in roles and status within the family. In traditional structures, women were responsible for household chores, while men provided livelihoods. However, the increasing need for financial resources has made material means almost indispensable for urban life. Therefore, family members who were capable of working started seeking employment to contribute effectively to their families' survival efforts. This change has played a crucial role in redefining roles and responsibilities within the family. The issue of children working on the streets has also become prevalent, particularly in marginal work sectors, as children can easily find jobs and contribute to the household economy. The economic dependence on vulnerable children forces them to confront the harsh realities of street life at a young age. This has resulted in the development of resilient children who begin their struggle for survival early. To comprehensively address this issue, it is crucial to understand why fathers permit or feel compelled to have their children work in such conditions. This study aims to evaluate data from semi-structured interviews with fathers of children working on the streets through a sociological lens and propose potential solutions to address this widespread social concern.

Keywords: Street working children, Changing family roles, Fatherhood.

Giriş

Modern dünyanın insanlara sunmuş olduğu imkânların fazlalığı, bilim ve teknolojiye meydana gelen değişimlerin toplumların hayatlarına yansıyan olumlu yönleri bir taraftan toplumsal problemlerin ortadan kalkması beklentisini arttırırken diğer taraftan da yeni sorunlarla karşılaşılmasını beraberinde getirmiştir. Yeni kurulan sanayi kentleri beraberinde büyükşehir hayatını getirirken aile ve sosyo-kültürel yapılanmada da değişimin yaşanmasına sebep olmuştur. Alışılmanın aksine, farklı sosyo-kültürel yapılanmalar ortaya koyan bu yeni yerleşim yerlerine hem bireyin hem de ailesinin uyum süreci çok da kolay olmamıştır. Daha önce aile içinde gerçekleşen eğitim, meslek edinme, beslenme gibi pek çok faaliyet bu yenedünya düzeninde, farklı kurumlarda yerine getirilmeye başlanırken ailenin fonksiyonlarında da değişimin yaşanmasını beraberinde getirmiştir.

Geleneksel toplumlarda ücretsiz aile işçisi olarak çalışan aile bireyleri, paraya ihtiyaç hissetmeden çalışıp paranın tek elde toplandığı bir sistemin içinde yaşarken, iş bulmak, çocukların eğitimlerini daha iyi imkânlarla gerçekleştirebilmek, daha iyi yaşam şekline kavuşabilmek, vb. için büyük kentlere göç etmeleri ile birlikte farklı yaşam şekillerini tercih etmek durumunda kalmışlardır. Göç edilen yerlerdeki yeni yaşam şekilleri birtakım imkanlar sağlamış olsa da sorunları da beraberinde getirmiştir. Yeni yaşam alanlarında paranın çok daha fazla önemli olduğunun anlaşılması ile birlikte aile fertlerinin her biri para kazanmanın yollarını aramaya başlamıştır. Özellikle ekonomik zorluklar, geçimlerini sağlamak için çaresizce yollar arayan savunmasız aileleri etkilemeye devam ettikçe, çocuklar genellikle küçük yaşta çalışmaya zorlanmaktadır. Dolayısıyla geleneksel toplumlarda babaların evin geçimini sağlamak gibi bir görevleri varken kent hayatına geçiş ile birlikte bu görevi eş ve çocukları ile birlikte paylaşmak durumunda kaldılar. Bu yeni süreçte babaların çoğu zaman kendileri çalışıp para kazanamazken çocuklarının kazandıkları ücretlerle evlerini geçindirmek durumunda kalmaları hem otoriteleri hem de kendilerine olan bakış açılarında değişikliklere yol açmıştır. Bu çalışmada aile bütçesine destek olmak veya kendi şahsi ve okul ihtiyaçlarını karşılayabilmek için sokaklarda çalışan çocukların babalarının, çocuklarının erken yaşlarda sokaklarda çalışarak para kazanma mücadelesinin içinde olmalarını nasıl değerlendirdikleri, babalarla yapılan yarı yapılandırılmış görüşme verileri üzerinden ortaya konulmak istenmiştir.

SOKAKTA ÇALIŞAN ÇOCUKLAR

Günümüzün hızla gelişen dünyasında, sokaklarda çalışan çocukların dünyanın bazı bölgelerinde çok yaygın bir görüntü haline geldiği açıktır. Çocuklar hayatta kalmak için

dilencilik, seyyar satıcılık, çöpçülük, kağıt toplama yankesicilik ve küçük eşyalar satmak gibi bir dizi tehlikeli işler yapmakta, genellikle bu yollarla ailelerine destek olmaktadır (Şişman, 2006; Yılmaz ve Dülgerler, 2011). Bu durum, ailelerini geçindirmek için sokaklarda çalışan çocukların omuzlarına ağır yükler yüklemekte, aynı zamanda da çocuklara açısından fiziksel tehlikeler, duygusal travmalar, sosyal dışlanma ve eğitim yoksunluğu gibi başka sorunları da ortaya çıkarmaktadır (Puri, vd., 2017; Şahin, 2021; Taib, vd., 2023). Örneğin sokak işçileri, koruma kisvesi altında kendilerini işgücü ve hatta insan ticareti amacıyla sömüren suç çetelerinin de kurbanı haline getirmektedir (Pinzón-Rondón, 2009; Self-Brown, 2021). Bu senaryolarda, çocuğun korkunun üstesinden gelmesi ve yeni 'koruyucularına' sadakat göstermesi gerektiğinden, bu tür bir kontrolden kaçmak giderek zorlaşmaktadır. Bununla birlikte çocukların sokak işçiliğine dahil olmalarının, içinde buldukları koşulların çok ötesine uzanan geniş kapsamlı sonuçları olduğu görülmektedir. Sınırlı fiziksel büyüme, bilişsel bozukluk, duygusal dengesizlik ve sosyal uyum problemleri gibi sorunlarla uğraşmak zorunda kalan bu çocuklar, erken yaşta iş yaşamına dahil olmaları nedeniyle “kayıp çocukluk” dönemi yaşamaktadırlar (Hoffmann, vd., 2017; Maciel, vd., 2013). Dolayısıyla sokakta çalışan çocukların yaşadıkları deneyimlerin kümülatif etkisi, gelişimleri üzerinde derin ve zararlı bir etkiye sahip olabilmektedir (Acar, 2010; Kahraman ve Karataş, 2018).

Elbette yaşlarının çok ötesinde ağır yükler ve sorumluluklar taşımalarına rağmen, sokakta çalışan birçok çocuk muazzam bir dayanıklılık ve beceriklilik göstermektedir. Dahası, çocuklar aile gelirine katkıda bulunmaya başladıklarında, finansal bağımsızlık talep ettiklerinden karar alma süreçlerinde güç kazanabilmektedirler. Bu güç, zorlu koşullar altında yaşarken değişen otoritelere uyum sağlamayı öğrenmesini sağladığı gibi sorumluluk, bağımsızlık ve girişimci yönlerinin gelişmesine katkıda bulunabilmektedir. Ancak potansiyel kazanımlar genellikle erken yaşta işe dahil olmayla ilişkili önemli kayıpların gölgesinde kalmaktadır. Sokakta çalışmanın fiziksel, duygusal ve sosyal maliyetleri, çocukların gelişimi ve gelecekteki yaşam fırsatları üzerinde olumsuz yansılarda da bulunabilmektedir. Eğitim eksikliği ve olumlu rol modellerine sınırlı maruz kalma, sosyal entegrasyonlarını engelleyebileceği gibi gerçek potansiyellerine ulaşmalarını da sınırlayabilmektedir (Şişman, 2006; Yılmaz ve Dülgerler, 2011). Bu nedenle sokakta çalışan çocuklar konusu karmaşık ve çok yönlü olup, altta yatan nedenleri ele alan ve etkili destek mekanizmaları sağlayan kapsamlı bir yaklaşım gerektirmektedir. Bazı çocuklar, sokaklarda çalışıyor olmalarından dolayı olumlu kazanımlar da elde ediyor olmalarına rağmen fiziksel, duygusal ve sosyal gelişimleri açısından çok önemli kayıplar yaşadıkları da önemli bir gerçektir.

KÜRESELLEŞME VE KENTLEŞME KISKACINDAKİ AİLEDE “BABA”NIN DEĞİŞEN OTORİTESİ

Babanın aile içindeki rolü, gelişen sosyal, ekonomik ve kültürel faktörler tarafından şekillendirilerek tarih boyunca önemli dönüşümler geçirmiştir. Geleneksel toplumlarda babalar, edindikleri bilgeliği çocuklarına aktaran, temel yaşam becerilerini ve hiyerarşik yapıları öğreten otorite figürleri ve koruyucular olarak görülmüştür (Sriram, 2011; Smit, 2002). Böylece ataerkil yapı birçok toplumda derinlemesine kök salmış ve babalara atfedilen beklenti ve sorumlulukları şekillendirmiştir. Babanın sorumluluğu genellikle ailenin maddi ihtiyaçlarını karşılayan, önemli kararlar alan ve çocukları disipline eden sınırlarla çizilirken anne, büyük ölçüde ev içi alana hapsedilmiş, rolleri çocuk bakımı ve ev işleriyle sınırlandırılmıştır. Bu nedenle geleneksel toplumlarda baba figürü, ailenin reisi olarak algılanır ve hane halkı üzerinde muazzam bir güce ve etkiye sahiptir. Ancak kültürel normlar, ekonomik güç ve yasal sistemlerin birleşimiyle sağlam bir şekilde kurulan babanın otoritesi, küreselleşme ve kentleşmenin ortaya çıkmasıyla birlikte önemli bir değişim geçirmiştir (Dette-Hagenmeyer, 2014).

Küreselleşmenin getirmiş olduğu önemli etkilerden biri, kadınların iş gücüne katılımının artması olmuştur. Kadınlar eğitim ve istihdam olanaklarına erişim sağladıkça ekonomik olarak daha bağımsız hale gelmiş ve mali destek için erkeklere olan bağımlılıkları azalmıştır. Bu değişim, kadınların hane içinde daha fazla özerklik kazanmasını sağlayarak gücün ve karar alma mekanizmalarının daha eşitlikçi bir şekilde dağılmasına yol açmıştır. Küreselleşmenin bir diğer sonucu da bireycilik ve kişisel özerkliğe yapılan vurgunun artması olmuştur. Bireyin artan hareketliliği, ebeveynlik ve otoriteye ilişkin farklı bakış açılarını bir araya getirirken aynı zamanda geleneksel aile yapısı ve bakım verme uygulamalarının dönüşüme uğramasının da zemini hazırlanmıştır (Dainel ve Pasley, 2016). Bu kültürel değişim, babalar da dahil olmak üzere otorite figürlerine koşulsuz itaat kavramını aşındırmıştır.

Küreselleşme birlikte eş zamanlı olarak kentleşme ve kentlileşme sürecine katılım da aile yapısının yeniden şekillenmesinde önemli bir rol oynamıştır. Kırsal ortamlardan kentsel ortamlara geçiş, yaşam tarzında, değerlerde ve ailevi beklentilerde bir değişimi de beraberinde getirmiştir (Edwards, 1986). Kentsel ortamlarda aileler genellikle daha küçük ve çekirdek yapıda olup, geniş aile ağları daha az destek ve rehberlik sağlamaktadır (Bhugra, vd., 2019). Bununla birlikte kent yaşamının getirmiş olduğu ekonomik zorluklar aile içerisinde yaşayan her bireyin çalışma yaşamına katılımını zorunlu hale getirmiştir. Bu değişim iş, çocuk bakımı ve ev sorumluluklarını yönetmek için babalar da dahil olmak üzere bireysel ailelere daha fazla sorumluluk yüklemiştir. Ayrıca, kentsel yaşamın anonimliği ve hızlı temposunun getirdiği yeni

yaşam tarzları, geleneksel aile yapılarını zorlayabilmekte ve babaların geleneksel toplumlarda olduğu gibi haneleri üzerinde aynı düzeyde kontrol sahibi olmalarını zorlaştırmaktadır (Hendriati ve Okvitawanli, 2019). Çünkü kentsel ortamlardaki çocuklar daha geniş bir yelpazede sosyal etkilere maruz kalmakta ve baba otoritesine daha az açık olabilmektedirler. Özellikle gelişmekte olan ülkelerin kentsel bölgelerinde çocuk işçiliğinin artan yaygınlığı, aile otoritesinin dinamiklerini daha da karmaşık hale getirmektedir. Sokaklarda çalışan çocuklar genellikle ailelerinin geçimine önemli ölçüde katkıda bulunmaktadır Ancak bu durum baba otoritesinde ciddi kırılmalar meydana gelmesine neden olmakta ve babanın hane içindeki etkisini azalttığı gibi babanın değer aşılmasını ve rehberlik etmesini de zorlaştırabilmektedir. Dolayısıyla, küreselleşme ve kentleşme sadece babaların geleneksel bakım sorumluluklarını etkilemekle kalmamış, aynı zamanda çağdaş toplumda babalığın anlaşılma ve uygulanma biçimlerini de etkilemiştir.

YÖNTEM

Saha çalışmaları, diğer araştırma yöntemleriyle erişilemeyen bağlamsal zenginlik ve gerçek dünya anlayışı sağlayarak birçok disiplinin kritik bir bileşenini temsil eder. Bu tür çalışmaların en önemli yönleri katılımcılarının öznel deneyimleri, davranışları ve perspektifleri hakkında derinlemesine içgörüler sunan yöntemlerinin kullanılmasına olanak sağlamalarıdır. Doğası gereği keşifsel olan saha araştırmaları; araştırmacıların karmaşık ve dinamik durumları arasındaki bağlantıları ortaya çıkarmak için nitel araştırma yöntemlerini tercih ederler. Nitel araştırma yöntemleri, öznelinin sosyal ve kültürel bağlamlarının daha derinlemesine anlaşılmasını sağlayarak nicel yöntemlerin gözden kaçırabileceği örüntü ve temaların ortaya çıkarılmasını sağlarlar. Böylelikle katılımcıların seslerinin de araştırma sonuçlarına dahil edilmesi sağlanarak araştırılan olgunun daha bütüncül ve incelikli bir şekilde anlaşılmasına olanak oluşturulur (Denzin ve Lincon, 2011; Creswell, 2013; Creswell, 2017). Bu yöntemde yaygın olarak katılımcı gözlem, derinlemesine görüşmeler, odak grupları ve doküman analizi gibi çeşitli teknikler kullanılmaktadır (Moustakas, 1994). Bu araştırmada da yarı yapılandırılmış görüşme formu kullanılarak derinlemesine görüşmeler gerçekleştirilmiştir.

Sokakta çalışan çocukların babaları ile yapılan görüşmeler, 11.05.2023- 1.11.2023 tarihleri arasında Ankara ilinde gerçekleştirilmiştir. Daha önceden sokakta çalışan çocukların anneleri ile görüşmeler gerçekleştirilerek yapılan çalışma (Şenol ve Dinç; 2023) sırasında, babalarla görüşmenin çok daha zor olacağı ancak çok da gerekli olduğu, bilgi verici içeriğinin fazla olacağı fark edildi. Sokakta çalışan çocukların anneleri ile görüşmeler gerçekleştirilirken babalara da ulaşılmaya çalışıldı. 50'nin üzerinde babaya çocukları ve yakınları üzerinden

kendilerine ulaşılmış olmasına rağmen “*Bu konuda ne konuşulacak?*”, “*Konuşmaya gerek var mı?*”, “*Bu konudan kime ne?*”, “*Bu bizi ilgilendirir.*” gibi sözlerle görüşme talebimiz reddedilmiştir. Bu sebeple görüşülebilir baba sayısı 19 ile sınırlı kalmıştır. Ancak görüşmeyi kabul eden babalar, görüşme talebini kabul etmeyen babaların genellikle çocuklarını çalıştırıyor olmanın ezikliğini hissediyor olmaları sebebi ile görüşme taleplerini kabul etmediklerini düşündükleri hatta böyle düşündüklerini biliyor olduklarını iddia etmiştir. Tüm bu gerekçelerle sadece 19 baba ile görüşme gerçekleştirilebilmiştir.

Sokakta çalışan bir çocuğun annesinin erkek kardeşini görüşmeye ikna etmesi ile başlayan bu görüşmeler, o babanın diğer sokakta çalışan çocuğu olan babaları ikna etmesi ve bizimle görüşme bağlantısını sağlaması sonrasında kartopu örneklem yöntemi ile devam ettirilmiştir. Çalışmada kartopu örneklem yönteminin seçilmiş olmasının sebebi, kendi içlerinden olan, güvendikleri, kıramadıkları kişilerin görüşmeci olmaya babaları ikna etmelerinin çok daha kolay olduğunun fark edilmiş olmasıdır. Babaların görüşmelere ikna süreçlerinde çocuklarından daha fazla eşleri, kız kardeşleri, anneleri gibi aile fertlerinden olan kadınların etkili olduklarını söylemekte de fayda var.

Demografik Bilgiler

Görüşme talebini kabul eden babaların yaş ortalamaları 31 olarak tespit edilmiştir. Görüşme talepleri iletildiğinde yaşları daha ileri olan babaların görüşme talebini daha kesin bir dille reddetmeleri ve bunun konuşulacak bir konu olduğunu düşünmediklerine vurgu yapmış olmaları, görüşmelere katılan babaların yaş ortalamalarının düşük olmasında etkili olduğu düşünülmektedir.

Görüşmeci babalardan 3’ü kadrolu bir işinin olduğunu, 9’u günlük geçici işlerde çalıştığını ancak her zaman iş bulma şansının olmadığını, 7’si de kendisinin de çocuklarının yapmış olduğu işleri yaptığını, vasıflı bir eleman olmadıkları için başka iş bulmakta zorlandıklarını, hatta 2 baba vasıflı işgücü olmadıkları için daimî bir iş bulmalarının imkânsız olduğuna inandıklarını belirtmiştir. Babaların eğitim seviyelerine bakıldığında 4’ünün ilköğretim mezunu, 5’inin ortaokul mezunu, birisinin ortaokul terk, 2’sinin lise terk, 3’ünün lise mezunu olduğu, birisinin açıktan lisede okuduğu, 2’sinin yüksek okul ve birisinin de üniversiten mezunu olduğu görülmektedir.

Görüşmeye katılan babaların 1’inin 8, 4’ünün 5, 2’sinin 4, 9’unun 3, 2’sinin 2 ve birisinin de 2 çocuğu olup eşinin de halen ikiz bebeklere hamile olduğu öğrenilmiştir. Babalara “*kaç çocuklarının sokaklarda çalıştığı*” sorulduğunda görüşme grubunda “*hepsi*” cevabını veren 13 baba, “*sadece büyük çocuklarım*” cevabını veren 2 baba, “*sadece erkek çocuklarım*” cevabını

veren 3 baba ve “Ben iş bulamadığım zaman eşim ve çocuğum çalışıyor” cevabını veren bir babanın olduğu tespit edilmiştir.

BULGULAR

Anne ve babalarda çocukları için her zaman en iyisini, en doğrusunu yapma, onlara en iyi şartları sunma isteğinin genellikle baskın olduğu bilinmektedir. Anne babaların bu konudaki hassasiyetlerine rağmen sokaklarda, sokağın olumsuz şartlarında çalışmalarına nasıl göz yumdukları ve bu durumu nasıl içselleştirdikleri, sokakta çalışan çocuklar probleminin ortadan kaldırılmasında, bu problemle mücadele sürecinde önemli bir adım olacağı düşüncesi ile hazırlanan bu çalışmada babalardan alınan cevapları dört grupta toplamak mümkün oldu. Bu bölümde her bir başlık görüşmecilerin ifadeleri doğrultusunda sosyolojik bakış açısı ile değerlendirilmeye çalışılacaktır.

Önceleri Zorunluluktan Sonra Alistık

Ailelerin çocukları için en iyi imkanları sağlama çabalarının köylerden kentlere göçü zorunlu hale getiriyor olması sonrasında, göç edilen yerlerdeki hayatın zorlukları kendisini paraya olan ihtiyaçla en şiddetli şekilde ortaya koymaktadır. Kent hayatı kiradan, suya, elektriğe, yiyeceğe kadar para olmadan hayatın sürdürülmesini imkânsız hale getirmektedir.

12 Numaralı görüşmeci çocuklarının sokaklarda çalışmaya başlamasını şu ifadelerle ortaya koymaktadır: “Para ne kadar önemli bişeymiş biz buralara gelince anladık hep. Köyde para lazım olmaz insana. Kasabaya, şehre gidince lazım olur biliriz hep ama. Bu kadar lazım olmanı söyleseler inanmazdım. Abla, şehirde yediğin, içtiğin para. Soluma parası alacaklar utanmasalar. Elimizde bi kısım para ile geldik. Çok para sandıydık. Anammmmm bir gitti para bir gitti anlatamam ilkgünler. Sonralarda da gitti tabi ama ilk günler giden çok kötüydü. Birkaç ay bizi idare eder sandıydık para eriyiverdi. Can hıraş iş aradık hanımla. Kör olası iş bulunmadı bitürlü, Benim en ufak, geldi “Baba Emirlerle ben de su satmaya gitcem. Ben de para kazancam dedi.” Anası ağlar durur “olmaz” der. Bigün iki gün geçti. “Biz iş buluncaya kadar gitsin.” dedik. Sona sona diğerleri de gitmeye başladılar. Anlaycan alistık gitti. Hiç neden çalışır bunlar demedik uzun zamandır. Anaları da ağlamıyo artık (gülüyor). Böyle işte. Başladılar çalışır giderler. Biz de yuvarlanır gider olduk. Anaları bi kocakarı bakar. Ben de iş buldukça giderim. Allah bugünümüzü aratmasın.”

8 numaralı görüşmeci de çocukların daha iyi bir eğitim alması için geldikleri bu yerde çocuklarının eğitimini sürdürebilmek için çocuklarını çalıştırmak zorunda kaldıklarından manidar bir şekilde bahsetmektedir: “Buraya neden geldik? Çocukları okutmak için. Ben lise

mezunuyum. Okumanın önemini bilirim. Çocuklarımız okusun dedik hanımla, ana ata demedik terk edip geldik buralara. Vicdansa vicdan. İnsan kendisini kötü hiss ediyor. Ben tek erkek çocuğum ailemde. Anam babam beni bırakmak istemedi. Ben de onları bırakmak istemedim ama herkes kendi çocuğuna üzülür. Biz de bebe belik rezil olmasın dedik. Eskisi gibi değil. Liseden sonra da okumaları lazım. Bizim köydeki ilkokul bile şimdilerde kapandı. Biz 12 yıl oldu geleli. Çocukları okula yollayalım dedik gelince elde yok evde yok. Kırdık döktük, topladık yolladık okula. Ama masraf bitmiyor ki. Bir gün geliyor çocuk defter lazım diyor, öbürün geliyor yardımcı kitap lazım diyor. Öbürü küçük o zamanlar suluboyası da kuru boyası da bitmiyor. Kıvrır oldu. İlla ki okusunlar istiyoruz. Neden geldik biz buraya? Düşünsene onlar okusun diye geldik okula gücümüz yetmiyor. Konu komşu, çocuğunu çalıştırıyor baktık. Ben okumuşum ya olmaz dedim. Olmadı ama masrafınızı çıkaracak kadar iki kardeş gitsinler bari dedik. Baktık sonra onlar eve de katkı sağlıyorlar. Öyle başladı gidiyor. Abla güç yetmiyor okul masraflarına. Bir bilsen anlarsın bizi. Kınama bizi. İnsan hem eğitilmiş olur hem de çocuğunu çalıştırır mı ama mecburiyetler işte. Şükür iyi okuyorlar ama. Biri lisede, biri, 7'ye gidiyor. Öbürü yeni başladı ilkokula. O da abileri ile gidiyor. Ufak tefek o da kazanıyor. Ama eşim de ben de onu çok yollamayız. Bazan ben de gidem diye ağlıyor da o zaman gider. İşte öyle böyle başladık. Kınama ama bizi. Olsa biz de özel okullara yollamak isteriz. Evlattan tatlısı mı var.”

7 numaralı baba da çocuklarını neden çalıştırdığını şu ifadelerle ortaya koymaktadır: “Sen şimdi bizi kınıyor musunnnnn, yoksa ayıplıyor musun anlayamadım ben. İnsan çocuklarına kıyamaz. Sizin gibi bizi de vaktiyle okutsalardı, biz de halden anlamayıp sorardık belki çocuklarınızı neden çalıştırdığınız diye. Halden anlamak lazım. Sen hiç kira ödedin mi? Ödesen de para varsa ödemek kolay. Ay dediğin dönüp dönüp gelir önüne. Evsahibi acımaz sana. Ver de ver der. Elentrik, su parası da öyle. Kaç aydır askıdan ödensin diye ben başvururum belediyeye. Kimin umrunda evsahibi seni atmış. Benim yükümü evsahipleri iki defa sokağa koydu. Ne yapar insan? Kim iş bulduysa çalışır. Biz de istemeyiz ama. Hem çocuklar oyun yapar çalışmayı da. Herkesin çocuğu, karısı çalışır burlarda. Çalmak çırpamak ayıp. İnsan yeter ki utancak iş yapmasın. Ayıp oluyo böyle yargılar gibi neden çocukların çalışıyor demek? Bilmek istediğinizi biliyom da anlıyom da ama sanki babalığımı yargılıyon gibi geliyor insan. Sebebini bilerseniz ne bilmeseniz ne. Çalışırlar işte. Çalışmak kötü değil hem. Sokaklar da kötü değil. Onlar birbirlerini korurur kollarlar. Sizin çocukları siz korursunuz. Bizim çocukları Allah korur. Sizinkiler şımarıp giderler. Bizimkiler altın değerinde Allah esirgesin her birini. Hayat sizinki kadar kolay değil. Anlamazsınız tabi (çok sinirleniyor).

Görüşmeler sırasında yedi numaralı babanın 8 çocuğunun olduğu ve her çocuğunun da sokaklarda çalışarak büyüdüğü öğrenilmiştir. Baba çocuklarının her birinin sokaklarda çalışarak büyümesinden kendisinin sorumlu tutulacağını düşündüğü için olsa gerek görüşmelerde son derece tepkili ifadeler kullandığı düşünülmektedir. Önceleri ilk üç çocuğu çalışırken zaman içinde diğer çocuklarının da çalışmaya başladığını ve neden bütün çocuklarının çalışmaya başladığını sorgulamadığını, sürecin kendiliğinden geliştiğini, görüşmeler sırasında vurgulamaya çalıştığı dikkati çekmiştir. Belki muhakemenin yıllar sonra dışarıdan birisinin yanında yapılıyor olması da kendisini kırmış olabilir. Görüşme talebine olumlu cevap vermesine rağmen görüşmeler sırasında çalışmanın yapılmasını yargılayıcı ifadeler kullanıyor olması sebebi ile görüşmelerin yarıda bırakılabileceği ve böyle bir durumda yapılan kısmın çalışmada da kullanılmayacağı kendisine söylenilmesine rağmen ısrarla “Siz de bizi anlayın. Bizi yargılamak neymiş görün. Çocuğunu kim çalıştırmak ister? Mecburuz, ben de bunu anlatayım size. Yoksa böyle herkese sorup sorup oturduğunuz yerden bize ahkam kesmek olmaz. Sor sor bakayım.” gibi ifadelerle görüşmeye devam etmek istediğini belirtmiştir. Babanın bu ifadelerinden çaresizliklerinin anlaşılmasını istediği düşünülmektedir. Köyde yaşanan geniş aile hayatı, evlenenlerin anne babaları ile birlikte kalmaları sebebi ile kira gibi önemli bir masraf kalemini ortadan kaldırmaktadır. Aynı şekilde aynı evin içinde çalışanların ücretsiz aile işçisi olması sebebi ile para tek elde toplanmakta, elektrik, su, ısınma gibi giderlerin tek ortak kasadan karşılanabilmesi, tarladan toplananın, hayvanlardan elde edilen ürünlerin yemeğe dönüştürülmesi ve tek tencereden tüketimin olması paraya olan ihtiyacı en alt seviyelere taşımaktadır. Kent hayatının işe, okula vb. gitmek için dahi paraya ihtiyaç hissettirdiği babaların ifadelerinden de anlaşıldığı gibi sadece çocukların değil, aile fertlerinin tümünün çalışmasını da zorunlu hale getirdiği anlaşılmaktadır.

Biz Bir Aileyiz

Görüşmeci babalardan bir kısmı aile olmanın, zorluklarla mücadele sürecinde çok önemli olduğuna, zorluklarla mücadele ederken aile bireylerinin dayanışmasının gerekliliğine inandıklarını ve bunu zorlu süreçlerinde tecrübe ettiklerine vurgu yapmış oldukları dikkati çekmektedir.

5 numaralı görüşmeci, aile birliğini sağlamanın önemini şu ifadelerle ortaya koymaktadır: “Rahmetli ağababam, aile elim gibidir derdi. Beş parmağın var der tek tek gösterirdi. Sonra her birini çekiştirir. Bak kırılır derdi. Ama yumruk yaparsan kimse sana bir şey yapamaz. Yapsa da işlemez derdi. Bizim buralara gelip de darmadağın olan köylülerimiz var. Allah muhafaza etsin inşallah. Biz hep bunu kulağımıza küpe ettik. Sen ben olmaz bizde. Büyük, küçük olmaz bizde.

Kim iş buldu çalışır. Köylük yerde bizler de çalışarak büyüdük. Biyanımızda bişey mi eksik. Köyde biz de büyürken dedelerimizle, amcalarımızla çalıştık hepberaber. Evlenmeden ben geldim. Askerlik sonrası ağababam beni evlendirdi köyden. Buralar bizi bozar diye korktu rahmetli. İyi de etmiş. Evlenip geldik buralara. Bizimki bikere bile benim önümden aykırı geçmedi. Çocuklarımı da öyle yetiştirdi Allah razı olsun. Bizimki çalışmaz. Evden de çıkmaz. Aha şurda Kızılay'ı görmemiştir daha. Çocuklarla ben çalışırız. Çocuklar birlikte giderler işe. Birbirlerini kollarlar. Okula da devam ederler. Biz kazanır götürürüz. Akşam olunca çocuklar da bana kazandıklarını verirler. Eve bişeyler lazımsa alır getiririm. Bizimki de pişirir, yoksa yetirir. Aile bizde böyle olur.” Ailenin bireyleri arasında birlik olmanın önemli olduğunu ve bu sebeple de aile bireylerinin her birinin üzerine düşeni tespit ederek görev şuurunu yerine getirmesi gerektiğini 19 numaralı görüşmeci de şu ifadelerle ortaya koymaktadır: “Çocuk da çalışır, baba da çalışır. Evde kim varsa çalışır. Şu çalışsın bu çalışsın olmaz ki. Kim ne bulursa yapar. Kim ne bulursa eve taşır. Önemli olan akşam bir sufra başında toplanmak değil mi? Karın doyurmak değil mi? Hem bu şehirlerde herşey para. Bikişinin çalışması ile olmaz. Memurlar bile bi kişi çalışmıyor ki artık. Onlar sadece çocuklarını çok çalıştırmazlar. Paraları var çünkü. Bizim çocuklar da çalışır herkes çalışır. Çocuklarımızı da okuldan mahrum etmeyiz ama. Anaları çok takip eder. Ben çalışırım. Şunu da yapmayiverem demez. Çocuklarım da Allah var. Hem işe gider para kazanırlar hem de okulları hep takdir. Çok iyi okurlar. Allah onlardan da razı olsun. Eh biz bu kadarını yapabildik. Onlar okuyup memur olsunlar, çocuklarını çalıştırmassınlar. Ama şimdi hayat mücadelesinde biraz güçsüzüz ya. Namerde muhtaç olmamak için çalışırlar. Hepimiz çalışırız ama. Misal ben. Çiçek satarım kavşaklarda. Ama bir taraftan da yakınım arabamı koyarım. Bulduğum kartonları içine atarım. İki işi bir arada yaparım. Anaları da temizliğe gider buldukça. Ama boş kaldıkça da parça başı iş alır komşulardan. Çocuklar da çalışıp hayatın zorluklarını anladıkları için haylazlık yapmazlar Allah var şimdi. Ben bunda kötülük görmem. Hepimiz çalışıp ailemizi güçlendireceğiz tabi de. Böyle böyle Sincan'dan bir ev aldık. Şimdi bitane daha alalım deriz. Çocuklar evlenmeden başlarını sokacak evleri olsun ki evlenince rahat etsinler. Kötü mü tapmışız. Biz iyi yaptık bence. Boş olanı Allah da sevmez.”

13 numaralı görüşmeci de aile oldukları için görevlerini yerine getirdiklerine inandıklarını şu ifadelerle ortaya koymaktadır: “Aile olmak, bir olmak demektir. Baba çalışır öbürleri yer demek değildir. Bizler böyle gördük büyüklerimizden. Misal paran pulun var. O zaman evlatlarını çalıştırmazsın. Ama paran yetmiyorsa kusura bakma o zaman herkes bir işin ucundan tutacak. Bizler böyle gördük. Bizim evin en küçüğü çalışmaz. Anası kıyamaz ona. Evlat bu kim kıyar

ama. Aile tutunsun diye elimizden geleni yaptık bugüne kadar. Biz böyle gördük. Böyle de öğrettik evlatlara.” Bu görüşmeci babanın da vurguladığı gibi aile bireylerinin üzerlerine düşen görev bilinci ile buldukları işlerde çalışarak aileye destek sağlamaya çalıştıkları anlaşılmaktadır.

Görüşmeci babaların ifadelerinden de anlaşılacağı gibi aile olmayı dayanışmanın ön şartı olarak kabul ettiklerini söylemek mümkün. Bu gruptaki görüşmeci babalar, aile bireylerinin birbirlerine dayanarak ayakta kalabileceklerine inandıkları için genç, yaşlı demeden her bir bireyin üzerine düşeni yapması gerektiğine vurgu yapmış oldukları dikkati çekmektedir. Biz bilincin hakîm olduğu ailelerden geldikleri ve bu tür ailelerde yaşadıkları için de çocuklarının erken yaşlarda çalışma hayatının içinde olmasında bir sakınca görmediklerine sık sık vurgu yapmış oldukları görülmektedir. Aile içinde yaşanan sıkıntılarda çözüm üretebilecek konumda olan her bir bireyin az çok demeden çözüm üreterek ailenin devamlılığının sağlanmasında etkin rol alması gerektiğini savunmaktadırlar.

Keşke Okumuş Olsaydım

Görüşme grubundaki babalara çocuklarının neden sokakta çalışıyor olduğu sorulduğunda, kendi eğitim seviyelerinin düşüklüğünü gerekçe göstermiş oldukları dikkati çekmektedir.

17 numaralı görüşmeci baba “Eğitimim olsa ben de doğru düzgün bir iş bulurdum. İş bulmak için çok çabalarım hep. Yok, yok. İş yok. İş bulsam ne karımı ne de çocuklarımı çalıştırırım. Babayım ben. Tabi ki ben çalışıp onlara bakmalıyım. İş bul sen bana, bak çalıştırır mıyım hiç.” derken 2 numaralı görüşmeci baba da “Bizim zamanımızda okumak bu kadar önemli değildi. Okumasan da iş bulurdun. Ben hastalık geçirdim. Herkes iş bulurken ben bulamadım. İyileşince aradım ama yok. Bulamadım. Okumuş olsaydım bulurdum. Okumamışsın, yaşın da geçmiş. Karınlar aç para lazım. Kira gelir para lazım. Elektrik, su derken. Yaşamak için ne bulursan yapıyorsun. Okusaydım deme okumamışsınız işte.” şeklindeki ifadeleri ile eğitimini sürdürememiş olmanın hayatlarına yansıyan olumsuzluklarını dile getirmektedir.

“Ben okumak istedim. Ama rahmet olsun babam “Tarlaya, takkaya kim bakacak? Okuyanlar hep tok da sen aç mısın? Küçükler okusun sen benim yerime geçeceksin.” diyerek beni okula yollamadı. Sonuç, işte bu. Baba hakka yürüyünce malaları da paylaşmak istedi kardeşler. Biz kaldık küçücük toprağa. Yeter mi? Yetmedi tabi. Geldik mecbur buralara ama okuyana iş yok şimdi. Bizlere hiç yok. Çocukları okutmaya çalışıyorum ama hem oku hem çalış. O da olduğu kadar işte. Çocuk ne yapsın. Okul bitsin de para kazanayım diye kafayı yoruyo. Keşke hiç kimseleri dinlemeden okusaydım derim ama bizim zamanımızda baba ata dinlemeden olmazdı. Çok sayardık biz büyüklerimizi. Büyükler de bilse böyle yapmazdı ama. Bizden geçti artık.

Çocuklarımız okusun, karnımız doysun yeter. Ama az yiyelim ama çocuklar okusun istiyoruz analarıyla.” şeklindeki ifadeleri ile 2 numaralı görüşmeci, eğitimin öneminin farkına vardıklarını ancak kendileri için geç kaldıklarını, çocukları için bu gerçekliği dikkate alarak çocuklarının eğitimlerini sürdürmeye gayret ettiklerini ortaya koymaktadır.

Görüşmeci babaların ifadeleri, eğitim seviyelerinin düşük olması sebebi ile iş bulamadıkları, iş bulsalar dahi vasıfsız işlerde çalıştıkları için düşük ücretler elde ediyor oldukları, daimî işlerinin olmadığı, kayıt dışı işlerde çalıştıkları için ailelerinin ihtiyaçlarını yeterli oranda karşılayamamaları sebebi ile aile fertlerinin özellikle de çocuklarının çalışmasına ihtiyaç duydukları hatta buna mecbur kaldıklarını ortaya koymaktadır. Görüşmeler sırasında bu yönde cevaplar veren babaların genellikle eğitimin öneminin farkında olan babalar oldukları, kendi eğitimlerini ailelerinin geleceği açısından önemsemiş olmalarına rağmen sosyal ve ekonomik sebeplerle eğitimlerine istedikleri seviyelerde devam edemedikleri, bunun da sadece kendi hayatlarına değil aile bireylerinin hayatlarına da olumsuz yönde etki ettiğinin farkında oldukları anlaşılmaktadır.

Onlar Çocuklarını Çalıştırmazlar

Görüşme grubundaki babaların bir kısmı, çocuklarının çalışma hayatına erken yaşlarda atılmış olmalarını kendilerinin yaşamış olduğu çaresizliğe bağladıkları için çocuklarının hayatında yaşanacak dönüm noktaları ile bu durumun ortadan kalkabileceğine inandıkları anlaşılmaktadır. 9 Numaralı görüşmeci: *“Ben üniversite okuduğum halde iş bulamadım. Çok aradım. Yok. Biz doğuştan şanssızlarız. Anada atada biraz bişeyler olacak ki sen de bişeyler yapabilesin. Ben çok çabaladım olmadı işte. Çocuklarımı sonuna kadar okutacam. Üniversite de yetmiyor artık. Üstüne yollayacam. Başka türlü bizim kaderimiz değişmez. Benim de şimdi bitane çocuğum çalışıyor senin dediğin gibi sokaklarda. Ama okul hayatları sürsün diye çalışıyor. Bizim gibi ev geçindirme gaylesi ile çalışmıyor. Kardeşi okusun, kendisi okusun diye çalışıyor. Onlar evlenince artık ben diyom ki onlar çocuklarını çalıştırmazlar. Bir Hocam söylemişti üniversitede okurken derste. Akademisyen üçüncü nesilde olurmuş ancak. Bizde de üçüncü nesil çocuklar sokakta çalışmaktan kurtulacaklar bence. Sence de öyle değil mi? Kıramıyoruz işte zincirlerimizi. Değiştiremiyoruz kaderimizi. Ama değişecek tabi. Onlar çocuklarını çalıştırmazlar. Benim elimden gelen bu. Ben zaten onları tek başlarına koymam sokağa. Birlikte karton topluyoruz. Bazan anneleri de gelir gece gidersek işe. Anne de üniversite mezunu. Kreşlerde yardımcı anne. Hayat mücadelesi işte. Ama onlar çocuklarını çalıştırmazlar.”* şeklinde bu konudaki görüşlerini ortaya koymuştur.

4 numaralı görüşmeci de kendilerini zorlayan şartlar sebebi ile çocuklarının çalışmak zorunda kaldığına şu ifadelerle ortaya koymaktadır: *“Ben çocuğum sokaklarda çalışsın istemem. Kimse istemez. Ama lise bitirdim ben. İş bulamadım. Köyde toprağımız da verimli değil. Asıl sebep eşim “illâ gidelim, illâ gidelim.” tutturdu. İyi mi oldu geldiğimiz? Bazı yönlerden iyi oldu, bazı yönlerden kötü. Orda tüm kardeşler bir arada çalışır, bir arada yerdik. Karnımız bugünkünden daha iyi doyardı o zamanlar. Köylük yer. Tavuğun var, ineğin var. Bahçeden yetişenler karnımızı doyururdu. Ama herkesler göç etmeye başlayınca bizim kadınlar da “Gidelim Allah gidelim” demeye başladılar. Herkes göç edince okul da sorun olmaya başladı. “Eşim bizim çocuklar da bizim gibi olacak.” diye kafamın etini yemeye başladı. Kadın kısmı işte bilirsin. Bi tutturdu mu tutturur. Geldik işte buralara. Tutunmaya çalışıyoruz hep birlikte. Ben gece bekçiliği yaparım inşaatlarda. Yetmez tabi. Eşim ev temizliğine gider. Çocuklar da mevsimine göre işte ne bulurlarsa satarlar. Okumaksa okudum. Lise mezunuyum ama olmuyor işte. Ben daha iyi büyütmek isterdim tabi çocuklarımı. Bu inşaat bitince belki beni kapıcı alacaklar. O zaman kira derdi olmaz. Apartmanda eşim de iş tutar. Çocuklara gerek kalmaz diye düşünüyoruz. Öyle işte. Ne yapalım onlar okusun diye biraz da bu katlandıklarımız. Onlar okusun, çocuklarına daha iyi şartlar sağlasınlar. Onlar çalıştırmasınlar çocuklarını. Ben onlara daha çok imkan verdim. Biz okul okuduk ama ne zorluklarla. Onlar sadece okula gidip boş kalınca da çalışıyorlar. Olur o kadar.”*

3 numaralı görüşmeci de: *“Onlar çocuklarını çalıştırmasınlar. Ben babamdan böyle gördüm böyle yaptım. Biz zengin bebeleri olamadık hiç. Bizi çalıştırdılar biz de böyle gördüğümüz için böyle yapıyoruz. Zengin olup çalıştırsak anlarım da. Hem ne var çalışsın. Hayatı öğrensin. Biz öyle bir eli yağda bir eli balda tipler değiliz. Onlar çalıştırmasın çocuklarını. Yaşamadan konuşmak olmaz. Zaten üzülürüm hep çocuklarıma iyi hayat sunamadım diye. İmkan olsa ben de çalıştırmam ama işte. Ben onlar okusun diye çabaladım. Onlar çalıştırmasın ben ne edeyim.”* şeklindeki ifadesi ile gönül rızası ile çocuklarını çalıştırmadığını ancak yaşanan çaresizliklerin onları bu hayat şekline mecbur bıraktığını net bir şekilde ortaya koymaktadır. Görüşmeci babaların pek çoğunun görüşmeler sırasında kendi tercihleri olmayan bu durumun zorunluluk olduğu için ortaya çıktığına sık sık vurgu yapmış oldukları dikkati çekmiştir.

Çocukların sokaklarda çalışmasının olumsuz taraflarını bildikleri halde onların çalışması ile evin geçimini daha insani şartlarda sağlayabildiklerini, çocuklarının eğitimlerini sürdürebildiklerini, çocuklarının çalışmaması durumunda ailenin diğer fertlerinin ve de özellikle çocuklarının daha istenmeyen şartlarda yaşamak zorunda kalacaklarını bildikleri için bu istenmeyen durumu onaylamak durumunda kaldıklarını belirten bu gruptaki babaların ortak

noktaları, eğitim seviyelerinin görüşme grubundaki diğer babalardan görece daha yüksek olmasıdır. Yaşam şartlarının onları, bildiklerine aykırı şartlarda yaşamak zorunda bırakıyor olmasından kaynaklanan serzenişlerini sık sık dile getirmiş oldukları dikkati çekmektedir. Öğrenim hayatı içinde öğrendiklerini uygulayamıyor olmanın, almış oldukları eğitime uygun işlerde çalışmıyor olmanın ve bu seviyelerde yaşama şekline kavuşamamış ve aile fertlerine bu düzeylerde yaşama şartları sunamamış olmanın ezikliğini hissettikleri görülmektedir. Kendilerinin çabalarına rağmen sağlayamadıkları yaşam şartlarını çocuklarının sağlayabilmesinin hem temennileri hem de beklentileri olduğuna yapmış oldukları vurgu son derece manidar bulunmuştur.

Sonuç

Dünyanın her döneminde ve her bölgesinde yaşam şartları aynı şekilde sürmemekle birlikte, bazı dönemlerin ortak özellikleri söz konusu olabilmektedir. Sanayi ihtilali ile birlikte başlayan kentleşme, kent hayatına uyum sürecinde aile içi rol ve sorumluluklarda da farklılıkların yaşanmasını beraberinde getirmiştir. Öncesinde kadın, erkek, yaşlı, genç rol ve sorumlulukları keskin çizgilerle ayrılmışken, kent hayatının hâkim olması ile birlikte daha iç içe geçmişlik söz konusu olmaya başlamıştır. Kentlerin genellikle kenar mahallelerinde yaşayan, eğitim ve ekonomik seviyeleri düşük olan ailelerin yaşam mücadelelerini sürdürebilmek için mümkün olan her bir ferdinin çalışmasına duyulan ihtiyaç, çalışan çocuklar probleminin ortaya çıkmasında etkili olmuştur.

18 yaşına kadar her birey çocuk olarak kabul edilmektedir. Çocukluk sürecinde çocukların hayatlarını anne babalarının koruması, desteği ile sürdürmeleri gerekir. Oysa sokakta çalışan çocuklar, erken yaşlardan itibaren sokaklarda mendil, poşet, simit, satıp ayakkabı boyayarak para kazanıp aile bütçesine katkı sağlamaya çalışmaktadırlar. Hem geleneksel hem de kent ailelerinde erkekler evin geçimini sağlama, kadınlar da ev içi işleri düzenlemek görevini yüklenirken geçiş aileleri olarak kabul edilen bu ailelerde çocuklar, evin geçimini sağlama ile ilgili sorumluluklar almak zorunda kalabilmektedirler. Bu durum, aile içi ilişki ağının farklılaşmasında etkili olduğu gibi çocukların sağlıklı bir şekilde büyümeleri ve sosyal hayatın içinde yer almalarını da olumsuz yönde etkileyebilmektedir.

Sokaklarda çalışarak aile bütçesine katkı sağlayan ya da eğitimlerini sürdürebilmek için çalışmak zorunda olan bu çocukların babaları ile yapılan nitel araştırma verilerine dayanarak, çocuklarının kendilerinden uzakta, bilmedikleri, kontrollerini sağlayamadıkları yerlerde çalışmalarını onaylamamakla birlikte yaşamış oldukları zorlu hayat mücadelesinin onları buna mecbur bıraktığını söyleyebilmek mümkün. Babaların, kendilerinin büyüme süreçlerinde de

çalışmış olmaları ve yaşadıkları sosyo-kültürel yapılardaki diğer ailelerin de çocuklarını çalıştırıyor olmaları sebebi ile çocuklarının erken yaşlardan itibaren çalışma hayatının içinde olmalarını çok da sakıncalı bulmadıkları anlaşılmaktadır. Özellikle evin zarurî ihtiyaçlarının karşılanması, çocuklarının kendi ve kardeşlerinin eğitimlerini sürdürebilmeleri için çalışmalarını normalleştirmiş görünüyorlar. Babalar, kendi eğitim seviyeleri düşük olduğu için çocuklarının çalışarak eğitim imkanlarından faydalanmalarını dolayısı ile de içinde buldukları sarmalı aşmalarının mümkün olduğunu düşünüyor olmaları da çocuklarının sokakta çalışmalarını kabullenmelerinde etkili bir faktör görünüyor. Görece eğitim seviyeleri yüksek olan babalar da kendilerinin kıramadığı olumsuz şartları çocuklarının hem çalışıp hem de kıracağına inandıkları anlaşılmaktadır.

Sokakta çalışan çocuklar problemi her ne kadar ailelerin bir tercihi gibi görünüyor olsa da babaların ifadelerine dayanarak tercih değil hayat şartlarının aileleri ve çocuklarını mecbur bırakması olduğunu söylemek gerekir. Bu noktada ailelerin bu kısır döngüden kendi gayretleri ile çıkmalarının son derece zor olduğunu belirtmek gerekir. Aile ve Sosyal Politikalar Bakanlığı'nın bu çocuklar ve aileleri ile ilgili çalışmaları olmakla birlikte yerel yönetimlerin ve sivil toplum kuruluşlarının yardımı ve desteği ile sorunun çözülmesinin çok daha kolay olacağına bir kez daha vurgu yapmak gerekecektir.

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ERKEN YAŞTA EVLENEN KADINLARIN DİLİNDEN “ANNE OLMAK”

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Özet

Ataerkil toplumlarda erkeğin kadın üzerindeki hâkimiyeti, toplumsal yapılanmanın doğal bir süreci gibi görünebilmektedir. Ancak bu örüntünün sadece kadınları, erkekleri ve çocukları değil, aynı zamanda toplumsal dokunun tamamına nüfuz eden zararlı etkilere yol açabildiği görülmektedir. Toplumlar, yapısal sürekliliklerini koruma arayışında, ortaya çıkan anormallikleri ele almak ve düzeltmek yerine, genellikle sistemi korumak için kısıtlamalar getirme yoluna başvurmaktadır. Bu kısıtlamalar, bir grubun diğerine boyun eğdirilmesi şeklinde tezahür edebilir veya yanlış yönlendirilerek sürdürülmesi nedeniyle istemeden de olsa sistemin istikrarına yönelik bir tehdit haline gelebilir. Bu nedenle bu araştırma öncelikle erken yaşta evliliklerin kadınlar üzerindeki etkisini ve bunun çocuklarıyla olan ilişkileri üzerindeki sonuçlarını incelemektedir. Her ne kadar tüm aile bileşenleri erken evliliklerden olumsuz etkilense de, bu çalışma odak noktasını kadınlar ve onların çocuklarıyla olan dinamikleri üzerindeki yansımaları incelemek üzere daraltmaktadır. Bu bağlamda araştırma, erken evliliklerin çocuk doğurma, annelik memnuniyeti, annelik rolleri ve sorumlulukları ile anne-çocuk ilişkileri üzerindeki etkilerini incelemeyi amaç edinmektedir. Bu amaçla, erken yaşta anneliğe geçiş yapmış 17 kadınla yarı yapılandırılmış görüşmeler yapılmış ve kadınların yanıtları sosyolojik boyutlar ışığında analiz edilmiştir. Anne-çocuk bağının önemini vurgulayan çok sayıda araştırmaya rağmen, kayda değer sayıda kadının çocuklarıyla sağlıklı bir ilişki kurabilecek olgunluğa erişmeden anneliğe adım atması endişe vericidir. Bu durum, bu araştırmanın aciliyetinin ve uygunluğunun altını çizmektedir. Bu erken yaştaki annelerin yaşadıkları deneyimleri ve bunun hem kendileri hem de çocukları üzerindeki etkilerini ortaya çıkarmanın, konuyla ilgili karar alma süreçlerinde yer alan paydaşlar için daha etkili çözümler düşünmeye katkıda bulunacağı beklenmektedir.

Anahtar Kelimeler: Annelik, Erken yaş evlilikleri, Ataerkil yapılanma.

BEING A MOTHER" ACCORDING TO WOMEN WHO MARRIED AT AN EARLY AGE

Abstract

In patriarchal societies, men often dominate over women, which may seem like a natural social order. However, this pattern can have harmful effects on not only women, men, and children, but also the entire social fabric. Societies often impose restrictions to protect the system rather than addressing and correcting emerging anomalies, which can perpetuate these harmful effects. Restrictions may arise, leading to the subjugation of one group by another or unintentionally threatening the stability of the system due to misguided perpetuation. This research primarily examines the impact of early marriage on women and its consequences for their relationships with their children. Although early marriages have negative effects on all family members, this study specifically focuses on the impact on women and their relationships with their children. The study aims to investigate the effects of early marriage on childbearing, maternal satisfaction, maternal roles and responsibilities, and mother-child relationships. Semi-structured interviews were conducted with 17 women who became mothers at an early age. Their responses were analysed in the light of sociological dimensions. Despite numerous studies emphasising the importance of mother-child bonding, a significant number of women enter motherhood before they are mature enough to establish a healthy relationship with their children. This highlights the urgency and relevance of this research. Understanding the experiences of early mothers and their impact on themselves and their children is expected to contribute to more effective solutions for stakeholders involved in decision-making processes on this issue.

Keywords: Motherhood, Early marriages, Patriarchal structuring.

Giriş

Aile, toplumun en küçük birimi olmasına rağmen toplumun işleyişinde çok önemli fonksiyonlar yüklenmektedir. Aileyi oluşturan bireylerin de bu önemli sorumlulukları yerine getirebilecek nitelikte olması gerekmektedir. Bu sebeple evlenen çiftelerin eş ve anne baba sorumluluğunu alabilecek yeterliğe ve olgunluğa ulaşmaları, sorumluluklarını olması gerektiği şekilde yerine getirebilmeleri önem arz etmektedir. Bu nedenledir ki hem resmi nikah hem de dini nikah sırasında tarafların tam ehliyetlerinin olması, akıl ve ruh sağlıklarının yerinde olması ve evliliğe rızalarının olması şartları aranır. Ancak 5395 sayılı Çocuk Koruma Kanununa göre 18 yaşını doldurmayan her birey çocuk olarak kabul edilmesine rağmen medeni kanun izin vermediği için 18 yaşının altındaki çocuklarını evlendirmek isteyen aileler, çocuklarını dini nikâhla evlendirmekte, 18 yaşını doldurduktan sonra da resmi nikah yapmaktadırlar. Bu durum medeni kanun koymuş olduğu müeyyidelerle ve resmi nikah öncesinde başlatılan süreçle kontrol edilebilirken dini nikah için resmi bir sürecin olmaması istismar yaşanmasına sebep olabilmektedir. Oysa her iki nikâh şekli de bu kuralları koyarken hem çiftlerin hem doğacak çocuklarının hem de toplumun sağlıklı bir şekilde devam etmesini sağlamak istemektedir. Bu hassasiyet sağlanmadığında cinsel, ekonomik, sosyal, psikolojik ihmal ve istismarın önü açılmış olmaktadır. Bununla birlikte erken yaşta evliliğin hem kadın hem de erkek için çok sayıda olumsuz yönleri olmakla birlikte ülkemizde erkeklerin evlenebilmeleri için askerliklerini tamamlamaları ve evlerinin geçimini sağlayabilmeleri için iş bulmaları tercihten öte bir zorunluluk gibi kabul edildiği için erkeklerin erken yaşta yapmış oldukları evlilikler, kadınlara oranla daha az olmaktadır. Buna karşın ataerkil yapılanma, erkeğin hakimiyetini daha kolay kabul ettirebilmesi için erkeğin evlenirken eşinden yaş olarak büyük olmasının tercih edilmesi kadınların erkeklere oranla daha erken yaşta evlendirilmelerinin önünü açmaktadır. Dolayısıyla kadınların erken yaşta yapmış oldukları evliliklerde yaşamış oldukları deneyimler daha fazla yıpratıcı olmakta ve yaşamlarının tümüne etki etmektedir. Bu nedenle bu çalışmada sadece erken yaşta evlendirilen kadınların yaşadığı süreci, ilk annelik deneyimleri, hissettikleri ve çocukları ile olan iletişimlerinin nasıl yapıldığına ilişkin bir çerçeve ortaya konulmaya çalışılacaktır.

ERKEK YAŞTA EVLİLİK VE KADIN

On sekiz yaşından önce yapılan evlilik olarak tanımlanan erken yaşta evlilik, dünya çapında gelişmekte olan birçok toplumda görülebilen yaygın bir uygulamadır. Bu evlilik türü, yalnızca doğrudan ilgili bireyleri değil, aynı zamanda içinde buldukları daha geniş toplumsal yapıyı

da etkileyen, kayda değer genişlikte sonuçlar doğurmaktadır. Bununla birlikte, erken evliliğin zararlı yansımalarının orantısız bir şekilde genç kızlar tarafından üstlenildiğinin altını çizmek büyük önem taşımaktadır (John, 2019, s.853; Adekoya ve Sokunbi, 2021, s.102).

Erken yaşta evlilikler, genç kadınların bütünsel gelişiminin önünde ciddi bir engel teşkil ederek kişisel gelişim, eğitim ve sosyo-ekonomik ilerlemeyi kapsayan birçok önemli alanda ilerleme kaydedilmesini engellemektedir. Bu tür durumlara maruz kalan kadınların önemli bir kısmı, zorunlu eğitimlerini tamamlama fırsatı bulamadan eğitim kurumlarından hızlıca alınmakta ve evliliğe itilmektedir. Esasen hala çocuk olan bu genç kadınlar, kendilerini sıklıkla ev içi sorumluluklar üstlenmek, çocuk doğurmak ve yetiştirmek ve zamanından önce yetişkin rolleri üstlenmek zorunda bulmaktadır. Bu ani yetişkinlik sorumlulukları, akademik ve kişisel olgunlaşmalarını önemli ölçüde engellemekte, muhtemel istihdam fırsatlarını kısıtlamakta ve onları çok sayıda sağlık tehlikesine maruz bırakmaktadır (Ahmed, 2013, s.84).

Nitekim çok sayıda akademik araştırma, erken yaşta evliliğin kadınların kırılganlığını farklı boyutlarda artırdığı gerçeğinin altını çizmektedir. Bunlar arasında ekonomik bağımlılık, tehlikeli sosyal davranışlara katılım, hayati önem taşıyan sağlık hizmetlerine sınırlı erişim, sosyal izolasyon, yoksullaşma, istismar ve şiddete yatkınlık yer almaktadır (Goel, 2022; İlham, vd., 2023). Bununla birlikte, erken evliliğin kadınlar için en acil ve doğrudan sonuçlarından birisi de erken çocuk doğurmanın yol açtığı sağlık komplikasyonlarıdır (Yoosefi Lebni, vd., 2023). Ergenlik çağındaki anneler için erken gebelik ihtimali önemli sağlık riskleri doğurmaktadır. Bunlar arasında yüksek riskli gebelikler, fiziksel rahatsızlıklar, depresyon, duygusal sıkıntılar ve yüksek ölüm oranları yer almaktadır (Kader, vd., 2022; Nisa, 2022; Hardiyati, 2023; Rusramov, 2023). Dahası bu küçük yaştaki annelerin çocukları, düşük doğum ağırlığına veya bebeklik dönemini atlatamamaya daha yatkındırlar. Erken yaşta evliliğe adım atan kadınların evlilik memnuniyetsizliği, bireysel özerklik ve bağımsızlığın erozyona uğraması ve aşırı sorumluluk yükü gibi aileyle ilgili bir dizi çıkmazla karşılaşma olasılığı da daha yüksektir (Kyari, 2014).

Özetle, erken yaşta evliliğin kadınlar için sonuçları çok yönlü ve geniş kapsamlıdır. Kişisel gelişimden aile ilişkilerine ve toplumsal katılıma kadar varoluşlarının tüm yönlerine nüfuz etmektedir. Bu nedenle konu, yoğun ilgi ve özel çaba gerektirdiği için konu ile ilgili mağdurların yaşadıkları deneyimler oldukça önem arz etmektedir. Bu deneyimlerin nasıl elde edileceğine ilişkin süreç yöntem başlığı altında tartışılacaktır.

YÖNTEM

Nitel araştırma, bir araştırma konusunu derinlemesine ve ayrıntılı olarak incelemek için kullanılan bir araştırma yöntemidir (Neuman, 2014). Bu yöntem, insan davranışlarını ve deneyimlerini derinlemesine anlamaya odaklanır. Sosyal ve kültürel konular, eğitim, sağlık, iş gibi farklı alanlarda kullanılmakla birlikte derinlemesine bilgi sağlaması, karmaşık konuları incelemeye uygun olması ve katılımcıların bakış açısını yansıtması nedeniyle yaygın olarak tercih edilir (Patton, 2015; Yıldırım ve Şimşek, 2018). Nitel araştırma yöntemlerinde çeşitli araştırma teknikleri bulunmakla birlikte sıklıkla katılımcı gözlem, görüşme ve döküman incelemesi teknikleri kullanılır (Denzin ve Lincoln, 2011). Bu çalışmada da yarı yapılmış görüşme formu kullanılarak görüşmeler gerçekleştirilmiştir.

Görüşmeler, Kırıkkale’de yaşayan ve erken yaşta evlenerek anne olmuş olan 17 kadın ile 21.01.2023-18.07.2023 tarihleri arasında gerçekleştirilmiştir. Amaçlı kartopu örneklem metodu kullanılan çalışmada erken yaşta evlenip çocuk sahibi olmuş bir anne ile başlayan araştırma süreci, o annenin ve çevresindeki diğer annelerle tanışması ile sürmüştür (Yıldırım ve Şimşek, 2018, s.116-120). Görüşme yapılan annelerin görüşmelere katılma konusunda istekli olmaları sebebi ile görüşmeler sırasında önemli bir engelle karşılaşmamıştır. Ancak görüşmeler sırasında kayınvalideleri yanında olan ve görece daha küçük olan kadınlara görüşme talebi iletildiğinde kayınvalidelerine baktıkları, onlardan izin alma gereği duydukları fark edilmiştir. Bu sebeple görüşme ortamında kayınvalideleri bulunan 8 kadının kayınvalidelerinden de izin istenmiştir. Ancak 3 kayınvalide “*Herkes erken evleniyor. Bunu araştıracak ne var?*”, “*Kocasını izin vermez. O bana emanet. Olmaz konuşamaz.*” ve “*Olmaz, olmaz. Bizim konuşacak bir şeyimiz yok. Ne anlatacak. N biliyor da anlatacak. Çocuğuna baksın O.*” şeklindeki mazeretleri ile görüşme talebine olumsuz cevap vermiştir. Dolayısıyla çalışmada her ne kadar erken yaş evliliği yapmış olan annelerle görüşme gerçekleştirilmiş olsa da yaşları genç olanların görüşmelere daha az katılabildikleri, yaşları ilerlemiş olanların daha kolay katılım sağladıkları fark edilmiştir. Bundan dolayı erken yaş evliliği yapan görüşme grubundaki kadınların yaş ortalamaları beklendiği kadar düşük olmamıştır. Erken yaş evliliği yapan kadınların her geçen gün sayılarının azalmaya başlaması da yaş ortalamasının yüksek olmasında etkili olmuştur.

Demografik Bilgiler

Görüşmeye katılan kadınların yaş ortalamaları 51 olarak tespit edilmiştir. Erken yaşta evlilik yapmış olan kadınların eğitim seviyelerinin dağılımına bakıldığında birisinin okuma yazmasının olmadığı, birisinin ilkokulu terk ettiği, 8’inin ilkokul mezunu olduğu, 2’sinin liseyi

terk ettiği, 4'ünün lise mezunu olduğu ve birisinin de sonradan yüksekokul bitirdiği tespit edilmiştir. Görüşmeciler kadınlar arasında devlet memuru olan yok. Kadınlardan birinin eşinin züccaciye dükkânının olduğu ve kadının da eşi ile birlikte bu dükkânda çalıştığı, diğer kadınların çalışma hayatlarının olmadığı tespit edilmiştir. Kadınların ilk evlilik yaşlarına bakıldığında bir kadının 12, 10 kadının 13, 3 kadının 14, 3 kadının 15 ve bir kadının da 16 yaşının başında evlendirildikleri tespit edilmiştir. Kadınların 2'si 13, 8' 14, 5'i 15 ve 2'si de 16 yaşında ilk çocuğunu doğurduğunu belirtmiştir. Bu kadar erken yaşta evlendirilen ve anne olan kadınların çocuk sayılarına da bakıldığında 4 kadının 6, 5 kadının 4, 6 kadının 3 ve 2 kadının da 2'şer çocuklarının olduğu öğrenilmiştir. 5 kadının 3, 2 kadının da 2 çocuğunun ölü doğduğu veya doğduktan sonra öldüğü tespit edilmiştir.

BULGULAR

Erken yaşta evlendirilen kadınların erken yaşta anne olmaları da beraberinde gelmektedir. Ancak kendileri reşit olmadan evlendirilen ve ardından da çocukları olan bu kadınlar sadece kendileri mağduriyet yaşamıyorlar, çocukları da onlarla birlikte mağduriyetler yaşamak zorunda kalıyorlar. Bir kişinin evlenip anne baba olabilmesi için kendi gelişim dönemlerini tamamlamış olması gerekir. Aksi halde hem kendi sorumluluğunu alamayacak hem de doğacak çocuklarına olması gerektiği şekilde annelik yapmaları mümkün olamayacaktır. Bu bölümde erken yaşta anne olan kadınların kendi ifadeleri ile annelik süreçleri, bu süreçte yaşadıkları, hissettikleri, düşünceleri, karşılaştıkları güçlükler ortaya konulmaya çalışılacaktır.

İlk Hamilelik

Erken yaşta anne olan kadınlara ilk hamile olduklarını öğrendiklerinde neler hissettikleri, neler düşündükleri sorulduğunda alınan cevaplarından bazıları aşağıda verilmiştir:

“Ben hamile olduğumu anlamadım ki bir şey düşünüp, bileyim. 12 yaşında evlendim. Evlilik ne bilmezdim ki, annelik ne bileyim. Sokaktan çocuğu alıp getirirsen ne bilir ki hamilelik bilsin. Uşağım bedenime düşmüş. Ne bilem ben. Kaynanam bakarmış demek bana. Bir akşam sofrada eşime dönüp “Bulsa beni yiyecek. Yarın karını ebe Hatice’ye götürem. İnşallah hamiledir. Yoksa bu bizim ocağımızı söndürür. Ne bu kadar yemek.” dedi. Elimi hemen sofradan çektim. Ama ölçem sanki açlıktan. Kayınbabamdan Allah razı olsun, hep korudu kolladı beni. Kaynanama kızdı. Kocamın sesi bilem çıkmadı. Yemeğini yemeye devam etti...yiyesi. Kayınbabam önündeki etten bi parça benim önüme attı “Ye kızım, bundan sonra yemeğin en güzel yeri benim gelinime verilsin.” dedi. Hep de dikkat etti Allah Ondan razı olsun. Herkes ortak tabaktan yer o zamanlar. Ev kalabalık. 7 kayın var. İlk gelin benim. Adam benden 13 yaş

büyük. Ben 12 yaşındayım. Utandım eti verse de kayınbabam elimi çektim sofradan. Bugün gibi hatırlarım. Elimi tuttu o eti yedirdi bana. Sonra da yufkayı büktü büktü yedirdi. Karnımın iyice doyduğunu anlayıncaya kadar yedirdi. “Yüklüyse kız acıkır, kendinin o obur günlerini unuttun mu?” diye kaynanama kızdı. Ertesi gün ebe hamile olduğumu söyleyince çok korktum. Hep böyle acıkırsam, ne yaparım diye korktum. Yani senin beklediğin gibi sevinmek felan olmadı. Açlıkla nasıl baş ederim korkusu oldu. (gülüyor).” (81 yaşında, 13 yaşında anne olmuş). Kadının ifadeleri, evliliğin ve hamileliğin, henüz çocuk yaşta bir kız için anlaşılabilir bir realite olduğunu vurgulamaktadır. Evliliğin getirdiği sorumlulukları kavramadan, hamileliğiyle baş başa kaldığı görülmektedir. Kayınbabasının koruyucu tavırları, kadının yaşadığı korkulara bir nebze çare olsa da hamileliğin sevincini bekleyenlerin aksine, onun için açlıkla başa çıkma korkusu daha baskındır. Bu durum, evliliğin ve anneliğin romantikleştirilmiş yönlerinden uzak, gerçek yaşamın sert gerçeklerini yansıtmaması bakımından son derece düşündürücüdür.

“Ben Erzincan’dan gelin getirildim buraya. Annemi özledim diye ağlamaktan hamile olduğumun farkına bile varmamışım. Hamile olduğumu anladığımda bebem 5 aylık olmuş karnımda. Karnım ortaya çıkınca elim fark etti. Annemin yanına bebem de olursa gidemem diye çok ağladım, çok üzüldüm. Senin anlayacağın anne olmak değil anneme gitmek derdindeydim. Öyle olunca da sevinmedim üzüldüm. Ölü doğdu o bebem. Annelik hissiyatı da gelmedi içimden o bebemde. İkinci bebemde biraz biraz annelik hissiyatım başladı ama. Belki öbürü öldü diye de olabilir.” (67 yaşında, 15 yaşında anne olmuş). Bu görüşme, kadının memleketinden uzaklaştırılıp yeni bir aileye entegre olması ve hamileliğin farkına varmasının üzerine odaklanmaktadır. Anneden uzaklaşmanın acısı, hamilelikle birleştiğinde, duygusal bir çatışmaya dönüşmüştür. Çünkü anneye ihtiyaç duyan, onun desteğine, varlığına ihtiyaç duyan bir çocuktan anne olmasını beklemek, annelik duyguları ile hareket etmesini beklemek, kaldıramayacağı kadar ağır bir yükün altına girmesini beklemek anlamına gelmektedir.

“Çok sevindim hamile olduğumu anlayınca. Artık yalnız kalmam diye düşündüm. Kocam işe gidince evde yalnız kalırdım. Bazan haftalarca gelmezdi. Kamyon şoförüydü o zamanlar. Ev de gecekondtu. Çok korkardım. Ondan sebep çok sevindim. Annelik değil de yalnızlıktan kurtulmak diyelim biz ona.” (48 yaşında, 15 yaşında anne olmuş). Bu kadının hikâyesi, hamileliğin beklenmedik bir sevinçle karşılandığını, ancak aslında annelik hissiyatı yerine yalnızlık hissiyatının öne çıktığını gösterir. Eşi isteyken evde yalnız kalmaktan duyduğu korku, hamilelikle gelen beklenmedik bir rahatlama sağlar. Bu durum, kadının annelikle ilgili beklentileri ve gerçek yaşam deneyimleri arasındaki çatışmayı vurgulamaktadır. Çünkü anne-baba ve aile sıcaklığına ihtiyaç duydukları bir dönemde onları yalnız bırakmak, oyuncakları ile

oynayacakları bir dönemde, hamilelik ve çocuk büyütme sorumluluğu yüklendiğinde gerçek ile oyunu ayırt edememelerine neden olmaktadır. Görüşmeler sırasında pek çok kadının oyun oynama şansının kendilerine tanınmadığından şikâyetçi oldukları dikkati çekmiştir.

Görüldüğü üzere erken yaşta evlenmiş ve hamile kalmış kadınların yaşadığı duygusal karmaşıklıklar yaşadıkları ortaya çıkmaktadır. Evlilik, hamilelik ve annelik deneyimleri genellikle romantikleştirilmiş toplumsal normlardan uzaktır. Bu nedenle kadınların yaşamış olduğu bu deneyimlerin yaşamlarını nasıl etkilediğinin tam olarak anlaşılması için ilk annelik deneyimlerine de yer verilecektir.

İlk Annelik

Küçük yaşta anne olan kadınlara ilk kez anne olduklarında neler hissettikleri sorulduğunda alınan cevaplardan bazıları aşağıda verilmiştir:

“Sanki ben anne olmamıştım. Doğurdum ama çok zor doğurdum. Belki üç gün kendimde değilmişim. Çocuk da erken doğmuş. Küçücük. Ben bakamazdım. Kaynanam baktı Allah razı olsun. Ben sanki ablasıydım. Kaynanam çok iyiydi dedim ya. Ben sokağa çıkar ip atlardım çocuklarla. Çocukla alakam yoktu. Kaynanamın çocuğu gibi hissettim. Sonra da hep onun çocuğu gibiydi o kızım. Hala çok sıcak değil bana.” (53 Yaşında, 14 yaşında anne olmuş). Bu görüşmecinin de söylediği gibi görüşmeler sırasında pek çok kadın ilk çocuklarına yeteri kadar annelik yapamadıklarını, bunun vicdani yükünü halâ taşıyor olduklarını belirtmiş olmaları son derece manidardır.

“Ben evcilik oynamayı çok severdim. Hep de anne olurum evcilik oynarken. Evlenirken de evcilik oynar gibi evlendim. Allah var, ne ağladım ne de sızlandım. Soran yok tabi evlenir misin diye ama olsun. Az öncekiler gibi ağladım sızladım diyemem ben. Güle oynaya evlendim. Ama Akşam olup adamla o odaya girdik ya anladım o zaman oyun olmadığını, oyuna benzemediğini. Doğumu sorma, hiç ama hiç sorma. Çok zordu. Ah bacım karılar zor doğururken çocuk nasıl doğursun (ağladığı belli olmasın istiyor). Sen de 20 gün, ben diyem 30 gün oturup kalkamadım. Çocuğu kaynanam yanıma getirirdi emzireyim diye ama o zaman da canım acırdı. Kaynanam baktı çoğucası. Ama biraz ayaklanınca oyuncak gibi onunla oynadım. Benim için oyuncaktı, olmayan oyuncagımdı. Hep babamdan kocaman gelin bebek istemiştım. Almamıştı tabi. İlk çocuğum kız oldu. Onu gelin yapardım. Perdenin altına sokardım. Perdeyi çekiştire çekiştire yırtmıştım. Kayınvalidem Allah rahmet etlesin, nur içinde yatırsın. Bigün sandıktan kendi duvağını çıkarmış, getirip verdi. Al bunla bebeğini gelin yap. Perdeyi de rahat bırak. Ama sadece oynama, ona iyi bak. Yoksa duvağı alırım.” dedi. Ne acı değil mi?” (77 yaşında, 13 yaşında anne olmuş). Kadının kendisinin de belirtmiş olduğu gibi çocuğun oyun hakkını elinden

alarak, taşınması mümkün olmayan gerçeklerle vaktinden çok önce tanışmalarını sağlamak insanlık suçu olarak kabul edilmeli. Görüşmeci kadınların, oyun çocuğu oldukları zaman anneliğin sorumluluğunun altından genellikle kayınvalide ve ehtilerinin yardımı ile kalkabildiklerine vurgu yaptıkları dikkati çekmektedir. Bu görüşmeci kadın *“Kayınvalidem de benim gibi ilk anne olduğunda çocuđuna bakmakta zorlanmış. Kayınvalidem 12'sine girdiğinde anne olmuş garip. Halden anlardı o yüzden.”* diyerek kadınlar arasında bir dayanışmanın da olduğundan bahsetmektedir. Ancak kendisi de aynı sıkıntıları yaşayan bir insanın bu kadar küçük yaşta bir kızı neden gelin olarak aldığı, ondan neden anne olmasını istediğini sorgulamak kadının aklına gelmiyor gibi görünüyor.

“Kaç yaşında olursan ol anne olmak kadının hoşuna gidiyor bence. Ben hep çocuklarım olduğunda, hamile olduğumu öğrendiğimde çok sevindim. Ama çok zor anne olmak. Nasıl doğuracam diye çok korktum hep. 15 yaşında anne oldum ilk. Allah var daha 12-13 yaşında doğuranlar kadar küçük değildim. Ama hamilesin dedi ebe. Ağlamaya başladım. Nasıl doğuracam diye. Çok ağladım. Hatta kaynanam “Ben doğuruverem bari.” diye çok güldü. Önceleri güldü ama benim korkum geçmeyince kızmaya başladı. Birgün ben yine ağlarken kafama kafama vurdu. “Tek doğuracak sen misin? Kimin karnında kalmış da senin karnında kalacak.” demişti. Söylediği doğru ama korkuyor insan. Çok korktum ama çocuđumu da çok sevdim. Hepsini çok severim çocuklarımın. Ama bu yaşa geldim halâ korkarım doğumdan. 6 tane doğurdum. İki yaşamadı. Dördü şükür sağ. Korkmasam daha doğururdum. Hamileliğimin sefasını korkudan hiç süremedim. Hala korkarım dedim değil mi?” (65 yaşında, 15 yaşında anne olmuş). Çocuđun korunup kollanması gerekirken doğumun acısı ile yüzleşmesini beklemek veya bu süreci normalleştirmesini beklemek gerçekçi olmayacaktır. Görüşmeler sırasında çocuk yaşta doğumun acısı ile karşılaşmalarının kadınlarda travmalara sebep olduğuna sık sık vurgu yaptıkları dikkati çekmiştir. Çocuđun bedenine hamilelik süreci, doğum ve annelik son derece ağır gelmektedir. Yetişkin olmadan, çocuk yaşta, biyolojik, psikolojik, sosyal gelişimini tamamlamadan bir kadından annelik süreci, doğum ve anneliğin sorumluluđunu beklemek, olası travmalara zemin hazırlamaktadır. Kadınların ifadelerinin de bunu ortaya koyduđu dikkati çekmektedir.

Erken Yaşta Anne Olmanın En Önemli Sakıncası

Erken yaşta anne olan görüşme grubundaki kadınlara erken yaşta anne olmanın en önemli sakıncasının ne olduğuna sorulduğunda görüşme grubunda üç farklı cevabın olduğuna fark edildi. Birinci grup anneler anneliklerini yaşayamamış olmalarının erken yaşta anne olmanın en

önemli sakıncası olduğunu söylemiş. Bu yönde cevaplar veren kadınların ifadelerinden ikisi aşağıda verilmiştir:

“Anneliğimi yaşayamadım. Nokta. Yazık değil mi bana? Yazık değil mi çocuğuma. Sonra doğanlar da akli başında bir anne bulamadılar ki.” Anam, babam, kocam dahil hepsinden hak alcam nokta.” (55 yaşında, 14 yaşında anne olmuş).

“El yordamıyla annelik yaptık. Yazık bize. Şimdi okulu bile var anneliğin. Benim gelinim 31 yaşında anne oldu. “Okulu var anne gidecem” dedi. Kocam da kaynanamlar da “Bu yaşta anne olmayı öğrenememiş mi? Sen el kadardın doğurduğunda onun kocasını. İzin verme.” dediler ama ben “Git kızım. Arkanda ben varım.” dedim. Hem kendisi hem çocukları için gitsin tabi. Uğraşmasınlar şu kadınlarla. Adamlar erken evlenip kendileri doğursunlar. Çok kızıyorum ben kadınları çok eziyorlar. Feminik mi ne öyle bişey diyo benim oğlum bana. Neyse neyim. Çeksinler ellerini bizden. Çocuktan kadın olur mu? En önemli sakıncası bu. Yaz, yaz. Çocuk çocuktur. Çocuktan hamile de olmaz, gelinde olmaz, anne de olmaz. Hahhhh yaz işte öyle. Çocukları güzelce bi büyütsünler. Hiç bi kadın 25’inden önce evlenmesin.” (51 yaşında, 14 yaşında anne olmuş).

Bu grupta cevaplar veren kadınlar, çocukluklarını yaşayamadan anne olmak zorunda kaldıklarını, böylece hem çocukluklarını yaşayamadıklarını hem anneliğe hazır olmadan anne oldukları için anneliklerini yaşayamadıklarını hem de çocuklarına anne olarak görevlerini yerine getiremediklerine dikkat çekmektedirler. Her seviyenin olması gerektiği şekilde yaşanamaması durumunda her üç bileşenin de olumsuz yönde etkilenmesinden dolayı olumsuzlukların genişleyerek devam ettiğine vurgu yaptıkları görülmektedir.

İkinci grup anneler, erken yaşta anne olmanın en önemli sakıncasının eğitim seviyesi düşük anne olmak olduğunu söylemiş. Bu yönde cevaplar veren kadınların ifadelerinden ikisi aşağıda verilmiştir:

“Ben ne biliyordum ki çocuklarıma ne öğreteyim. İlkokulu bitirdim. Dünya eskisi gibi değil ki. Çocuğuma şimdi derslerinde bilem yardım edemem. Çok üzücü. Kızım “ Arkadaşlarımmın anneleri derslerini birlikte yapıyormuş. Senin söylediklerin yanlış çıkıyor hep.” diyor. Çok üzülüyorum. İnan ki çok uğraşıyorum ama bilemiyorum üniversite bitirmiş anne ile aynı olur muyum hiç. Komşuların çocuklarına felan soruyorum ama “Yine yanlış yaptırdın ödevimi” diye dönecek eve diye yürek tutuyorum akşama kadar.” (32 yaşında, 14 yaşında anne olmuş).

“Öyle zor ki cahil anne olmak. Çocuğuna mahcup oluyorsun. İnsanın çocuğundan daha değerlisi var mı? Üç bebem olduğunda bir de karnımda vardı. İlk oğlum okula başladı. Çok

utandım. Anneler bilgili hep çevrede. Biz kapıcıyız. Oturduğumuz yerin eğitim seviyesi yüksek. Baktım çocuğum da eziliyor. Ben bilmediğimi çocuğuma nasıl öğreteyim. Apartmanda bir abla Allah razı olsun bana yardım etti. Açıktan okumaya başladım. Çocuklarımla okudum. Beş dakika boşluk olsa okudum. Yerde kağıt bulsam okudum. Sınavlar için hazırlanırken öğrendiklerimi çocuklarıma öğrettim. Yüksek okul bitirdim böyle böyle. Şimdi kadınlara haklar da veriyorlar ya ben de üniversiteye devam etsem diyorum eşime. “Çocuklar okudu yeter artık.” diyor ama ben devam etmeyi düşünüyorum. Torunlarımmın anneannesi, babaannesi cahil olmasın. Onlara da örnek olayım. Hele kızlar çok güçlü olsun istiyorum. Erkenden benim gibi evlenmesinler.” (gülüyor) (51 yaşında, 14 yaşında anne olmuş).

Bu gruptaki anneler, anne olarak en önemli görevlerinin çocuklarını hayata karşı yetiştirmek, güçlü bireyler haline getirmek olduğuna inandıklarını ancak bunu başarabilecek kendilerinin bilgi seviyelerinin olmadığını belirtmektedirler. Kendileri erken yaşta evlendirildikleri için eğitim alamadıklarını, eğitimlerini yarıda bırakmak zorunda kaldıklarını, bu sebeple de kendi ifadeleri ile “cahil” oldukları için çocuklarına yardımcı olamadıklarını belirtmektedirler. Hatta bir anne, “*Cahil annesi olacağına hiç annesi olmasa daha iyi.*” diyerek eğitilmiş anne olmanın önemine vurgu yaparak, eğitilmiş annenin çocuğun hayatındaki önemine vurgu yapmıştır.

Üçüncü grup anneler, erken yaşta anne olmanın en önemli sakıncasının çocuklarını kaybetmek olduğunu söylemiştir. Bu yönde cevaplar veren kadınların ifadelerinden üçü aşağıda verilmiştir:

“9 ay on gün karnında taşı ölsün. Zaten çocuksun. Zor taşımışsın. Sonra kaybet. Her ziyarete gelen bi de “Küçük ya kimbilir ne yanlışlar yaptı.” demez mi? Öl artık, sen de öl.” (42 yaşında, 14 yaşında anne olmuş.)

“Hangi kadın çocuğu ölsün ister sorarım sana. Küçücüksün. Anasının kıyamadığısın, ama hamile oluyorsun. Hamileyken de sana kendine iyi bak demiyorlar ki. Benim kaynanangibiydi. Bu bizim soyumuzu sürdürecekt demezdi. Daha yük yüklerdi sırtına. Büyük elim beni biraz korurdu. O bana analık yaptı. Bir de bir hafta sonra bebem öldü mü? Kaynanam iki şaplak attı bana. Yere yapıştım. Bebeğim ölmüş ona mı üzüleyim. Küçük de olsan annesin sonuçta. Boşver artık anlatmayayım. İnsan yerine konmamışız.” (39 yaşında, 15 yaşında anne olmuş).

“Şimdinin kadınlarını çok kıskanırım ben. Nasıl kıskanmayayım. Kocaları el üstünde tutuyo hamileler diye. Elleri karınlarında geziniyolla. Ben hamileyken hep bayılırdım. İçim geçiverirdi. Kaynanam “Bundan karı da olmaz, ana da olmaz.” derdi. Gözümü açtım mı bağırmağa başladı. Akşam kocam gelince bi de ona şikâyet ederdi. Allah var o çok kızmazdı.

Bebem ölünce “Bi bebeyi doğuramadın.” diye diye beni yedi bitirdi. Çocuğum ölmüş zaten. Çocuğum zatı beni nazlatsan olmaz mı? Sen de kadınsın. Küçük de olsan annesin ama. Çok üzüldüm, çok ağladım. Ama nafile. Zor, zor, Allah başa vermesin. İki bebemi arka arkaya kaybettim. Çok zor.” (ağlıyor) (69 yaşında, 14 yaşında anne olmuş).

Küçük yaşta da olsa anne olmak her kadın için çok özel bir an, çok özel bir deneyim. Ancak ilk olarak biyolojik gelişimi cinsel ilişkiyi, hamileliği kaldırabilecek düzeye gelmeden hamile kalan kadınlar arasında ölü doğum veya doğumda ölme oranları son derece yüksek gerçekleşmektedir. Biyolojik, psikolojik ve sosyal gelişimini tamamlayamadan 9 ay hamilelik geçirip de zor şartlarda doğum yapan kadınların çocuklarını kaybetmeleri onlarda çok büyük travmalara dönüşebilmektedir. Çocukken anne olmak zorunda kaldıklarında büyük bir gayretle çocuklarını büyütme çabı yaparken çocuklarının ölmesi kendi dünyalarına büyük bir başarısızlık olarak yansımaktadır. Bir de çevrenin çocuklarını koruyup kollayamadıkları, yaşamalarını sağlayamadıkları yönündeki ima ve suçlamaları, bu süreci çok daha zor yaşamalarına sebep olduğunu görüşmeciler kadınların ifadeleri ve görüşmeler sırasında yapılan gözlemlere dayanarak söylemek mümkün.

Çocukları ile İlişkileri

Erken yaşta anne olan kadınların çocukları ile ilişkilerinin nasıl olduğu sorulduğunda alınan cevapları iki grupta toplamak mümkün oldu. Çocukları ile iletişimlerinin iyi olduğunu söyleyen annelerin ifadelerinden birkaçı aşağıda verilmiştir:

“İnsanın çocuğu ile itişmesi kötü olur mu hiç. Sen annesin tabi ki iyi olacak ilişkin. Onlar hata yapar. Ben çocukluğumu yaşayamadım bari onlar yaşasınlar. İyi şükür. Çok iyi.” (33 Yaşında, 14 yaşında anne olmuş).

“Bebelerimden başka kimim var? Ben çocukluğumu yaşayamadım onlar yaşasın diye canımı veririm. Öyle erken felan da evlendirmem. Herşeyin bir zamanı var. Ben onların hep arkasındayım. Hiç kötü değil. Çok iyiyiz.” (55 yaşında, 15 yaşında anne olmuş).

“Onlar benim yurdum. Onlar benim evim, ocağım. Allah acılarını göstermesin. Okula gittiklerinde okulun bahçesinde beklerdim onları. Kendilerini yalnız hissetmesinler diye. Birşeylere ihtiyaçları olsa hemen koşayım isterdim. Şimdi evli barklılar, bir gün telefonla seslerini duymasam kafalarımı yerim. Allah var onlar da bana çok düşkünler.” (42 yaşında, 14 yaşında anne olmuş).

“Onlar için yaşadım ben, onlar için de ölürüm. O nasıl soru? Onlar da benim için ölürler. Niye çektim bunca derdi ben? Çok iyiyiz çok şükür.” (43 yaşında, 16 yaşında anne olmuş).

Kadınların ifadelerinden de anlaşılacağı gibi çocukları ile güçlü ilişkileri olduğunu söyleyen bu grup kadınlar hayatlarını çocuklarına adanmışlar. Çocukları onların yaşama gayesi, onları ayakta tutan en önemli unsur olmuş. Birlikte büyüdükleri için aralarındaki ilişki, anne otoritesinden çok arkadaşlık ilişkisine dönüşmüş. Görüşmeler sırasında yapılan gözlemlere dayanarak bu gruptaki annelerin çoğunun çocukları ile bağıllık değil bağımlılık ilişkisi geliştirmiş olduklarını söylemek yanlış olmayacaktır. Çocukları için öleceklerini, çocuklarının da onlar için öleceğini söylemeleri, bu düşünceyi pekiştirmektedir.

Çocukları ile iletişimlerinin iyi olmadığını söyleyen annelerin ifadelerinden, ilişkilerini olumsuz yönde nelerin etkilediğini düşünüyor oldukları sorulduğunda vermiş oldukları cevaplardan birkaçı aşağıda verilmiştir:

“Ben kendim çocuktum o zamanlar. Çocuk nasıl bakılır ne bilemedim. Oyun oynarken nasıl canın ister bakarsın bebeğine, istemez bakmazsın. Ben o şekildeydim. Çocuk ağlayınca bakmazdım. Kaynanam bakarsa bakar bakmazsa bakmazdım. Canım oyun isterse oynardım. Ama altını değiştirmek hiç istemezdim, iğrenirdim, öğürürdüm. Hele kusunca. İnan annelik hissetmediğim için. Çocuklar da öyle değil mi? Sonraki çocuklarıma öyle yapmadım. Belki de kaynanama yıkmak istedim. Benim gözüm hep dışarı çıkıp ip atlamaktaydı. Sonraki çocuklarımda kendi evimiz vardı. İlk çocuğumu da kaynanama bıraktık. O garibim ana baba evinde hiç kalmadı desem yalan olmaz. Şimdi ev bark sahibi oldu kızım. Elini ayağını öpüyom ama nafile. Öbürleri ile aram iyi ama.” (68 yaşında, 15 yaşında anne olmuş).

“Çocuklar benim için oyun arkadaşım. Annelik hissetmedim onlara karşı. Hissettim aslında da nasıl annelik yapacağımı bilemedim. Ben çocuktum, nasıl anne olsaydım? Ama yine de anne olmak için çok çalıştım, inan bana. Çocuklarımla aramda sorun yok aslında ama aramız serin. Anne çocuk gibi değiliz.” (65 yaşında, 16 yaşında anne olmuş).

“Bilemedim annelik yapmayı. Duygularım içimde vardı ama onları yansıtamamışım kuzularıma. Belki de ben soğuk bir insanımdır. Ama böyle sınımsız bir duygumuz olmadı.” (53 yaşında, 14 yaşında anne olmuş).

“Üç bebem öldü. İyi olsa bebelerim ölür müydü? Bakamadım kuzularıma diye hep üzülür, ağlarım. Doğup büyüyenleri de sevdim sandım, boğmuşum. Seninki sevmek değil benim çocuklar. Annelikte iyi değilim. Çok eleştiriyorlar beni. “Pimpiriksin, boğuyorsun, beni bana bırakmıyorsun” diye en küçükleri. Hep onlara bir şey oluvercek diye korkarım. Ondan memnun olmuyorlar. Doğru olabilir söyledikleri ama üç bebem öldü. Bunlarıııııı (ağlıyor).”

Çocukları ile ilişkilerinin çok iyi olmadığını söyleyen bu gruptaki annelerin, ilişkilerinin iyi olmamasının sebebi olarak çocuklarını değil kendilerini suçladıkları dikkati çekmektedir.

Küçük yaşta anne oldukları için çocuklarına nasıl annelik yapmaları gerektiğini bilemediklerini ya çok ilgi gösterip boğduklarını, onları kendilerine bağımlı yaptıklarına ya da anneliği nasıl yapacaklarını bilemedikleri veya sorumluluk alamadıkları için çocukları ile gerekli ve sağlıklı iletişimi sağlayamadıklarına vurgu yaptıkları anlaşılmaktadır. Kendilerinin ilgiye, bilgiye, yardıma ihtiyaçları olduğu bir dönemde, bilmediklerini çocuklarına öğretmelerinin mümkün olmadığı anlaşıldığında sorun çözülecek, bu çocuklardan ne eşlik ne de annelik beklenecektir.

Sonuç

Çocukluk, çok özel bir dönem olup, çocuğun hayata hazırlanmasında son derece önemli bir süreçtir. Birey bu süreçte ne kadar donanımlı hale getirilirse bir sonraki süreci o oranda kaliteli sürdürme şansı elde etmektedir. Ancak özenle büyütüleceği, hayatın zorluklarına karşı donanımlı hale getirileceği dönemde, bu donanımı sağlanmadan anne babasından, kendisini emniyette hissedeceği ortamdaki uzaklaştırılarak evlendirilen bu kız çocukları savunmasız kalmaktadırlar. İlgiye muhtaç oldukları bu süreçte anne olmanın sorumluluğunu almaları istendiğinde ya sorumluluklarını olması gereken şekilde yerine getiremedikleri ya da bu sorumlulukları yerine getirmeye çalışırken kendi hayatlarını yaşayamadıkları, olması gerekenden fazla yük taşımak zorunda kaldıkları ya da hem kendilerine hem de sorumluluk alanlarındakilere karşı haksızlık yaptıkları görülmektedir.

17 erken yaş evliliği yapmış ve erken yaşlarda anne olmuş kadınlarla yapılan görüşme verileri ve bu görüşmeler sırasındaki gözlemlere dayanarak çocuk yaşta anne olmaları, annelik sorumluluğunu üzerlerine almaları beklenen bu kız çocukları ve onların çocuklarına karşı insanlık suçunun işlendiğini söylemek yanlış veya iddialı olmayacaktır. Çocuklara nasıl sorumluluk alacakları, nasıl sevecekleri, hayat mücadelelerini nasıl sürdürecekleri, kendi ayakları üzerinde nasıl kalabilecekleri, kısacası nasıl birey olacakları öğretilmeden birey olmayı öğretmelerini istemek mantıklı değildir. Eğer ısrarcı davranılırsa da aksaklık ve yanlışlıkların olacağını bilmek gerekir.

Hiç bir insana kaldırabileceğinden fazla yük yüklenemez. Kadın da olsa erkek de olsa her bireyin kendi süreçlerini olması gerektiği şekilde yaşamasına izin verilmeli, hatta özel destekler verilmeli ki kendilerine yüklenen sorumlulukları olması gerektiği şekilde yerine getirebilsinler. Aksi halde bu donanımı sağlamalarına izin verilmeden, sorumluluk almalarını beklemek hem onlara hem gelecek kuşaklara hem de içinde yaşadıkları topluma karşı haksızlık olacaktır.

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**INVESTIGATION of THERMAL and SHAPE MEMORY PROPERTIES of Er₂O₃
DOPED PLA/PEG BLEND COMPOSITE FILMS**

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Abstract

Shape memory polymers (SMP) are known as smart materials that can return to their original shape from their deformed shape when exposed to an external effect such as temperature, pH and light. In recent years, SMPs have had a wide range of applications, especially in biological studies such as drug release and enzymes, food packaging, radiation shielding, and smart electronic devices. In this study, a blend film consisting of SMPs such as poly lactic acid and poly ethylene glycol was prepared by solvent casting method. Different amounts of Er₂O₃ (rare earth element) were added to the prepared blend solutions and PLA-PEG blend/Er₂O₃ composite films were obtained. Firstly, functional group analyzes of polymer blend / Er₂O₃ composite films were performed with ATR-IR. Then, thermal characterization was carried out by thermogravimetric analysis (TGA) and Differential scanning calorimetry (DSC). Surface morphologies were examined by scanning electron microscope (SEM) and investigated the shape memory properties of polymer composite films doped with Er₂O₃.

Keywords: Poly (lactic acid), Poly (ethylene glycol), Rare earth element, Composite, Thermal

Introduction

Shape memory polymers (SMP) are at the top of the class of smart materials that can regain their shape when exposed to an external effect such as heat, light, pH and magnetic field [1]. In recent years, SMPs have been frequently used in medical and biological applications such as drug delivery systems and smart textiles due to their features such as low cost, recyclability, easy processability and biocompatibility [2, 3].

Poly lactic acid (PLA), poly ϵ -caprolactone (PCL), poly vinyl alcohol and poly hydroxy alkanoate are among the most commonly used SMPs. PLA is a biocompatible aliphatic polyester derived from corn and sugar cane [4]. In addition to the advantages of PLA, it cannot be directly turned into a product that requires toughness and flexibility because it is quite brittle [5]. Therefore, in order to obtain a more flexible product, it is possible to obtain a new polymer type with low cost and very good properties by blending it with a good plasticizer and biocompatible polymer such as PEG [6, 7].

Rare earth elements (REEs) have many uses, such as LED bulbs, cars, airplanes and televisions [8]. Especially Erbium (Er), one of the REEs, is considered one of the basic REEs due to its important optical properties and radiation properties [9, 10].

In this study, composite films were obtained by adding Er_2O_3 , one of the REEs, to PLA/PEG blend by solution casting method. Functional group analyzes of the obtained composite films were performed with Attenuated Total Reflectance infrared spectroscopy (ATR-IR). The shape memory properties of PLA-PEG/ Er_2O_3 composite films, which were thermally characterized by thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC), were also examined.

Experimental

Preparation of Er_2O_3 doped PLA/PEG Blends

Initially, it was aimed to prepare PLA/PEG blend composite films containing 2% Er_2O_3 by solution casting method. First of all, 0.01 g Er_2O_3 nanoparticles were dispersed in 5 mL chloroform for 1 hour. In a separate beaker, mixing continued until 0.25 g PLA and 0.25 g PEG were completely dissolved in 5 mL chloroform at a ratio of 1:1 (w:w). The PLA/PEG solution, which was mixed in a magnetic stirrer for 2 hours, was added to the Er_2O_3 solution and continued to disperse for another 15 minutes. At the end of the period, the resulting solution was poured into the petri dish and dried in a vacuum oven at 40 °C. Using the same procedure, PLA/PEG blend composite films containing 4%, 8% and 12% Er_2O_3 were prepared.

Result and Discussion

The weak signals at 2940 and 2880 cm^{-1} belong to aliphatic asymmetric and symmetric $-\text{CH}_3$ stretching vibrations, respectively [11]. The signal belonging to the characteristic $-\text{C}=\text{O}$ stretching vibration of PLA at 1762 cm^{-1} is clearly seen in the PLA/PEG blend composite film containing 2% Er_2O_3 [12]. However, as the Er_2O_3 percentage increased, it was determined that the characteristic signal of PLA decreased in intensity as expected. Signals of C-O-C stretching vibrations appeared at 1180 and 1090 cm^{-1} [13]. While the signal of the Er-O bond in the ATR-IR spectra was seen at 560 cm^{-1} , it was observed that this signal increased as the Er_2O_3 percentage increased [14].

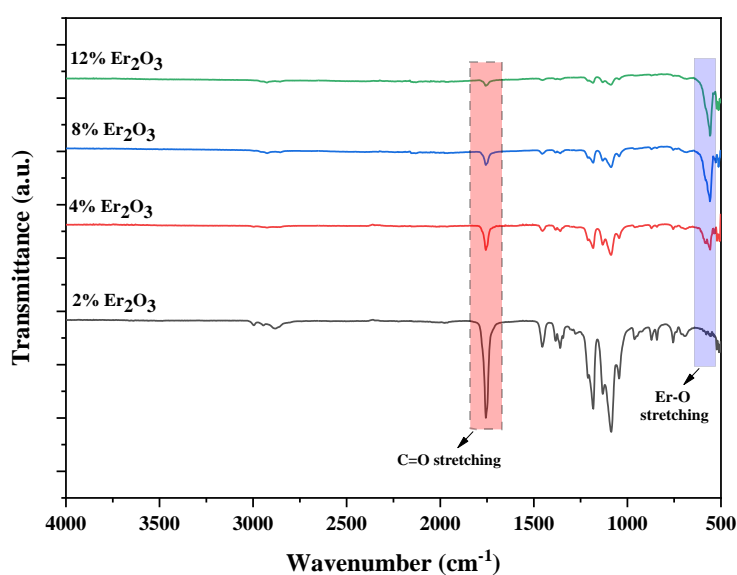


Figure 1. ATR-IR graphs of PLA-PEG / Er_2O_3 composites

DSC curves of pure PLA/PEG blend and Er_2O_3 composite films are given in Figure 2. Since the melting temperature (T_m) of PEG and the glass transition temperature (T_g) of PLA are very close to each other, the signal at 66.5 $^{\circ}\text{C}$ can be considered to belong to these two temperatures [15, 16]. The signal at 176.8 $^{\circ}\text{C}$ can be attributed to the T_m of PLA [17]. After adding Er_2O_3 , both T_g and T_m decreased, but it was observed that they started to increase with the increasing percentage of Er_2O_3 . In fact, it was determined that the T_g value of PLA in the PLA/PEG blend composite film containing 12% Er_2O_3 was 67 $^{\circ}\text{C}$. This can be interpreted as Er_2O_3 reducing the free volume between polymer chains.

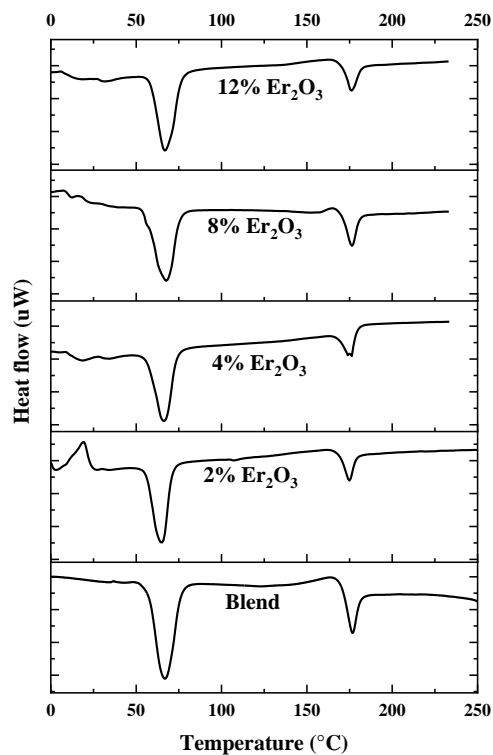


Figure 2. DSC curves of PLA-PEG / Er₂O₃ composites

Figure 3 shows the TGA curves of PLA/PEG blend composite films with different amounts of Er₂O₃ added. It can be seen that all TGA curves undergo single-step degradation. While the initial degradation temperature (T_i) value of the pure PLA/PEG blend film was observed to be 237 °C, it was determined that the T_i value increased up to 250 °C with the addition of Er₂O₃. We can interpret this situation as Er₂O₃ increasing the thermal stability of the pure blend. In addition, it was observed that the residue rate in the films increased with the increasing percentage of Er₂O₃, which has good thermal stability.

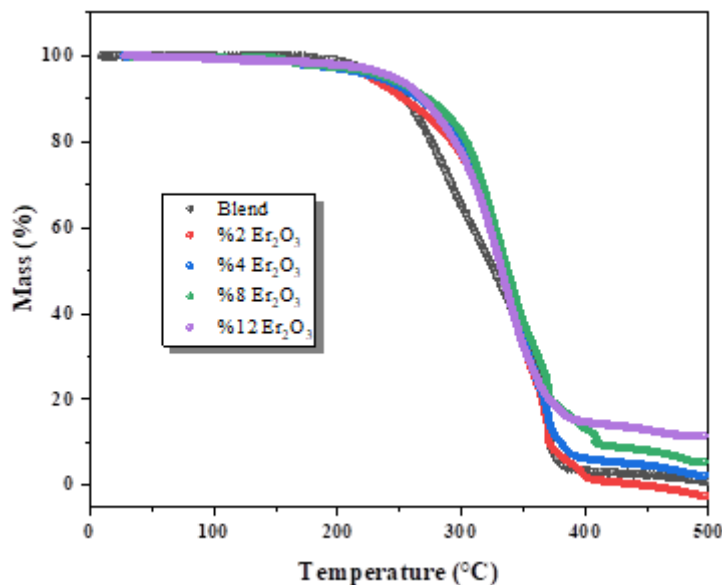


Figure 3. TGA curves of PLA-PEG / Er₂O₃ composites

The shape memory properties of PLA/PEG blend composite films containing 2% and 12% Er₂O₃ were examined in Figure 4. For this, firstly the composite films were cut into strips. Then, the films were immersed in hot water and shaped into spirals. It was observed that the films cooled to room conditions maintained their spiral state. The polymeric composite films, which were immersed in hot water again, turned into strips, which were their initial state. However, it was determined that increasing the Er₂O₃ percentage decreased the shape memory properties of polymer blend composite films.

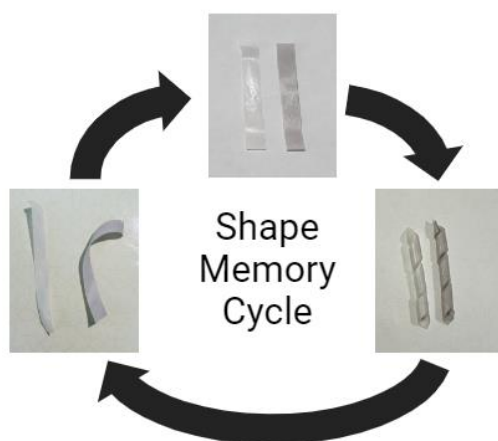


Figure 4. Shape memory cycle of PLA-PEG / Er₂O₃ composites

Conclusion

PLA and PEG, which have shape memory properties, were mixed in a 1:1 ratio (w:w), and Er₂O₃ was added at different rates to the resulting blend solution. PLA-PEG blend / Er₂O₃

composite films were prepared by solution casting method. In the ATR-IR spectra of Er₂O₃-doped polymer blend composite films, it was observed that the characteristic signal of Er₂O₃ at 560 cm⁻¹ increased with increasing percentage. The fact that Er₂O₃ increases the T_i value of the pure PLA/PEG blend film can be interpreted as the thermal stability of the composites being higher. Finally, it was determined that Er₂O₃ did not contribute positively to the shape memory effect and further increased the shape cycling time.

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EBEVEYN İLE BİRLİKTE KİTAP OKUMA SÜREÇLERİNİN OKUL ÖNCESİ DÖNEM ÇOCUKLARININ DİL GELİŞİMLERİNE ETKİSİ

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Özet

Ebeveyn-çocuk arasında gerçekleştirilebilecek en eğlenceli etkinliklerden birisi kitap okumadır. Her evde uygulanabilir bir etkinlik türü olması nedeni ile kitap okuma sürecinin zenginleştirilmesini sağlamak ve çocukların dil becerilerine katkısını ortaya koymak, ebeveynlerin ve eğitimcilerin çocuklarla kitap okumalarına teşvik oluşturması bakımından önemli görülmektedir. Bu çalışmanın amacı, ebeveynlerin okul öncesi dönemde olan çocukları ile kitap okumalarının, çocukların dil gelişimine etkisini, yapılan güncel araştırmaların sonuçları ışığında incelemektir. Bu çalışmada, nitel yöntemlerden sistematik derleme tekniği kullanılmıştır. Çalışma kapsamında, okul öncesi dönem çocuklarının ebeveynleri ile kitap okuma etkinliklerinin dil gelişimlerine etkisini inceleyen araştırma makalelerine ulaşılmıştır. Bu amaçla, Gazi Üniversitesi kütüphanesi aracılığıyla erişim sağlanabilen Scopus, Taylor&Francis, ERIC, Sage, Springer, TR Dizin ve Dergipark veri tabanında, 10.11.2022-11.12.2022 tarihleri arasında tarama yapılmıştır. Tarama shared reading/paylaşımlı okuma, dialogic reading/etkileşimli/etkileşimli okuma ve preschool/okul öncesi anahtar kavramlarıyla sınırlandırılmış ve tarama sonucunda belirlenen kriterlere uyan 31 araştırma makalesi çalışmaya dahil edilmiştir. Çalışma kapsamındaki makalelerden elde edilen veriler incelendiğinde, ebeveyn ile birlikte yapılan kitap okuma etkinliklerinin çocukların özellikle sözcük dağarcığı, hikâye anlama-anlatma ve dilbilgisi olmak üzere genel dil gelişimi becerilerini desteklediği; ebeveyn-çocuk birlikte kitap okuma sürecinde, ebeveynin kullandığı okuma yönteminin, çocuğun dil becerileri gelişiminde etkili olduğu; çocuğun süreçteki etkileşimini artıran ve aktif katılımını sağlayan etkileşimli okuma yönteminin geleneksel okuma yöntemine göre çocuğun dil gelişimini daha çok desteklediği; ebeveynin birlikte kitap okuma etkinliklerinde farklı özellikteki kitaplar ve okuma tekniğindeki uyarlamalar ile çocukların dil gelişim alanlarının farklı boyutlarını destekleyebileceği; risk altında bulunan ve dezavantajlı koşullara sahip çocukların dil becerilerini desteklemede ebeveynlere verilen kitap okumaya ilişkin eğitimlerin, etkili bir müdahale aracı olduğu, sonuçlarına ulaşılmaktadır.

Anahtar Kelimeler: paylaşımlı okuma, okul öncesi dönem, dil gelişimi

**THE EFFECT OF BOOK READING PROCESSES WITH PARENTS ON
LANGUAGE DEVELOPMENT OF PRESCHOOL CHILDREN**

Abstract

One of the most enjoyable activities that can be carried out between parent and child is book reading. Since it is a type of activity that can be applied in every home, enriching the book reading process and revealing its contribution to children's language skills are considered important in terms of encouraging parents and educators to read books with children. The aim of this study is to examine the effect of parents' reading books with their preschool children on children's language development in the light of the current researches. In this study, systematic review technique from qualitative methods was used. Within the scope of the study, research articles examining the effect of book reading activities of preschool children with their parents on their language development were accessed. For this purpose, Taylor&Francis, ERIC, Sage, Springer, TR Index and Dergipark databases, which can be accessed through Gazi University library, were searched between 10.11.2022- 11.12.2022. The search was limited to the key concepts of shared reading, dialogic reading, dialogic/interactive reading and preschool, and 31 research articles that met the criteria determined as a result of the search were included in the study. When the data obtained from the articles within the scope of the study were examined, it was found that book reading activities with parents support children's general language development skills, especially vocabulary, story comprehension and narration, and grammar; the reading method used by the parent in the parent-child co-reading process is effective in the development of the child's language skills; the dialogic reading method, which increases the interaction of the child in the process and provides active participation, supports the child's language development more than the traditional reading method; the parent can support different dimensions of children's language development areas with books with different characteristics and adaptations in reading technique in shared reading activities; it is concluded that trainings on book reading given to parents are an effective intervention tool in supporting the language skills of children who are at risk and have disadvantaged conditions.

Keywords: shared reading, preschool period, language development

Giriş

Kitap, çocuğun yaratıcılığını, bilişsel becerilerini, alıcı ve ifade edici dil becerileri, okumaya yazmaya hazır bulunuşluğunu geliştirmede etkin bir materyal olarak kullanılmaktadır (Sheridan, 2000). Ebeveynlerin çocukları ile sık sık kitap okumaları, okuma sürecinde çocuğun etkileşimine izin vermeleri ve kitabı bir eğitim materyali, olarak görmeleri, çocukların doğal okumaya geçişini destekleyen unsurlar olarak görülmektedir (Anbar, 2004). Ebeveyn ile paylaşımlı kitap okuma süreci, ideal olarak çocukların temel sözcükleri anlamasını, metin üzerinden çıkarım yapmasını kolaylaştıran, metin ve resimler hakkında paylaşımları içeren nitelikli etkinliklerden biridir ve çocukların bu paylaşımından beklenen anlamı çıkarabilmeleri ve bu etkinliklerde aktif katılımları açısından kritik öneme sahiptir (Wander Woude, Kleeck ve Wander Ween, 2009).

Çocukla birlikte okuma süreci yetişkinin ve çocuğun okumadaki rolü ve etkileşimine göre değişebilmektedir. *Geleneksel okuma*, ebeveynin anlatıcı, çocuğun edilgen bir dinleyici olduğu, daha çok ebeveynin sözel aktarımını içeren kitap okuma yöntemi olarak tanımlanabilmektedir. Geleneksel okuma sırasında genellikle çocuklar pasif konumdadır ve süreçte çok fazla sorulara yer verilmez (Dolunay Sarıca, 2016). *Paylaşımlı kitap okuma*, ebeveynin çocuğu ile birlikte süreci yürüttüğü, çocuğun da okuma etkinliğine aktif olarak katıldığı, dil temelli bir aktivite olarak görülen kitap okuma yöntemidir. Paylaşımlı kitap okuma süreci, çocuğun müdahalelerine ve etkileşimine izin veren esnekliktedir (Justice ve Kaderavek, 2002; Karaman Benli, 2021). *Etkileşimli kitap okuma*, paylaşımlı kitap okuma yöntemlerinden birisi olarak görülen etkileşimli kitap okumanın (etkileşimli okuma/diyaloğa dayalı okuma), özellikle son zamanlarda araştırmacıların üzerinde çalıştığı konulardan birisi haline geldiği görülmektedir (Doğan ve Keskinılıç, 2022; Turan ve Topçu, 2018). Etkileşimli kitap okuma etkinliğinde, ebeveyn ve çocuk bazen değiştirir, çocuk aktif bir anlatıcı ebeveyn ise hikâyeyi dinleyen konumuna geçmektedir. Süreci yöneten genellikle çocuk olmaktadır. Ebeveynler gerektiğinde sorular sorarak, çocukları soru sormaları için cesaretlendirerek, gerektiğinde açıklamalar yaparak, çocuğun keşif sürecine, olayların yaşamla bağını kurmasına rehberlik etmektedir (Akoğlu, 2016; Whitehurst ve Lonigan, 1998). Etkileşimli kitap okuma etkinliğinde ebeveynler süreci derinleştirmek için PEER (prompt, evaluate, expand, repeat) basamaklarını kullanabilmektedir. Çocuğun etkinliğe aktif katılımını sağlamak için teşvik etme (prompt), uygun geri bildirimlerle değerlendirmeyi sağlama (evaluate), çocukların ifadelerini genişletme (expand) ve öğrendiklerini günlük yaşama aktararak tekrar edilmesini sağlama (repeat),

ebeveynlerin etkileşimli kitap okuma sürecini nitelikli hale getirmesine yardımcı olabilmektedir (Zevenbergen ve Whitehurst, 2003).

Alan yazında, yetişkin ile etkileşimli kitap okumanın çocuğun sözel dil becerileri başta olmak üzere, sosyo-duygusal gelişimi, erken okuryazarlık ve yaratıcı düşünme becerilerinin gelişimine katkıda bulunduğunu gösteren araştırmalar dikkat çekmektedir (Işıtan, Saçkes ve Biber, 2020; Yıldız Bıçakçı, Er ve Aral, 2018; Zevenbergen, Worth, Dretto ve Travers, 2018). Yıldız Bıçakçı, Er ve Aral (2018), 46-62 aylık çocuklarla ve ebeveynleriyle yaptıkları çalışmada, anne-babaların çocukları ile etkileşimli kitap okuma uygulamalarının, çocuğun dil gelişimini anlamlı düzeyde desteklediğini belirtmektedir. Dil gelişiminin bileşenlerinden olan sözcük dağarcığının gelişimi için ebeveynlerin nitelikli bir sözel dil alanı oluşturması önemli görülmektedir. Etkileşimli kitap okuma, süreci ebeveynlere ihtiyaç duyulan zengin dil deneyimleri için gerekli ortamı sunmaktadır (Otto, 2021; Walpole, 2012).

Okul öncesi dönemde sözel dil gelişimi, çocukların okuryazarlık deneyimlerini, okul başarısını, sosyo-duygusal gelişimini olumlu etkileyen önemli bir bileşen olarak görülmektedir. Sözcük dağarcığı, dilbilgisi, sözcük dizimi farkındalığı, anlam bilgisi ve sözel iletişim becerileri çocuklarda geliştirilmesi hedeflenen sözel dil becerilerinden bazılarıdır (Carroll, Bowyer-Crane, Duff, Hulme ve Snowling, 2011; Otto, 2021; Rohde, 2015). Çocukların dil alanında gelişimlerinin en önemli göstergelerden birisi sahip oldukları sözcük dağarcıklarıdır. Sözcük dağarcığı, en geniş anlamıyla kişinin anlamını ve söylenişini bildiği tüm sözcükleri ifade etmektedir (Carrol, Bowyer-Crane, Duff, Hulme ve Snowling, 2011). Bennet Armistead, Duke ve Moses (2005)'a göre ise sözcük dağarcığı, bireyin duyduğunda anlayabildiği ve kendisini ifade ederken kullanabildiği sözcüklerin tamamıdır.

Bebekler çevresindekilerle ilk sesli iletişimini ağlama yoluyla kurmaktadır. Daha sonra sözcüklerin anlamalarını ve ifade edilişlerini öğrendikçe dil gelişimleri hızlı bir şekilde ilerlemekte ve sözlü iletişimi aktif bir şekilde kullanmaya başlamaktadırlar (Küçükkaragöz, 2002). Öncelikle seslerin ve hecelerin kullanılmasıyla başlayan ifade edici dil 12. aya doğru yerini sözcüklere bırakmaktadır. Bebeklerin sözcüklerin anlamalarını keşfetme, dağarcığına yeni sözcükler eklemesinde çevresindeki yetişkinler tarafından desteklenmesi gerekmektedir. Bebeklerin ilk sözcüklerini genellikle, çevresinde en çok duyduğu kişilerin isimleri, hayvanlar, yiyecekler, sevdiği oyuncaklar vb. oluşturmaktadır. Yetişkinlerin bebekle iletişim kurarken ortak dikkati sağlaması, göz teması kurması, bebeğin taklit edebileceği özellikte sözcükler seçmesi, bebeğin denemelerini takdir ve teşvik etmesi oldukça önemlidir (Machado, 2013; Otto, 2021; Senemoğlu, 2020). Bebekler on sekiz aylıktan itibaren haftada yaklaşık olarak iki sözcük

öğrenmektedir. Çocukların kullanabildiği sözcük sayısının iki yaşa geldiğinde hızlıca arttığı görülmektedir. Bu dönemde çocuklar bildikleri sözcükleri birleştirerek iki sözcüklü cümleler kurmaya başlamaktadır. Çocukların üç yaşa gelmesiyle artık anlamını bildiği ve ifade ettiği sözcük sayısı bine yaklaşmaktadır (Morrow, 2014). Okul öncesi döneme gelindiğinde artık çocuğun sözcük dağarcığının çarpıcı bir şekilde arttığı görülmektedir. İlk okula başlama düzeyinde bir çocuğun bildiği sözcük sayısının ortalama 14 bine yaklaştığı belirtilmektedir (Carol vd., 2011). Ayrıca bu dönemde çocuklar kelimeleri birleştirerek çok daha karmaşık yapılarda cümlelerle düşüncelerini aktarabilmektedir (Santrock, 2021).

Çocukların bildiği sözcük sayısının artması ve bu sözcüklerin temsilini anlamlandırabilmesi birçok alanda da gelişimini desteklemektedir. Sözcük dağarcığının artması çocuğun ileriki zamanlarda okuduğunu ve dinlediğini anlama becerilerini de artırmaktadır. Okuma, yazılı sembollerden sözcükler aracılığıyla anlam çıkarma işidir. Okunan sözcüğün çocuğun dünyasında bir karşılığı olmadığında okuma amacına ulaşamaz. Böyle durumlar, çocukların okumaya karşı motivasyonunu azaltması nedeniyle zararlı olabilmektedir (Whitehurst ve Lonigan, 1998). Hemphill ve Tivnan (2008), yaptıkları boylamsal çalışmada, okuduğunu anlama becerisinin en güçlü yordayıcısının sözcük dağarcığı olduğunu bildirmektedir. Juel (1988) ise yaptığı çalışma sonucunda, sözcük dağarcığı yeterince gelişmemiş çocukların okumaya karşı isteklerinin daha az olduğunu ve düşünce geliştirmekte zorlandıklarını belirtmektedir.

Çocuklarda sözcük dağarcığının sağlıklı bir şekilde gelişebilmesi, sözcükleri anlama ve konuşma becerisine sahip olabilmesi için sinir sisteminin bazı yeterliliklere sahip olması gerekmektedir. Ayrıca vokal donanımlarının sağlıklı ve işler durumda olması, özellikle ifade edici dil gelişiminde önemli rol oynamaktadır (Otto, 2021; Santrock, 2021). Yapılan araştırmalar, ailenin sosyoekonomik düzeyi, öğrenim durumu, çocuğun cinsiyeti, aile içi ilişkilerin niteliği, ev içerisinde iki dillilik olma durumu, ailenin oyun oynama, kitap okuma vb. etkinliklerle çocuğu konuşmaya teşvik etme gibi çevresel etmenlerin çocukların sözcük dağarcığı üzerinde etkili olduğunu göstermektedir (Tümkeya, 2010). Anne babaların, çocuklarıyla sözel iletişim içerisindeyken çocuğun kullandığı sözcükleri *başka kelimelerle ifade etme*, söylediği sözcükleri cümleler oluşturacak şekilde *genişletme* ve çevresindeki nesnelere adını öğrenebilmesi için *etiketleme* davranışlarını göstermesi, çocukların sözcük dağarcığını olumlu etkilemektedir. Ayrıca zengin dil olanakları sunan nitelikli bir kitap aracılığıyla yapılabilecek okuma etkinlikleri, çocukların dil gelişimlerini, hikâye anlatma becerilerini geliştirmektedir (Bredkamp, 2015; Otto, 2021; Santrock, 2021). Çocukların sahip olduğu dil

becerileri, buldukları gelişim dönemini ve sonraki gelişim süreçlerini etkilemesi açısından oldukça önemlidir. Bu nedenle çocuğun bulunduğu ortamların dil becerilerini geliştirecek deneyimler sunması gerekmektedir. Özellikle çocuğun okul öncesi eğitim kurumuna devam edemediği durumlarda, çocuğa sunulan ev ortamının özellikleri çok daha değerli olmaktadır. Bu durum, yakın zamanda yaşadığımız covid-19 pandemi sürecinde daha çok hissedilmiştir. Ebeveynlerin, çocuklarının gelişimlerini etkileyebilme potansiyellerini fark etmesi, oluşturacakları eğitim fırsatlarını da çeşitlendirebilmektedir. Anne ve babalar, doğru materyalleri temin ederek, olumlu model olarak, gelişim dönemine uygun oyun ve etkinlikleri kullanarak çocuklarının beceri gelişimini destekleyebilmektedir. Ebeveyn-çocuk arasında gerçekleştirilebilecek en eğlenceli etkinliklerden birisi kitap okumadır. Her evde uygulanabilir bir etkinlik türü olması nedeniyle, kitap okuma sürecinin zenginleştirilmesini sağlamak ve çocukların dil becerilerine katkısını ortaya koymak, ebeveynlerin ve eğitimcilerin çocuklarla kitap okumalarına teşvik oluşturması bakımından önemli görülmektedir. Bu çalışmanın amacı, ebeveynlerin okul öncesi dönemde olan çocukları ile kitap okumalarının, çocukların dil gelişimine etkisini, yapılan güncel araştırmaların sonuçları ışığında incelemektir.

YÖNTEM

Bu çalışmada, nitel yöntemlerden sistematik derleme tekniği kullanılmıştır. Sistematik derleme, belirli bir konu çerçevesinde yapılan çalışmaları, belirlenen kriterler çerçevesinde inceleyerek, çalışmalardan elde edilen verilerin sentezlenmesi olarak tanımlanabilmektedir (Lasserson, Thomas ve Higgins, 2019). Çalışma kapsamında, okul öncesi dönem çocuklarının ebeveynleri ile kitap okuma etkinliklerinin dil gelişimlerine etkisini inceleyen araştırma makalelerine ulaşılmıştır. Bu amaçla:

1. Gazi üniversitesi kütüphanesi aracılığıyla erişim sağlanabilen Scopus, Taylor&Francis, ERİC, Sage, Springer, TR Dizin ve Dergipark veri tabanında, 10.11.2022- 11.12.2022 tarihleri arasında tarama yapılmıştır.
2. Tarama shared reading/paylaşımlı okuma, dialogic reading/etkileşimli/etkileşimli okuma ve preschool/okul öncesi anahtar kavramlarıyla gerçekleştirilerek makaleler aşağıdaki kriterlere uygunluğuna göre seçilmiştir:
 - a. 2017-2022 yılları arasında yayınlanmış olması,
 - b. Çalışma içerisindeki çocukların 3-6 yaş grubunda olması,
 - c. Makalelerin Türkçe veya İngilizce dillerinde yazılmış olması,

- d. Ebeveyn-çocuk kitap okuma sürecini içermesi,
- e. Çocukların dil gelişimine ilişkin sonuçlar içeren araştırma makalesi olması (tez ve derleme makaleleri hariç tutulmuştur).

3. Tarama sonucunda kriterlere uygun olarak 31 makale çalışmaya dahil edilmiştir (Ek-1).

Çalışmaya dahil edilen makalelerin dili incelendiğinde 28 makalenin İngilizce, 3 makalenin Türkçe dillerinde yazıldığı görülmektedir. Araştırmalarda kullanılan yöntemler incelendiğinde ise; 24 makalenin nicel, 4 makalenin nitel ve 3 makalenin de karma desenle gerçekleştirildiği belirlenmiştir. Nicel yöntemle gerçekleştirilen 10 araştırmanın tarama, 14 araştırmanın ise deneysel desenle oluşturulduğu görülmektedir. Çalışılan konu ile ilgili olarak nitel ve karma yöntemle yapılan çalışmaların azlığı dikkat çekmektedir.

Bu çalışma içerisinde, shared reading/paylaşımlı okuma, dialogic reading/etkileşimli/etkileşimli okuma ve preschool/okul öncesi anahtar kavramları ile taranarak çalışmaya dahil edilen araştırmaların sunduğu bulgular ve sonuçları doğrultusunda “Ebeveynlerin Kitap Okuma Davranışının Çocukların Dil Gelişimine Etkisi”, “Kitap Okuma Sürecindeki Uyarlamaların Çocukların Dil Gelişimine Etkisi” ve “Kitap Okumaya İlişkin Aile Eğitimi İçeren Müdahalelerin Etkisi” temaları oluşturulmuştur. Oluşturulan temalar, incelenen araştırmalar ve ilgili alan yazın ile birlikte tartışılmıştır.

Araştırmanın Etiği

Çalışma sürecinde “Yükseköğretim Kurumları Bilimsel Araştırma ve Yayın Etiği Yönergesi” çerçevesinde tüm kurallara uyulmuş ve etik ihlali olarak nitelendirilebilecek eylemlerden kaçınılmıştır.

BULGULAR VE TARTIŞMA

Çalışmanın bu bölümünde elde edilen bulgular, oluşturulan temalar doğrultusunda yorumlanmış ve tartışılmıştır.

Ebeveynlerin Kitap Okuma Davranışının Çocukların Dil Gelişimine Etkisi

Birlikte kitap okuma, ebeveynlerin çocuklarının dil gelişimlerini desteklemek için kullanabilecekleri en etkili yöntemlerden birisidir (Otto, 2021; Whitehurst ve Lonigan, 1998). Alanyazında yapılan araştırmalar, ebeveynlerin çocukları ile gerçekleştirdikleri kitap okuma süreçlerinin, çocukların sözcük dağarcığını, hikayeleri anlama ve anlatma becerilerini, dilbilgisini ve karışık cümle yapılarını kullanabilmelerini ve sesbilgisel farkındalıklarını desteklediğini göstermektedir:

Adinarayanan, Nambi, Krishnan ve Vijayaraghavan (2022), Hindistan'da 4-6 yaş arası 210 çocuk ve ailesi ile yaptıkları deneysel çalışmalarında, ebeveyn-çocuk birlikte kitap okuma süreçlerinin çocukların hikâye anlatma becerilerini önemli derecede artırdığını belirtmektedir. Anne ile çocuk arasında paylaşımlı okuma sürecinin niteliğinin değerlendirildiği başka bir çalışmada da gözlem sonrası analizleri, paylaşımlı okumanın niteliğinin arttıkça çocuğun hikâye anlatma becerilerinin de niteliğinin arttığını bildirmektedir (Marjanovič-Umek, Hacin ve Fekonja, 2019). Anderson, Atkinson, Swaggerty ve O'Brien (2018), Amerika'da 5-6 yaş çocuğu olan 152 ebeveyn ile yaptığı çalışmada, ebeveynlerin çocukları ile birlikte kitap okuma sıklığının ailenin geliri ve ebeveynleri eğitim düzeyi ile pozitif yönde ilişkili olduğunu; kitap okuma sıklığının da çocukların hikâye anlama ve anlatma becerileri ile pozitif yönde ilişkili olduğunu belirtmektedir. Bir sözel dil becerisi olarak hikâye anlatma, hikâyenin anlaşılması, hatırlanarak bellekten geri çağırılması ve uygun sözcüklerle ifade edilmesi gibi bir takım farklı becerileri de içermektedir. Hikâye anlama ve anlatma becerisi, çocukların okuryazarlığa geçtiği dönemde okuduğunu anlama becerisini de etkilemektedir (Hogan, Adlof ve Alanzo, 2014; Kargın, Güldenoğlu ve Ergül 2017).

Dil gelişiminin önemli göstergelerinden birisi olan sözcük dağarcığı, ebeveynlerin ev içerisindeki etkinlikleri ile desteklenebilmektedir. Sözcük dağarcığının zenginliğinin, çocukların okuduklarını anlama, düşünce geliştirme ve okuma motivasyonunu artırdığı düşünüldüğünde oldukça önemli görülmektedir (Hemphill ve Tivnan, 2008; Juel, 1988). Çalışma kapsamında incelenen makaleler de ebeveynlerin çocukları ile birlikte kitap okuma etkinliklerinin çocukların sözcük dağarcığını olumlu etkilediğini göstermektedir. Knauer, Jakiela, Ozier, Aboudd ve Fernald (2019), Kenya kırsallarında 2-7 yaş arasında 510 çocuk ve ailesi ile yaptıkları çalışmalarında, etkileşimli okuma etkinliklerinin çocukların sözcük dağarcığını artırmada önemli bir araç olabildiğini ortaya koymaktadır. Bir başka deneysel çalışmada da 69 ebeveyne çocukları ile kitap okurken kullanabilecekleri kelime öğretimi uygulamalarını içeren bir eğitim sunulmaktadır. Bu eğitim sonrasında ebeveynlerin okuma etkinliklerinde bu uygulamaları kullandıkları ve bu durumun çocukların sözcük dağarcığını etkilemede önemli olduğu belirtilmektedir (Requa, Chen, Irey ve Cunningham, 2022).

Çocuklar okul öncesi dönemle birlikte dil becerilerini, dilbilgisi kurallarını konuşma içerisinde kullanmaya başlayacakları şekilde geliştirmektedir (Otto, 2021; Santrock, 2021). Söz dizimini edinme, farklı görevdeki sözcük ve cümleleri uygun kullanma; düşüncelerini ifade edebilme ve genişletebilme becerilerini edinebilmeleri bakımından önemlidir. Lenhart, Suggate ve Lenhard

(2022), beş çalışmadaki 643 çocuktan elde edilen verileri sentezledikleri çalışmasında, ebeveynlerin çocukları ile kitap okumaya başladıklarındaki çocuğun yaşı ve kitap okuma sıklığı değişkenlerinin, çocukların dilbilgisi ve sözel dil becerilerini açıkladığını belirtmektedir. Ebeveyn-çocuk kitap okumaya başlamada çocuğun yaşı düştükçe ve birlikte kitap okuma sıklığı arttıkça, çocuğun dil becerilerinin de arttığı belirtilmektedir. Işıkoğlu ve Şimşek (2022) da 48-72 aylık 302 ebeveynin katılımı ile gerçekleştirdikleri çalışmalarında, çocuğa ilk kitap alma yaşı ile birlikte kitap okuma sıklığının, çocukların dil gelişimlerini açıklamada anlamlı etkisi olduğunu ifade etmektedir.

Çalışma kapsamında incelenen makalelerin sonuçları, ebeveynlerin çocukları ile birlikte yaptıkları kitap okuma etkinliklerinin, çocukların hikâye anlama ve anlatma becerilerini, dilbilgisi kullanımlarını, sözcük dağarcıklarını ve genel olarak sözel dil gelişimlerini desteklediğini; bu desteğin seviyesinin ailenin sosyoekonomik düzeyi, kitap okuma sıklığı ve okumaya başlamadaki çocuğun yaşı gibi özelliklerden etkilendiğini göstermektedir. Elde edilen sonuçlar alan yazından elde edilen önceki bilgiler ile tutarlı görülmektedir (Bredenkamp, 2015; Santrock, 2021; Tümkaya, 2010).

Kitap Okuma Sürecindeki Uyarlamaların Çocukların Dil Gelişimine Etkisi

İncelenen çalışmalar, ebeveyn-çocuk birlikte kitap okuma sürecinde ebeveynin okuma sırasında kullandığı yöntemlerin, farklı uygulamaların ve okumada kullanılan materyallerin özelliklerinin, çocukların dil gelişimini etkilemede ayırıcı etkisi olduğunu göstermektedir.

Dicataldo, Rowe ve Roch (2022), İtalya’da 40 okul öncesi dönem öğrencisi ve ailesi ile yaptığı deneysel çalışmada, ebeveynlerin normal kitap okuma süreçleri ile etkileşimli okuma süreçlerinin çocukların dil gelişimi üzerindeki farklı etkilerini araştırmaktadır. Çalışmanın sonuçları, etkileşimli okumanın çocukların alıcı-ifade edici dil ve sözel çıkarım becerilerini desteklemekte daha etkili bir yöntem olduğunu ortaya koymaktadır. Knauer, Jakiela, Ozier, Aboudd ve Fernald (2019), 510 çocuk ve ebeveyn ile yaptıkları çalışmalarında, ebeveynleri 4 gruba ayırarak, bir gruba sadece kitaplar verip diğer gruplara değişen düzeyde etkileşimli okuma eğitimleri vermiştir. Ebeveynlerin çocuklarla birlikte okuma etkinliklerinden önce ve sonra yapılan ölçümler, çocukların müdahale öncesine göre dil becerilerinde gelişme görüldüğünü, özellikle ebeveyne verilen etkileşimli okuma eğitimleri arttıkça çocukların dil becerilerindeki gelişimin de arttığı görülmüştür. Araştırmalar kitap okumanın çocukların dil gelişimine katkılarını göstermekle birlikte etkileşimli okuma yönteminin bu gelişimi daha çok desteklediğini de ortaya koymaktadır. Etkileşimli okuma yönteminin, dili etkin kullanmaya

dayanan, dilin kullanımını teşvik eden stratejileri içermesinin ve çocuğun aktif katılımını destekleyen yapısının (Zevenbergen ve Whitehurst, 2003), kitap okuma etkinliğini çocukların dil gelişimini doğrudan destekleyen bir uygulamaya dönüşmesini sağladığı düşünülmektedir.

Riordan, Reese, Das, Carroll ve Schaugency (2022), Yeni Zelanda’da 69 çocuk ve ebeveyni ile yaptıkları deneysel çalışmada, ebeveynlere kitap okumaya ilişkin iki farklı yaklaşımla eğitimler sunmaktadır. Bir grubun eğitiminde okuma sırasında hikâye hakkında sohbet ederek okuma etkinliği odağa alınırken diğer grubun eğitiminde sözcüklerin sesleri hakkında konuşarak kitap okuma odak haline getirilmektedir. Müdahale sonrasında, hikâye ile ilgili sohbet ederek okuma yapılan çocukların anlam odaklı konuşma, konu ile ilgili ayrıntılı konuşabilme becerileri artarken diğer gruptaki çocukların ses odaklı konuşmalarının ve ses bilgisel farkındalıkların arttığı görülmektedir. Bu çalışma sonucu, farklı uyarlama ve yaklaşımları kullanarak kitap okuma sürecinin çıktılarının kontrol edilebildiğini ve hedef odaklı olarak düzenlenebildiğini göstermesi açısından önemli görülmektedir. Riordan, Reese, Rouse ve Schaugency (2018), 45 ebeveyn ile yaptıkları başka bir çalışmalarında, ebeveynlerin çocukları ile kafiyeli ve kafiyesiz kitaplarla yaptıkları okuma etkinliklerinin çıktılarını incelemektedir. Çalışma sonucunda elde edilen veriler kafiyesiz kitaplarla okuma yapıldığında ebeveyn-çocuk arasında daha çok hikâye odaklı ve çıkarımsal konuşmalar yaptıkları; kafiyeli kitap okuma sürecinde ise konuşmaların ses odaklı olduğu görülmektedir. Her iki kitap okuma sürecinin de çocukların dil gelişimini desteklediği, kafiyeli kitapların ek olarak çocukların erken okuryazarlık beceri gelişimine daha fazla katkı sağladığı belirtilmektedir. Çocukların sözcüklerdeki kafiyeleri fark etmesi ve kendi kafiyeli sözcüklerini oluşturabilmesi, ses bilgisel farkındalığının gelişiminin önemli göstergelerinden birisi olarak görülmektedir (Rohl, 2000). Kitap okuma etkinliklerinde ve hazırlanan müdahale programlarında kafiye içeren kitapların da kullanılmasının faydalı olabileceği düşünülmektedir. Yetişkinlerin çocukları ile gerçekleştirdikleri kitap okuma sürecindeki uyarlamaları, sözel dil becerilerini desteklemede niteliği artırmaktadır (Karaman Benli, 2019).

Kitap Okumaya İlişkin Aile Eğitimi İçeren Müdahalelerin Etkisi

Yapılan aile eğitim çalışmalarının genellikle, çocuklar için dezavantajlı olan durumlara yönelik müdahaleler içerdiği ve temel amacının dezavantajlı durumların çocuklara olumsuz etkilerini ortadan kaldırmak olduğu görülmektedir (Dere Çiftçi ve Aksoy, 2018). İncelenen araştırmalar, ebeveyn-çocuk kitap okuma uygulamalarının, çocuğun özel gereksinimli olma, ailenin düşük

sosyoekonomik kořullara sahip olması ve göçmenlik gibi çocukların dil gelişimlerini olumsuz etkileyebilecek durumlarda müdahale amacıyla kullanılabileceğini ortaya koymaktadır.

Westerveld, Wicks ve Paynter (2021), otizm spektrum bozukluğu tanılı 16 çocuk ve ebeveyni ile yaptığı çalışmada, ebeveynlere çocukları ile kitap okuma davranışlarını geliştirmek amacıyla oluşturulmuş, bir eğitim oturumu, ev ziyaretleri ve telefon görüşmeleri ile gerçekleştirilen bir koçluk programı uygulanmaktadır. Ebeveynlerin çocukları ile sürdürdüğü 8 haftalık müdahalenin ardından yapılan ölçümler, çocukların kitap okuma sürecindeki sözel katılımlarının ve kullandıkları farklı sözcüklerin arttığını göstermektedir. Nelson, Stoddard, Fryer ve Muñoz (2019), okul öncesi dönemde işitme yetersizliği bulunan 4 çocuğun ve annesinin dahil edildiği çalışmada, anneye kitap okuma sırasında anne ve çocuk arasındaki etkileşimi artırmaya ilişkin stratejileri içeren kısa bir eğitim sunulmaktadır. Verilen eğitim sonrasında gerçekleştirilen birlikte okuma süreçlerinde annelerin ilgi çekici sorularının arttığı ve genel ölçümlerde çocukların ifade edici dil becerilerinde gelişmelerin olduğu görülmektedir. Akamoglu ve Meadan (2019), serebral palsi ve otizm spektrum bozukluğu tanıları olan iki çocuk ve annesi ile gerçekleştirdikleri deneysel çalışmada, annelere çocukları ile kitap okuma süreçlerini daha kaliteli hale getirebilecek stratejilerin öğretimini içeren ve haftada ortalama 2-3 kere olmak üzere toplamda 12 hafta süren eğitim koçluğu desteği vermektedir. Eğitim sonrasında anneler, çocuklarının okuma sırasında daha fazla iletişime girmeye başladığını ve birlikte kitap okuma süreçlerinin çocuklarının iletişim becerilerini artırdığını ifade etmektedir. Özel gereksinimli bir çocuğa sahip olma, zaman zaman ebeveynlerin ihtiyacı olan sosyal desteği alamama, çocuğun gelişimini desteklemede yeterli bilgiye sahip olamama gibi farklı konularda sorunlar yaşamasına sebep olabilmektedir (Fareo, 2015). Çocukluk çağında görülen yetersizlikler, sendrom ve bozukluklar incelendiğinde, genellikle bu durumların dil gelişiminde gecikme ve bozukluklara neden olduğu görülmektedir (DSM-IV-TR, 2001). Çalışma kapsamında incelenen arařtırmalar, bu risk faktörü ile baş etmede ebeveynlerin kitap okuma etkinliklerini kullanabileceğini göstermektedir.

Ev ortamında çocuğa sunulan uyanların niceliği ve niteliği çocukların dil gelişimini desteklemekte oldukça etkilidir. Ailenin düşük sosyoekonomik düzeyde oluşu, ev içerisinde bulunan kitap sayısının, niteliğinin ve kitap okumaya ilişkin bilgi ve beceri düzeyinin de düşüklüğü ile ilişkilendirilebilmektedir (Can ve Ginsburg-Block, 2016; Niklas ve Schneider, 2013). Bu durum, düşük sosyoekonomik kořullara sahip olan ailelerin çocuklarının gelişimsel açıdan dezavantajlı olma olasılığını artırmaktadır. Chacko, Fabiano, Doctoroff ve Fortson

(2018), ekonomik geliri düşük olan 126 baba ve okul öncesi dönemdeki çocuğu ile yaptığı çalışmada babalar, haftada 90 dakika olmak üzere toplamda 8 hafta süren, paylaşımlı kitap okumaya ilişkin hazırlanmış bir eğitim programına katılmaktadır. Babalar aracılığıyla uygulanan müdahale sonrasında çocukların genel dil becerilerinde önemli derecede artışların olduğu belirtilmektedir. Dias-Broensa ve Steensel (2022), Hollanda’da düşük sosyoekonomik düzeye sahip 176 ebeveyne ve çocukları ile yaptıkları deneysel çalışmada, ebeveynlere birlikte okumayı geliştirmeye ilişkin eğitim ve rehberliğin yapılması için ev ziyaretleri (5-20 kez) düzenlenmektedir. Müdahaleler sonrasında çocukların gelişimine ilişkin veriler incelendiğinde, müdahalenin çocukların hikâye anlama becerilerinde önemli derecede artışları sağladığı görülmektedir. Ancak müdahale sonrasında çocukların alıcı dil becerilerinde ve sözcük dağarcıklarında beklenen gelişimin görülemediği belirtilmektedir. Bu durum aile eğitimlerinin ve müdahale programlarının hazırlanmasında çalışılan grubun özellikleri, çalışma süresi ve eğitimin içeriği gibi konuların, beklenen etkinin ortaya çıkmasında önemli etkisi olduğunu düşündürmektedir.

SONUÇ

Çalışma kapsamına alınan güncel araştırmalardan elde edilen veriler incelendiğinde;

Ebeveyn ile birlikte yapılan kitap okuma etkinliklerinin çocukların özellikle sözcük dağarcığı, hikâye anlama-anlatma ve dilbilgisi olmak üzere genel dil becerilerini desteklediği; bu desteğin seviyesinin ailenin sosyoekonomik düzeyi, çocuk ile gerçekleştirdikleri okuma sıklığı, okumaya başladıklarındaki çocuk yaşı gibi çevresel etmenlerden etkilendiği,

Ebeveyn-çocuk birlikte kitap okuma sürecinde, ebeveynin kullandığı okuma yönteminin, çocuğun dil becerileri gelişiminde etkili olduğu; çocuğun süreçteki etkileşimini artıran ve aktif katılımını sağlayan etkileşimli okuma yönteminin geleneksel okuma yöntemine göre çocuğun dil gelişimini daha çok desteklediği,

Ebeveynin birlikte kitap okuma etkinliklerinde farklı özellikteki kitaplar ve okuma tekniğindeki uyarlamalar ile çocukların dil gelişim alanlarının farklı boyutlarını destekleyebileceği,

Risk altında bulunan ve dezavantajlı koşullara sahip çocukların dil becerilerini desteklemede ebeveynlere verilen kitap okumaya ilişkin aile eğitimlerinin, etkili bir müdahale aracı olduğu, sonuçlarına ulaşılmaktadır.

Bu sonuçlar, gelecekte kitap okuma ile ilgili yapılması planlanan çalışmaların bebeklik döneminde başlanmasının ve yöntem çeşitliliğinin artırılmasının gerekliliğini ortaya koymaktadır.

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**WATER PRODUCTIVITY OF OLIVE GROWING IN AEGEAN REGION IN
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Abstract

Climate change has made sustainable water management efforts, which aim to protect water resources and use water efficiently, important. Water productivity is a parameter by which the relationship between water and agricultural products is analysed and the amount of product per unit of water is determined. In this study, the water productivity values of oil olives in Aydın, Denizli, İzmir, Manisa and Muğla provinces in the Aegean Region between 2012 and 2021 were calculated by using Cropwat and Aquacrop models. The climate data of the region, the olive production data and the crop data for oil olives were taken from the Turkish State Meteorological Service, the Turkish Statistical Institute and the General Directorate of Agricultural Research and Policies, respectively. In addition, the change of water productivity over time and space was also analysed. According to the study findings, the average water productivity values with Cropwat and Aquacrop models were calculated as 0.35 and 0.49 kg/m³ in Aydın, 1.13 and 1.23 kg/m³ in Denizli, 0.44 and 0.52 kg/m³ in İzmir, 0.65 and 0.73 kg/m³ in Manisa, and 0.32 and 0.37 kg/m³ in Muğla, respectively. As a result, it was found that Denizli province had the highest olive production amount per unit water.

Key words: Aquacrop, Cropwat, Evapotranspiration, Olive, Water productivity.

Introduction

Climate change, population and production/consumption are factors that directly affect water resources. The pressure on freshwater resources increases with the population, and climate change reduces freshwater resources. Increasing production activities affect water resources by both using clean water and polluting the water resources with the wastewater. Domestic and industrial water use reduces the amount of water left for agricultural production. In cases where rainwater is not sufficient in agricultural production, the need for blue water increases the cost. For these reasons, it is important to conduct research on the efficient use of fresh water and to develop irrigation policies (Molden et al., 2010). Water productivity studies aim to increase the amount of product without increasing the amount of water used or to reduce the amount of water for the same amount of product (Descheemaeker et al., 2013). It is one of the values examined in order to obtain more products with less water and to ensure sustainability. Agricultural water productivity is the ratio of the amount of product to the amount of water used for production. There are many studies on the relationship between water and crops. Water consumption of olive, which is a drought-resistant crop, is also one of the subjects studied.

According to 2021 data, 23 million tons of olives were produced in approximately 10.3 million hectares of land in the world. Olives are grown mostly in countries bordering the Mediterranean Sea such as Spain, Italy, Greece, Turkey, Tunisia, Syria, Morocco, France and Portugal. According to 2023 data, approximately 93% of the world's olive trees were located in these countries (FAO, 2023). When the countries with the most olive-cultivated areas in the world are examined, it is seen that Turkey ranks 5th (Table 1). It has been reported that there are 194.5 million olive trees in an area of approximately 9 million decares in Turkey in 2022, and 74% of these trees are olive trees for oil (TÜİK, 2023).

Table 1. Amount of olive cultivated area in the world (thousand ha)(FAO, 2023)

Country/Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Spain	2504	2507	2516	2351	2522	2555	2579	2602	2624	2623
Tunisia	1811	1823	1589	1625	1646	944	2995	1281	3660	1281
Italy	1125	1147	1157	1148	1145	1142	1142	1139	1146	1129
Morocco	968	922	947	1006	1008	1021	1045	1073	1069	1104
Turkey	814	826	826	837	846	846	864	879	887	889
Greece	808	797	818	821	798	793	963	903	906	819

In this study, the water productivity of oil olives produced in Aydın, Denizli, İzmir, Manisa and Muğla provinces in the Aegean Region was calculated for the 2012-2021 period by using evapotranspiration values.

MATERIAL AND METHOD

Study Area

The area of the study includes the provinces of Aydın, Denizli, İzmir, Manisa and Muğla where oil olives are grown in Turkey (Figure 1).

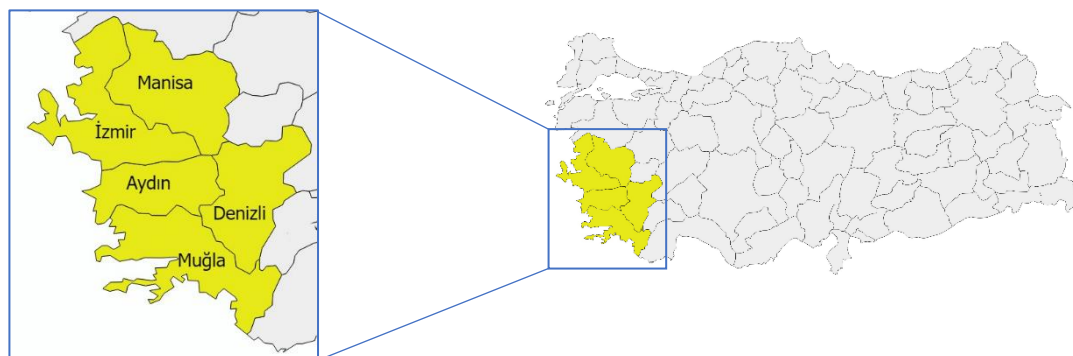


Figure 1. The scope of study (Paintmaps, 2023)

Data

Meteorological Data

In the Aquacrop and Cropwat programs, daily maximum and minimum temperature ($^{\circ}\text{C}$), wind speed (m/s), relative humidity (%), sunshine duration (hours) and rainfall (mm) for between 2012 and 2021 years were used. These data were obtained from the Turkish State Meteorological Service. Total rainfall was converted to effective rainfall using the USDA SCS method (Allen, Pereira, Raes, & Smith, 1998) (Figure 2).

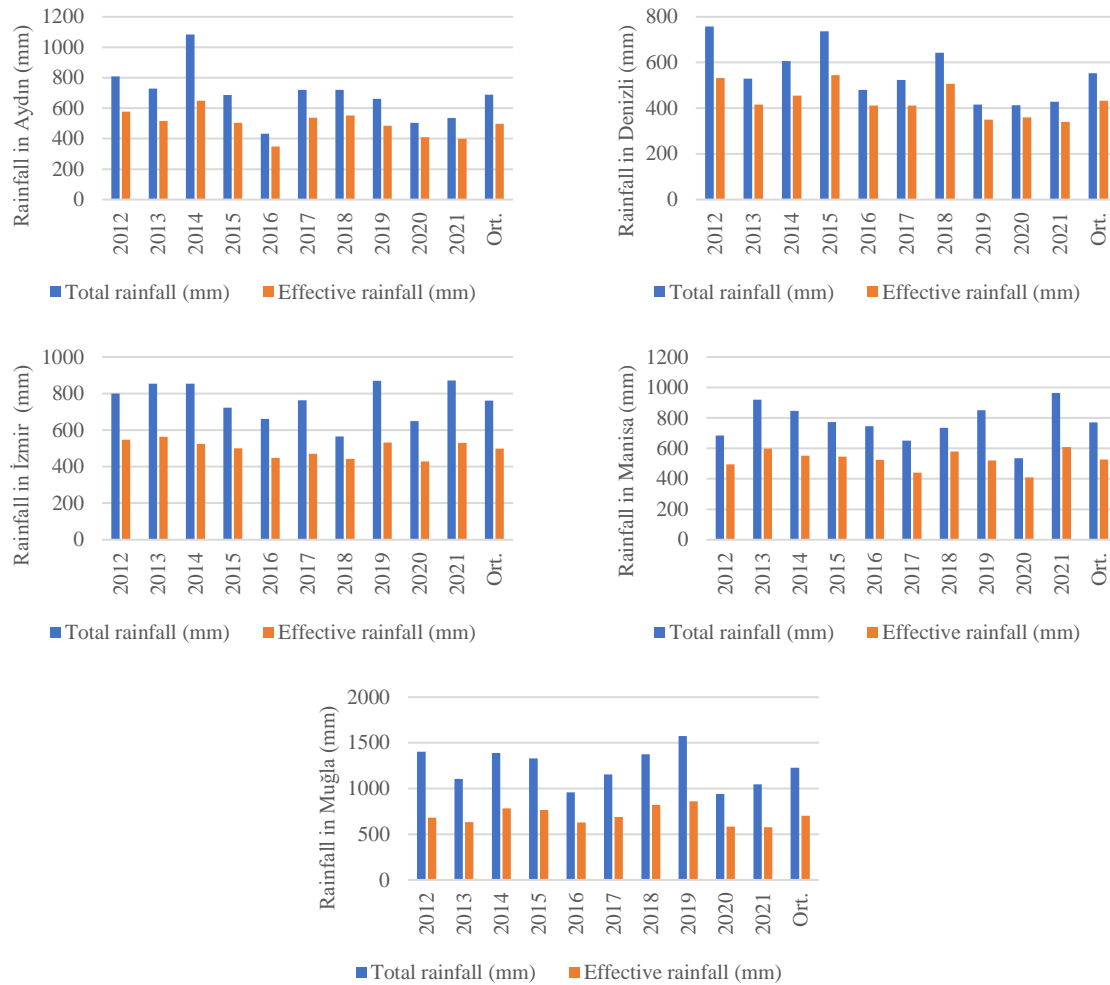


Figure 2. Total and effective rainfall values

Plant Data

Plant Data Used in the Cropwat Program

In the study, the crop coefficient values (K_c), plant development stages, sowing-planting time, harvest time data required to calculate the water consumption of olives with the Cropwat model were obtained from the guide titled "Plant Water Consumption of Irrigated Plants in Turkey" prepared by TAGEM. Root depth (1.70 m), critical depletion fraction (0.65), yield response factor (0.2), plant height (4.00 m) data were taken from FAO (Table 2) (FAO, 2023; TAGEM, 2017).

Table 2. Crop coefficients of olives, development periods and sowing-planting times (TAGEM, 2017)

Province	Crop coefficient			Development stages (days)					Sowing-planting time
	K_{c1}	K_{c3}	K_{c4}	I	II	III	IV	Total	
Aydın	0.48	0.69	0.63	30	85	55	85	255	April I
Denizli	0.48	0.70	0.61	30	90	60	90	270	April I
İzmir	0.47	0.73	0.66	30	85	55	85	255	March III
Manisa	0.48	0.71	0.62	30	90	60	90	270	April I
Muğla	0.59	0.73	0.64	30	90	60	90	270	March III

The expressions I, II and III indicate the 10-day periods of the month.

Plant Data Used in the Aquacrop Program

Development stages of mature olive trees were adjusted using TAGEM data. The average diameter of the tree was taken as 4 m at the beginning of the season and 5 m in the middle of the season. For the plant density calculation, the olive tree was calibrated by considering it as small plants, each covering an area of 200 cm² (Poppe, 2016). The number of plants in a hectare was calculated as "initial plant density". The base temperature was taken as 6.0 °C, the upper temperature was 40.0 °C, the plant root depth was 1.70 m, and the water content was 45%. Region-specific data were given in Table 3. Earlier studies were used to determine other inputs (Hunink & Droogers, 2010; Poppe, 2016).

Table 3. Plant data used in the calibration of the Aquacrop program

	Tree density (tree/ha)*	Tree yield (kg olive/tree)*	Initial plant density (plant/ha)	CC _{ini} (%)	CC _x (%)	HI (%)	Planting date**	Harvest date**
Aydın	150	12.80	94248	18.85	29.45	9	3 April	13 December
Denizli	280	19.47	175980	35.19	54.96	20	1 April	26 December
İzmir	190	14.13	119415	23.88	37.29	11	30 March	9 December
Manisa	190	16.93	119000	23.88	37.29	12	1 April	26 December
Muğla	170	9.75	106850	21.37	33.37	6	20 March	14 December

CC_{ini}: Initial canopy cover; CC_x: Maximum canopy cover; HI: Harvest index
 *TÜİK data; ** TAGEM data

Calculating Water Productivity (WP)

Depending on the subject of the research, the amount of water can be evapotranspiration, the total amount of water supplied to the production area, or the amount of polluted water (Molden et al., 2010). ET values were used in this study.

WP of olive was calculated using Cropwat and Aquacrop models. For to calculate, the product yield obtained from the Aquacrop model was divided by the ET values obtained from both programs (Equation 1).

$$WP = \frac{\text{yield (ton/ha)}}{ET (m^3/ha)} \quad \text{Equation 1}$$

WP shows the amount of product obtained per unit amount of water consumed.

RESULT AND DISCUSSION

The WP change of 5 provinces in the Aegean Region of Turkey between 2012 and 2021 was observed. The year with the highest WP in Aydın province was 2020 according to both models (0.38 and 0.53 kg/m³ with Cropwat and Aquacrop, respectively). The year had the lowest value was 2012-2016 with 0.34 kg/m³ WP according to the Cropwat model, and 2012 with 0.45 kg/m³

WP for the Aquacrop model. According to Cropwat model calculations, WP varies between 0.34-0.38 kg/m³, and for Aquacrop model calculations it varies between 0.45-0.53 kg/m³ (Figure 3).

The most efficient year in WP in Denizli province was 2020, which had the highest olive productivity for two models (1.56 and 1.55 kg/m³ with Cropwat and Aquacrop models, respectively). The year with the lowest WP was 2012 in accordance with both models (0.96 and 1.07 kg/m³ with Cropwat and Aquacrop models, respectively) (Figure 3). The years 2012 and 2013 have approximately the same olive yield. However, the higher ET value calculated for 2012 reduced the WP of the same year. Unlike most years, the effective parameter was the ET value.

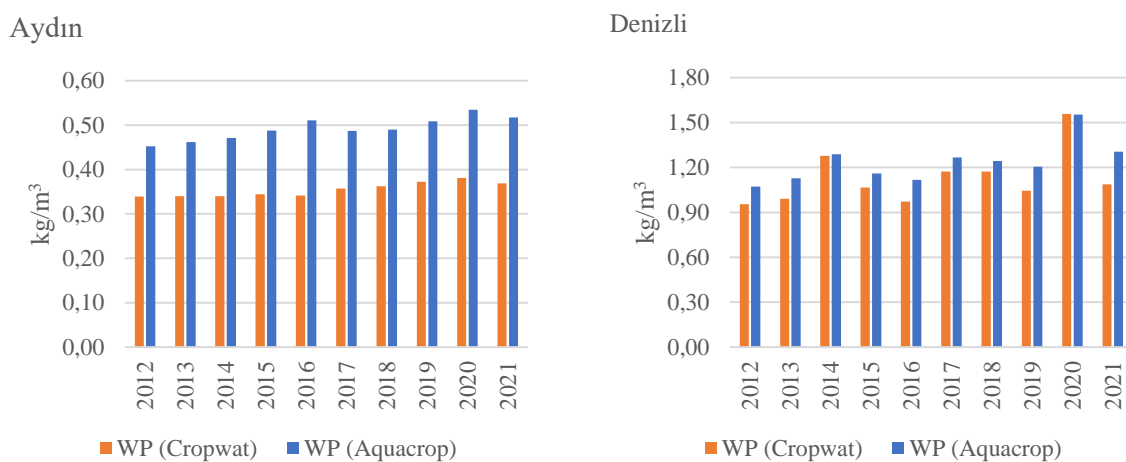


Figure 3. WP for Aydın and Denizli provinces

The highest WP in Izmir was observed in 2014, which had the highest olive yield according to both models (0.51 and 0.57 kg/m³ with Cropwat and Aquacrop, respectively). The lowest WP was observed in 2016 and 2021 (0.37 kg/m³) for the Cropwat model and in 2012 and 2021 (0.47 kg/m³) for the Aquacrop model (Figure 4). The years 2016 and 2021 had the lowest olive yield. 2012 is the year in which both the lowest ET and WP were calculated with the Aquacrop model. The highest WP in Manisa was experienced in 2021 with two models (0.77 and 0.87 kg/m³ with Cropwat and Aquacrop, respectively). This year has been the second highest year in olive yield. At the same time, since it has a low ET value, it has the highest value in WP. The lowest WP was observed in 2016 with the Cropwat model (0.55 kg/m³) and in 2012 with the Aquacrop model (0.63 kg/m³) (Figure 4). As with the highest value, 2012 and 2016 also had low values in WP because they were the years when the lowest olive yield was observed.

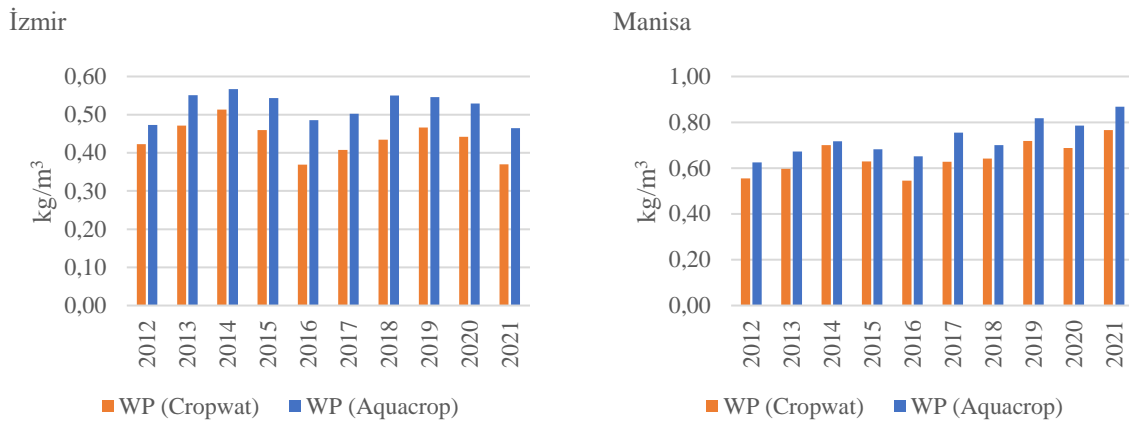


Figure 4. WP for İzmir and Manisa provinces

The highest WP in Muğla province was calculated as 0.38 and 0.43 kg/m³ with two models, Cropwat and Aquacrop, respectively, in 2020. The lowest WP was calculated as 0.28 kg/m³ in 2016 with the Cropwat model and 0.33 kg/m³ in 2013 and 2016 with the Aquacrop model (Figure 5). The WP in Muğla province could not be explained by olive yield and/or ET values. 2020 is the year with the second lowest ET value for both models and ranks fifth in olive yield. Since years with higher olive yields also have higher ET values, their WP decreased. The opposite situation is seen at the lowest WP. The year 2016 has an above-average ET value according to the two models and is the third lowest year in olive productivity. In other words, since olive yield was low and the amount of water consumed by the plant was high, it reduced the WP.

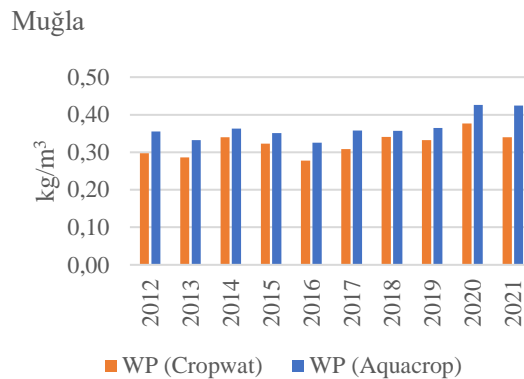


Figure 5. WP for Muğla province

The average WP with Cropwat and Aquacrop models were calculated as 0.35 and 0.49 kg/m³ in Aydın province, 1.13 and 1.23 kg/m³ in Denizli province, 0.44 and 0.52 kg/m³ in İzmir province, 0.65 and 0.73 kg/m³ in Manisa province and 0.32 and 0.37 kg/m³ in Muğla province, respectively. Standard deviation values with Cropwat and Aquacrop models were 0.015 and 0.025 kg/m³ for Aydın province, 0.172 and 0.129 kg/m³ for Denizli province, 0.043 and 0.035 kg/m³ for İzmir province, 0.068 and 0.073 kg/m³ for Manisa province and 0.029 and 0.032 kg/m³ for Muğla province, respectively. The average WP value calculated with both models

was observed to be highest in Denizli and lowest in Muğla. In general, WP values calculated with the Cropwat model were lower than the values calculated with the Aquacrop model (Figure 6). The reason for this is that the ET values obtained with the Aquacrop model were lower.

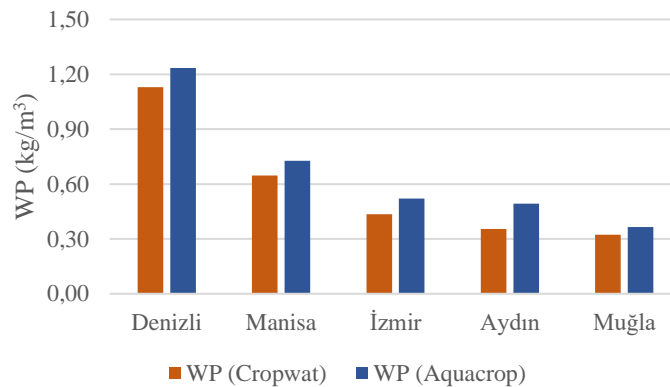


Figure 6. Average WP values of all provinces

This study showed how WP values for olives changed in 10 years in case of no irrigation. It was seen that previous studies had investigated the effect of regulated deficit irrigation (RDI) on water efficiency (Ahumada-Orellana, Ortega-Farías, Searles, & Retamales, 2017; Alcaras, Rousseaux, & Searles, 2021; Arampatzis et al., 2018; Serman, Orgaz, Starobinsky, Capraro, & Fereres, 2021).

Naoum et al. irrigated the olive trees at rates varying between ET*40-100%. Researchers reported that they achieved the highest water use efficiency in irrigation, which was ET*65%. (Naoum et al., 2016). Alcaras et al. carried out a study lasting 3 seasons in which irrigation was applied at ET*100, 66, 33 and 0% rates after olive harvest. It was reported that water efficiency was higher in 0% than other treatments in the first season, 0% was higher than 100% in the second season, but no difference in water efficiency was observed between irrigation levels in the third season (Alcaras et al., 2021). Serman et al. studied seven different irrigation rates (ET*120, 100, 90, 80, 70, 60 and 40%) for olive trees. It was reported that WP was 3.4 kg ha⁻¹ mm⁻¹ at maximum yield, and 4.0 and 2.8 kg ha⁻¹ mm⁻¹ at 715 and at 390 mm irrigation, respectively. Researchers indicated that there was a decrease in yield due to decreased irrigation after the first year (Serman et al., 2021).

CONCLUSION

According to the results of the study, the average WP with Cropwat and Aquacrop models were calculated as 0.35 and 0.49 kg/m³ in Aydın province, 1.13 and 1.23 kg/m³ in Denizli province, 0.44 and 0.52 kg/m³ in İzmir province, 0.65 and 0.73 kg/m³ in Manisa province and 0.32 and 0.37 kg/m³ in Muğla province, respectively. Standard deviation values with Cropwat and Aquacrop models were 0.015 and 0.025 kg/m³ for Aydın province, 0.172 and 0.129 kg/m³ for Denizli province, 0.043 and 0.035 kg/m³ for İzmir province, 0.068 and 0.073 kg/m³ for Manisa

province and 0.029 and 0.032 kg/m³ for Muğla province, respectively. Denizli was the province with the highest WP value. It was seen that WP increased when increased crop yield was supported by lower water use. The WP of years changed depending on climatic conditions although the same amounts of olives are produced. Distribution of rainfall throughout the year was more important than the total or effective rainfall. In addition, the Aquacrop model was more affected by meteorological data and, in general, the Aquacrop WP was higher than the Cropwat WP.

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ALÜMİNYUM VE ALAŞIMLARI İÇİN ORGANİK KOROZYON ENGELLEYİCİLER

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Özet

Metalik malzemeler korozyon adı verilen bir süreçle kendiliğinden çözünür ve bu durum önemli mali ve güvenlik kayıplarına neden olur. Alüminyum ve alaşımları çeşitli koşullarda korozyon direnci gösterdiğinden çok sayıda önemli endüstriyel uygulamada kullanılmaktadır. Açıkta kalan yüzeylerde kompakt ve yapışkan bir pasif oksit filmin ilk oluşumu korozyon direncine neden olur. Ancak metalin parçalanmasını başlatan klorür iyonları gibi iyonların varlığında koruyucu oksit kaplama lokal olarak hasar görebilir. Ticari, havacılık ve savunma uygulamaları için hafif alaşımlarda korozyonun önlenmesi şu anda önemli bir araştırma alanıdır. Doğal veya yapay eylemler korozyonun başlamasına neden olabilir. Bir dizi endüstriyel proseste metalik korozyonun önlenmesine büyük önem verilmiştir. Düşük sentez maliyetleri, büyük etkinlikleri ve kullanım basitlikleri nedeniyle sentetik korozyon inhibitörleri şu anda mevcut olan en yaygın kullanılan ve etkili yaklaşımdır. -OH, -NO₂, -OCH₃, -COOH, -NH₂, -COOC₂H₅, -CONH₂, vb. gibi polar fonksiyonel gruplar formunda çoklu heterotrofların yanı sıra bağlanmayan ve π -elektronların varlığı kapsamlı konjugasyon biçimi, organik inhibitörlere etkinlik kazandıran şeydir.

Anahtar Kelimeler: Alüminyum, Alüminyum alaşımları, Korozyon, Organik korozyon inhibitörleri

ORGANIC CORROSION INHIBITORS FOR ALUMINUM AND ITS ALLOYS

Abstract

Metallic materials spontaneously dissolve through a process called corrosion, which causes significant financial and safety losses. As aluminium and its alloys display corrosion resistance in a variety of conditions, they are used in numerous significant industrial applications. The initial formation of a compact and adherent passive oxide film on the exposed surfaces is what causes the corrosion resistance. However, the protective oxide covering can be locally damaged in the presence of ions, such as chloride ions, which starts metal breakdown. For commercial, aerospace, and defence applications, corrosion avoidance in light-weight alloys is currently a key field of research. Natural or artificial actions may cause corrosion to start. Significant attention has been paid to the prevention of metallic corrosion throughout a number of industrial processes. Because of their low cost of synthesis, great effectiveness, and simplicity of use, synthetic corrosion inhibitors are the most widely used and efficient approach currently available. The existence of multiple heteroatoms in the form of polar functional groups, such as -OH, -NO₂, -OCH₃, -COOH, -NH₂, -COOC₂H₅, -CONH₂, etc., as well as non-bonding and π -electrons in the form of extensive conjugation, is what gives organic inhibitors their effectiveness.

Keywords: Aluminum, Aluminum alloys, Corrosion, Organic corrosion inhibitors,

Introduction

Aluminium is widely used nowadays because of its exceptional adaptability and corrosion resistance, which make it appropriate for a variety of items from household foil to armour plate and the primary building material for previous generations of aircraft and spacecraft. The biggest motivation for alloy development and corrosion research, which is still ongoing, has come from aerospace applications, which call for strength, toughness, corrosion resistance, and low weight. A wide network of power transmission lines, building cladding for various types of structures, and the adaptable extruded section used in glass house construction have all been made possible by durable aluminium. In order to reduce emissions from the huge and quickly growing number of cars and trucks on the planet, it is becoming more and more popular to use lighter metals. With the right combination of composition, temper, and manufacturing method, aluminium and its alloys can be exactly suited to the requirements of any application. They offer a wide range of desirable characteristics. Aluminium can be cast directly into shaped products or extruded through dies of various shapes and then rolled, forged, slit, sheared, and formed. Its other key characteristics are excellent thermal and electrical conductivity, heat and light reflection, cryogenic compatibility, nonferromagnetic property, low density, strong corrosion resistance, and sanitary and nontoxic properties for food contact applications. Aluminium is exceptional in that it is highly recyclable, which can offset the high energy cost of its initial manufacturing. Modern economies depend on aluminium, which frequently replaces steel and plastics in building and automotive applications, as well as copper in the production and transmission of electricity, magnesium, titanium, composites and plastics in aerospace and defence, steel, plastics and glass in packaging and wood and vinyl in the building and construction industries (Scamans et al., 2010).

CORROSION RESISTANCE OF ALUMINUM

Among all metals, aluminium is one of the most widely used. An effective thin passive oxide layer is suggested to form on the aluminum surface in aerated environments. This oxide layer protects the aluminium surface from additional corrosion since it is inert, stable, and adherent. This oxide layer deteriorates in conditions with a higher or lower pH. Thus, strong alkaline solutions and mineral acids are both extremely corrosive to aluminium. Acidic solutions, in particular HCl, are frequently used to pickle and clean aluminium in corrosive ways. Several studies on the prevention of corrosion of aluminium in HCl solutions have been conducted (Alqarni et al., 2022).

Due to the development of a resistant oxide layer, aluminium exhibits good corrosion resistance

in various aqueous conditions and the atmosphere. The corrosion products are also non-toxic and colourless. Aluminium is one of the most desirable materials for a variety of applications, such as packaging for food, beverages, and pharmaceutical items, sacrificial anodes, automotive, marine, and aerospace parts. This is due to a combination of these attributes and other factors. The most frequent forms of corrosion for aluminium, irrespective of the corrosive environment, include general, galvanic, pitting, stress-corrosion cracking, intergranular, and exfoliation (Winston Revie, 2011).

The most hazardous type of aluminium corrosion is pitting corrosion. On the surface of the metal, it appears as irregularly shaped holes and pits. The type of material, the corrosive medium, and the characteristics of the environment to which aluminium and its alloys are exposed determine the diameter and depth of the pits. In aerated chloride solutions, aluminium typically experiences pitting corrosion. Commercially available wrought aluminium alloys can be divided into two groups based on the method of strengthening. While series 2xxx, 6xxx, and 7xxx alloys can be heat-treated, series 1xxx, 3xxx, 4xxx, and 5xxx alloys cannot. In comparison to heat treatable alloys, non-heat treatable alloys have superior corrosion resistance to general corrosion. However, series 6xxx alloys containing the Al-Mg₂Si system also show considerable resistance to general corrosion. The presence of appreciable amounts of soluble alloying elements, such as copper, magnesium, silicon, and zinc, will make these alloys susceptible to stress-corrosion cracking. The same is observed for the heat treatable alloys (Xhanari & Finsgar, 2019).

CORROSION PREVENTION OF ALUMINUM

The fundamental tactic for reducing electrochemical corrosion of aluminium and its alloys is to successfully isolate the metal from corrosion agents. Corrosion inhibitors can be used to accomplish this. One of the most well-known strategies for preventing corrosion is the use of inhibitors. The majority of effective acid inhibitors are organic molecules with a structure predominately made up of nitrogen, sulphur, or oxygen atoms. Organic substances that are utilised as inhibitors function by adsorbing on surfaces. Therefore, an inhibitor's effectiveness also depends on the inhibitor's internal structure, which takes into account factors like the number of adsorption active centres present in the molecule, their charge density, the molecular size, the mode of adsorption, the formation of metallic complexes, and the projected area of the inhibitor on the metal surface (Okafor and Zheng, 2009; Abdallah et al., 2012).

In various conditions, a variety of techniques and their combinations have been employed to reduce the corrosion of aluminium and its alloys. Anodizing, coatings (conversion, inorganic,

organic, or organic-inorganic varieties), and inhibitors (inorganic and organic) are some of the most often tried protective techniques (Domingues et al., 2003, Lundvall et al., 2007, Niknahad et al., 2010, Harvey, 2013, Golru et al., 2015).

In the aircraft industry, where strength-to-weight ratio and reasonably low cost are valued highly, aluminium alloy AA-2024-T3 is widely utilised. The behaviour of the alloying elements, primarily copper, during surface treatments is generally connected with the 2000 series alloys' sensitivity to localised corrosion. The alloy is protected by two successive procedures in order to comply with the necessary level of corrosion resistance: anodizing or conversion coating in acid electrolytes containing chromate species, followed by application of epoxy primers and paint coatings. The chromate base treatments encourage a scalloped film-electrolyte interface (in the case of anodizing a porous anodic film and in the case of conversion coating), ensuring effective adherence of primers and coatings. The resulting organic coating gives the aluminium alloy exceptional corrosion resistance since it has a low water permeability and a minimal fall in fatigue strength. However, because of their hazardous and carcinogenic characteristics, chromate species are now the focus of increased environmental regulation. Thus, both the commercial and academic sectors have investigated a number of alternative treatments (Lundvall et al., 2007).

Currently, the aerospace sector uses chromic acid anodizing (CAA) to form oxide layers on high strength aluminium alloys such as Al 2024-T3. Traditional sulphuric acid baths shouldn't be used for these treatments because they reduce the material's fatigue life. Incorporating some Cr(VI) and Cr(III) into an Al₂O₃ film is recommended by CAA. The produced film may either be utilised unsealed as a base for painting or adhesive bonding, or it might be sealed in hot water to provide the alloy considerable corrosion resistance. Despite the good properties of the films obtained with this process, the use of Cr(VI)-containing treatments is unadvised from a health and environmental point of view, since it is toxic and carcinogenic (Domingues et al., 2003).

Organic compounds have been extensively used as corrosion inhibitors for aluminum and its alloys due to the fact that they contain several heteroatoms (N, S, O and P) which serve as adsorption centers (Xhanari and Finsgar, 2016). Natural compounds, also known as green corrosion inhibitors, have been extensively used to protect aluminum materials (Abiola and Tobun, 2010, Abdallah et al., 2012, Gerengi, 2012, Chaubey et al., 2017). Furthermore, corrosion inhibitor research for aluminum and its alloys have been also presented in several patents.

CORROSION INHIBITORS

Corrosion inhibitors are widely used to stop or at least slow down the corrosion process of metals in a variety of industries, from the construction industry to the preservation of cultural heritage. A corrosion inhibitor is defined as a "chemical substance that, when present in the corrosion system at a suitable concentration, decreases the corrosion rate, without significantly changing the concentration of any corrosive agent." In small concentrations, it typically works. This does not include any chemical that causes a significant pH fluctuation reduction in corrosion rate or oxygen or hydrogen sulphide scavengers that remove hostile species from the solution. Depending on whether their major effect is to delay the cathodic or anodic reaction of the corrosion process or both of them, corrosion inhibitors can be categorised as cathodic, anodic, or mixed. As a result, they either significantly keep the metal's corrosion potential more or less constant or they cause it to shift in one of two directions towards either the cathodic or the anodic directions. The lowering of a metal's active surface area and/or a change in the activation energy of the oxidation or reduction process in corrosion can both result in the inhibition of anodic or cathodic corrosion reactions. Improved protection and lower inhibitor concentrations are frequently determined by the combination of cathodic and anodic corrosion inhibitors. No matter which activity the corrosion inhibitor hinders, it will interact with the metal/solution interface by generating a film, which can take one of three different forms: (a) passivating film; (b) precipitation film; or (c) adsorption film. The 30-200 nm thick passivating oxide layers provide good corrosion protection. The use of traditional oxidising inhibitors like chromates and nitrites has been mostly discontinued because of toxicity issues, with the exception of situations where corrosion might seriously endanger human safety (such as the aerospace industry and construction). This group of inhibitors also includes nonoxidizing compounds like tungstates and molybdates, which only have a passivating action in aerated solutions. Precipitation film-type inhibitors are substances that react with soluble species in the environment to form insoluble protective films, such as phosphonates and polyphosphates when exposed to calcium ions in solution, or with protected metal ions when exposed to copper-benzotriazole (BTA) salt film. These films may have pores and be less than completely adherent, although in this instance, the corrosion protection is still fairly effective. Most adsorption protective film inhibitors are organic compounds. A hydrophilic group that can form a connection with the metal surface and a hydrophobic portion of the molecule that extends towards the bulk of the solution are common features of their molecular structure. Adsorbed inhibitor molecules reduce water and oxygen access to the metal surface, slowing the rate of

corrosion (Monticelli, 2018).

In factories, corrosion inhibitors are frequently used to slow down the rate of corrosion of metals and alloys that come into contact with harsh conditions. In order to prevent corrosion on metal surfaces, a protective coating is formed by the adsorption of inhibitors; as a result, the metal surface and the inhibitor are in contact with one another. Corrosion inhibitors come in two varieties: inorganic and organic. The formation of an oxide film or a salt that is barely soluble on the metal surface is related to the protective action of inorganic inhibitors. On the other hand, organic inhibitors' protective function is derived from their adsorption on oxide coatings. According to Ogurtsov et al. (2004), amino acids, hydroxy carboxylic acids, various organic compounds with polar groups, including oxygen, sulphur, and nitrogen, and heterocyclic compounds with functional groups and conjugated double bonds can all be utilised as corrosion inhibitors. Chromates are the most popular inorganic inhibitors used for aluminium or aluminium alloys. However, there is a lot of interest in their replacement due to the high toxicity of chromate. Despite the abundance of organic molecules, new corrosion inhibitors are always required. In order to use a suitable natural source as a corrosion inhibitor in diverse corrosive solutions, great efforts have been carried out in this direction (Rosliza & Nik, 2010). The development of nontoxic substitutes for the inorganic and organic inhibitors currently used has received attention due to growing ecological awareness, stringent environmental regulations, as well as the ineluctable drive towards sustainable and environmentally friendly processes. Numerous studies have examined the effectiveness of natural compounds as corrosion inhibitors in a variety of harsh conditions (Abdel-Gaber et al., 2008; Gerengi, 2012).

ORGANIC COMPOUNDS AS CORROSION INHIBITORS FOR DIFFERENT ALUMINUM AND ALUMINUM ALLOYS

Some of different organic compounds as corrosion inhibitors for different aluminum and aluminum alloys in various alkaline solutions are: Fluorescein, Adipic acid, Polyvinyl alcohol, Gelatin, Carboxymethylcellulose, Methyl cellulose, Polyethylene glycol, Thiourea, Tartrate, Phenyl thiourea, Polyaniline, Polyacrylic acid, Polymethylmethacrylate, Cetyl trimethylammonium chloride, 3-hydroxy flavone, 3-hydroxy flavone + quaternary ammonium bromide, 3-hydroxy flavone + quaternary ammonium iodide, Succinic acid, Glutaric acid, Bismark brown dye, Crystal violet dye, Congo Red dye, L-cysteine, 4-carboxy phenyl thiourea, 2-propanol, and 3-methylpyridine.

Some of different organic compounds as corrosion inhibitors for different aluminum and

aluminum alloys in various chloride solutions are: Sulfathiazole, Ferrous gluconate, Citric acid, Monoethanolamine, Vanillin, Phthalic acid, Anthranilic acid, Triisopropanolamine, Diisopropyl thiourea, Calcium gluconate, Cerium dibutylphosphate, Salicylaldehyde, Quinaldic acid, Benzotriazole, 2-mercaptobenzothiazole, Cerium diphenyl phosphate, Cerium dibutyl phosphate, Mischmetal diphenyl phosphate, Sodium dodecylbenzenesulfonate, 8-hydroxyquinoline, Benzotriazole, Tryptophan, Dodecylbenzenesulphonic acid, Sodium lauryl sulfate, Potassium sodium tartrate, 8-aminoquinoline, 8-nitroquinoline, Sinapinic acid, Gentisic acid, Tolyltriazole, Benzotriazole, Thiophenol, 2-mercaptobenzothiazole, Cerium(III) acetate, Sodium benzoate, Benzamide, and Thioacetamide.

Different aluminum and aluminum alloys were used as material in these studies were: Pure, 99%, 98%, 95%, 57S (97.7% Al), AA1060, AA5052, A5754, AA6061, AA6063, AA20556 (92.47% Al), AA2024, AA2024-T3, AA2198, AA3003, AA5052, AA7022, AA7050, AA7075, Al-2.5Mg, Al-0.8Mg, Al-8%Si-3%Cu, Al-4%Cu, Al-12%Cu, Al-12%Cu-4%Fe, AA7075-T6, and ADC12.

Edrah and Hasan (2010) investigated the ability of thiourea, phenyl thiourea, and 4-carboxy phenyl thiourea to suppress aluminium corrosion in solutions containing 0.3–1.0 M NaOH at 21 °C. The researchers came to the conclusion that these compounds considerably reduce aluminum's corrosion in a NaOH solution. The maximum recorded inhibitory effectiveness was 28.3%, which is too low of a result to justify their claim. Data indicated that as NaOH concentration was raised, the efficiency of the inhibition reduced. With the exception of the sample submerged in 0.3 M NaOH solution, phenyl thiourea was shown to be the best inhibitor in all the tested solutions. In a 0.3 M NaOH solution, 4-carboxy phenyl thiourea showed the greatest efficiency as an inhibitor. Through adsorption, this substance formed a coating that shielded the aluminium surface.

As a corrosion inhibitor for the aluminium alloy AA2024-T3 in 0.05 M NaCl solution, cerium tartrate was synthesised by Hu et al. (2015) and tested. According to the investigators, this substance exerted an impact on both cathodic and anodic corrosion processes and quickly formed a protective film on the surface of the alloy. Following the first inhibition of the dealloying of the Al₂CuMg phase by this protective coating, surface characterisation showed that cerium ions changed into cerium oxide/hydroxides and appeared at the Al₂CuMg phase, preventing further corrosion at those corrosion sites.

Using the weight loss (WL) and potentiodynamic polarisation (PDP) techniques, Dhayabaran et al. (2004) investigated the effectiveness of fluorescein, a synthetic organic compound with

the IUPAC name 3',6'-dihydroxyspiro[2-benzofuran-3,9'-xanthene]-1-one, as a corrosion inhibitor for commercially pure aluminium in 1.0 N NaOH solution at 30 °C. Fluorescein's ability to suppress growth improved when concentration was increased. The efficiency of the inhibition was further improved by adding CaO to the fluorescein-containing solutions. The authors claimed that fluorescein functioned as an anodic-type inhibitor based on the PDP measurements.

Polyvinyl alcohol was investigated by Umoren et al. (2007) utilising the WL and hydrogen evolution (HE) procedures as a corrosion inhibitor for the AA1060 aluminium alloy in 0.1 M NaOH solution at 30 and 40 °C. When the concentration of the inhibitor was increased, the efficiency of the inhibition increased and performed better at 30 °C than it performed at 40 °C. The inhibitory efficacy values obtained using the two approaches displayed a reasonable correlation, but the values were modest (the highest was 34%). It was reported that adding potassium halides (KI, KBr, and KCl) produced a synergistic effect. The suggested mechanism for this chemical was physisorption.

Using the PSP, EIS, and cyclic voltammetry (CV) techniques, Abdallah et al. (2016b) examined the inhibitive behaviour of gelatin as a corrosion inhibitor for pure aluminium and two aluminium alloys, particularly AA6063 and AA20556 (92.47% aluminium), in 0.1 M NaOH solution at 30–60 °C. The efficiency of the inhibition increased as the concentration of gelatin increased, but it dropped when the temperature and Si content of the alloys increased. The researchers noted that pure aluminium > AA6063 > AA20556 was the order in which gelatin's ability to block reduced. The authors claim that this resulted from gelatin's reduced propensity to adsorb on silicon compared to aluminium. They claimed that gelatin forms a barrier film on the surface of aluminium and aluminum-silicon alloys, shielding them from damage.

Using the WL and thermometric techniques, Umoren et al. (2009) investigated the synergistic effect of potassium halides (KI, KCl, and KBr) and polyethylene glycol (PEG) in the corrosion of aluminium in 1 M NaOH solution at 30 and 60 °C. With higher PEG concentrations and higher temperatures, the inhibition was more effective. The synergistic effect of adding potassium halides to PEG was highlighted by the authors. Comparing KI with PEG to KBr and KCl, this combination produced the most efficient inhibition. As a potential PEG adsorption mechanism, the authors proposed chemisorption.

Using the WL method, Edrah and Hasan (2010) investigated the ability of thiourea, phenyl thiourea, and 4-carboxy phenyl thiourea to prevent the corrosion of aluminium in solutions containing 0.3–1.0 M NaOH at 21 °C. The researchers came to the conclusion that these

compounds considerably reduce aluminum's corrosion in a NaOH solution. The maximum recorded inhibitory effectiveness was 28.3%, which was too low of a result to justify their conclusion. Data indicated that as NaOH concentration was raised, the efficiency of the inhibition reduced. With the exception of the sample submerged in 0.3 M NaOH solution, phenyl thiourea was shown to be the best inhibitor in all the tested solutions. In a 0.3 M NaOH solution, 4-carboxy phenyl thiourea showed the greatest efficiency as an inhibitor. Through adsorption, this substance formed a coating that shielded the aluminium surface.

Chitosan's unfavourable characteristic as a corrosion-mitigating coating film is its propensity to absorb an excessive amount of moisture from the air before forming a hydrogel. As a result, the focus of previous studies has been on using chemical or bioorganic substances to change the molecular structure of chitosan. Al-6063 samples coated with modified chitosan films offered reduced moisture sensitivity, improved pore resistance by an order of magnitude greater than those of the single chitosan coatings, and conferred salt-spray resistance for 720 hours. The modified chitosan films were generated from a precursor solution with a chitosan/dextrine ratio of 70/30. The inherent ability of CH to adsorb metal ions, which has been exploited to remove various metallic cations from ground and waste water, is another technique to change the structure of chitosan. The ability of chitosan to absorb metals is influenced by a variety of variables, including pH, ion concentration, temperature, percentage of deacetylation, interaction time, and chain length. The amines on chitosan are bound by the metallic cations. The amino and N-acetylamino groups have nitrogen electrons that can form dative bonds with transition metal ions. These biopolymers' hydroxyl groups may serve as donors and be engaged in the coordination of metal ions. At a neutral pH, the metal ions should be more closely coordinated because low pH would encourage protonation of the amino sites and dramatically reduce the capacity of chitin and chitosan to chelate metals. To explain the mechanism of coordination in the formation of complexes, various models have been presented out. In the so-called "bridge" scenario, the metallic ion is considered to be attached to a number of nitrogen atoms from the same or separate chains. In the so-called pendant model, the metallic ions are believed to be suspended from the amino group (Lundvall et al., 2007).

Using the EIS, linear sweep voltammetry (LSV), and WL methods, Jevremovic and Miskovic-Stankovic (2012) investigated the inhibitory efficiency of monoethanolamine (MEA) in the corrosion of 99.7% aluminium in 3 wt% NaCl solution saturated with CO₂ at 20 °C. Up to 5 mM, MEA's concentration improved its ability to block, but as concentration grew, its efficiency reduced. The polarisation measurements revealed that the corrosion potential shifted

towards more positive values with the addition of MEA without significantly altering the anodic and cathodic Tafel slopes. The authors hypothesised that MEA physisorbed on the aluminium surface in accordance with the thermodynamic calculations.

Phthalic acid, o-phenylenediamine, and anthranilic acid were investigated using the PDP method by Banerjee et al. (2011) as corrosion inhibitors for 99.15% aluminium alloy in 0.6 M NaCl solution at 30 °C. According to the authors, the efficiency of all three compounds' inhibition first increased with rising compound concentration before declining at a specific concentration. Phthalic acid, o-phenylenediamine, and anthranilic were the sequence in which the inhibition was most effective. This, however, was only accurate for the ideal concentration (4.105 M), not for the values of lowest or greatest concentration. The N-O donor atom combinations in the molecules were attributed by the authors for the compounds' inhibitory order.

Lamaka et al. (2007) studied the inhibition effectiveness of eleven organic compounds, i.e., salicylaldoxime (SAL), 2-mercaptobenzothiazole, 8-HQ, thioacetamide, quinaldic acid, α -benzoionoxime, 2-(2-hydroxyphenyl) benzoxazole, dithiooxamide, cuprizone, and cupferron, in the corrosion of AA 2024-T3 aluminium alloy in 0.05 M NaCl solution. Salicylaldoxime, 8-HQ, and quinaldic acid demonstrated the highest levels of inhibitory efficacy. The passivation of active intermetallic zones and the development of a chelate layer on the alloy surface, according to the authors, were both factors in the inhibitory effect. The authors claim that complexes, including active S-phases (intermetallic zones that make up around 60% of all intermetallic inclusions and are made of Al₂MgCu), chemisorb and precipitate on the alloy surface. They demonstrated how these substances functioned as inhibitors of mixed types.

Using the WL, PDP, and AC impedance techniques, Hakeem et al. (2014) investigated the efficiency of calcium gluconate as a corrosion inhibitor for 95% aluminium in aqueous solution containing 60 ppm Cl⁻ (pH = 11) with and without the addition of Zn²⁺. The efficiency of the inhibition increased as calcium gluconate concentration increased. The Zn²⁺ addition resulted in an additional improvement in the efficiency of the inhibition, as evidenced by the WL measurements.

COATINGS FOR ORGANIC–INORGANIC HYBRID ALUMINUM ALLOYS

As a new functional material, organic-inorganic hybrid materials have attracted a lot of attention recently. In most cases, the hydrolysis and condensation of organically modified silicates with conventional alkoxide precursor results in the formation of the hybrid material. These substances have tremendous attention since they contribute both organic and inorganic

properties. Chemical bonds that join the organic and inorganic components together hide the boundaries between them. The hybrid coating material's surface gains hydrophobic properties with the aid of organic functional groups. A covalent bonding of the single bond forms dense, highly adherent coatings on steel and aluminium. Hybrid films made from sol-gel can make a single bond with the surface of aluminium or steel. In addition, water-based systems are easily capable of producing thin films formed from sol-gel, which emits far fewer volatile organic compounds (VOC) than systems based on solvents. These characteristics make it possible to produce coatings that are environmentally friendly in place of chromate conversion coatings. Chou et al. (2001) used potentiodynamic polarisation curve analysis (PDS) to examine the corrosion resistance behaviour of thin films made from sol-gel that were applied over stainless steel. In order to assess the corrosion-protective traits of hybrid organic-inorganic coatings on 2024-T3 aluminium alloys, Metroke et al. (2002) used EIS and salt spray analysis; they discovered that the hydrolysis water ratio, organic content, curing mechanism, and solvent dilution had an impact on the structure and corrosion resistance properties of the examined Ormosil thin films.

CONCLUSIONS

Aluminium alloys are strong yet lightweight materials that have been widely employed in the industry. They are, nevertheless, prone to corrosion, particularly localised corrosion. The many types of localised corrosion, including as pitting corrosion, crevice corrosion, and stress corrosion cracking, can frequently result in unexpected and catastrophic failures and are challenging to detect. Because of this, there has been a great deal of interest in understanding and predicting localised corrosion of aluminium alloys for a long time.

Organic compounds have been extensively used as corrosion inhibitors for aluminum and its alloys due to the fact that they contain several heteroatoms (N, S, O and P) which serve as adsorption centers. Organic coating gives the aluminium alloy exceptional corrosion resistance since it has a low water permeability and a minimal fall in fatigue strength. A strong covalent bonding anchoring to the surface appears to be necessary for both organic molecule adherence and electronic level stabilising of the oxidised surface. Once functionalized, the ultrathin oxide's electrical states resemble those of the bulk oxide. The presence of the organic layer can give to the system a more insulating character than that of the bulk oxide itself.

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**THE EFFECT OF AEROSIL THICKENER ON THE MECHANICAL PROPERTIES
OF UNSATURATED POLYESTER THERMOSET RESIN**

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Abstract

When it is desired to produce products with different properties in different areas of the industry, the additives, fillers and chemicals used to produce products must be selected correctly. Thickening additives are one of them. Synthetic hydrophilic amorphous silica called Aerosil is used as viscosity adjuster, thickener and strength enhancer in unsaturated polyester resins, silicone rubbers, industrial paints/coatings, lubricants and adhesives. In this experimental study, the viscosity and mechanical properties of pure unsaturated polyester resin and thermoset polyester composites filled with different ratios (1-3wt.%) of synthetic hydrophilic amorphous silica called Aerosil were investigated. Composites containing polyester resin and thickener Aerosil silica were first mixed in a mechanical mixer and then produced in molds using the resin casting technique. The composites were subjected to viscosity measurement, hardness and flexure tests. The properties such as hardness, flexural strength, flexural modulus and deformation rate in bending of the composite materials shaped in molds were investigated. As a result, some changes were observed in the mechanical performance of the composite materials depending on the Aerosil additive ratio added to the thermoset polyester. Compared to pure polyester resin, the hardness and deformation rate of the composites containing Aerosil additives decreased, while the flexural strength values and flexural modulus values first increased and then decreased. The highest Flexural modulus was 3510 MPa and the highest flexural strength was 122 MPa in polyester composite with 1wt.% Aerosil additive. The highest hardness was obtained in pure polyester with a hardness of 45 Barcol. Viscosity increased with increasing Aerosil silica content. The microstructure of the samples used in the experiment was examined using scanning electron microscopy.

Keywords: Unsaturated polyester, Aerosil, mechanical properties, composite, thermoset

Introduction

Unsaturated polyester resin (UPR) is a versatile thermoset polymer widely used in various industries due to its excellent combination of properties and ease of processing. It is formed through a polycondensation reaction between a diol and a diacid or anhydride, resulting in a polymer with unsaturated reactive sites. UPR is a thermoset resin, meaning it undergoes irreversible curing when exposed to a catalyst or initiator, typically in combination with a reactive monomer such as styrene. Cured UPR exhibits very good mechanical properties, including high strength and stiffness, making it suitable for structural applications. In addition, UPR exhibits resistance to many different chemicals, making it suitable for applications where there is exposure to corrosive substances. In addition, UPR formulations can be designed to have low shrinkage during curing, contributing to the dimensional stability of moulded parts. Furthermore, polyester resin shows good adhesion to various substrates, allowing composite materials with strong bonds to be produced. Unsaturated polyester can be formulated to have good weather resistance, making it suitable for outdoor applications. Additives with different properties are added to polyesters to achieve different properties [1-21]. One of these is resin thickening additives.

Thickening additives are a type of fumed silica, a fine, white powder composed of microscopic amorphous silica particles. It is commonly used as a thickening or strengthening agent in a variety of materials, including adhesives, sealants, paints, coatings, and plastics. Chemically, it is actually a structure composed of amorphous silicon dioxide (SiO_2) and is produced by hydrolysis of silicon tetrachloride (SiCl_4) in a high-temperature flame. Aerosil particles are very fine, with a typical average particle size in the nano-meter range. The small particle size contributes to its effectiveness in a variety of applications. In addition, fumed silica materials such as Aerosil typically have a high surface area. The surface of Aerosil particles can be modified to improve its compatibility with different matrices or to achieve specific performance characteristics in the final product.

Aerosil additives are also a thickening agent. It can significantly increase the viscosity of liquids, making it useful in controlling the flow properties of formulations. It is also often used as a reinforcing filler in plastic, rubber and elastomer compounds, improving mechanical properties. In addition, it is also widely used as a reinforcing filler to improve the mechanical properties of unsaturated polyester resins. The addition of Aerosil to unsaturated polyester formulations has a positive effect on the properties of the composite material. In other words, adding Aerosil to unsaturated polyester can increase the strength of the composite. It also plays

an important role in increasing the flexural strength of unsaturated polyester composites and can contribute to increased impact and wear resistance.

Aerosil or fumed silica is commonly used as a thickening agent in unsaturated polyester resins. Adding Aerosil to unsaturated polyester resin can significantly affect the viscosity of the resin system. The primary role of Aerosil additive in unsaturated polyester resin is to increase viscosity. The fine particles of the Aerosil additive act as a thickening agent by forming a three-dimensional network within the resin. This network restricts the flow of the resin, resulting in higher viscosity. Aerosil also imparts thixotropic behaviour to the resin system. Thixotropy refers to the property of a material to become less viscous under shear stress and return to a higher viscosity when the stress is removed. This property is desirable in applications where controlled flow is required, such as vertical applications. By using Aerosil additives at different ratios in polyester resins, the consistency of the viscosity of the liquid resin is achieved at the desired values. There is a possibility that other fillers added to the polyester material may precipitate in the liquid resin at the end of mixing. In order to prevent this situation and to adjust the resin viscosity, a certain amount of thickener is added to the resin. A transmission electron microscope image of a typical thickener (Aerosil 200) is shown. In Figure 1a, the TEM image shows thickener particles and agglomerated silica. Figure 1b shows the effect of Aerosil additive added to different liquids on viscosity. In the figure, as the Aerosil ratio increases, the viscosity increase depending on the type of liquids. Figure 1c shows the effect of Aerosil additive added to different liquids on viscosity. In the figure, as the Aerosil ratio increases, the viscosities increase depending on the type of liquids.

When Aerosil thickener fumed silica is dispersed in a liquid, it interacts directly with the silanol groups on the surface or indirectly through the liquid molecules. This can be attributed to hydrogen cross-linking and a temporary three-dimensional network is formed. This structure becomes macroscopically "visible". If subjected to mechanical loads (in the form of intense stirring or shaking), the network breaks down again and the viscosity of the system is reduced. When static, the Aerosil particles interact, and the viscosity returns to its original value. This process is called thixotropy. There are few studies on fumed silica doped polyester composites with nanoparticle sizes in the literature [23-25].

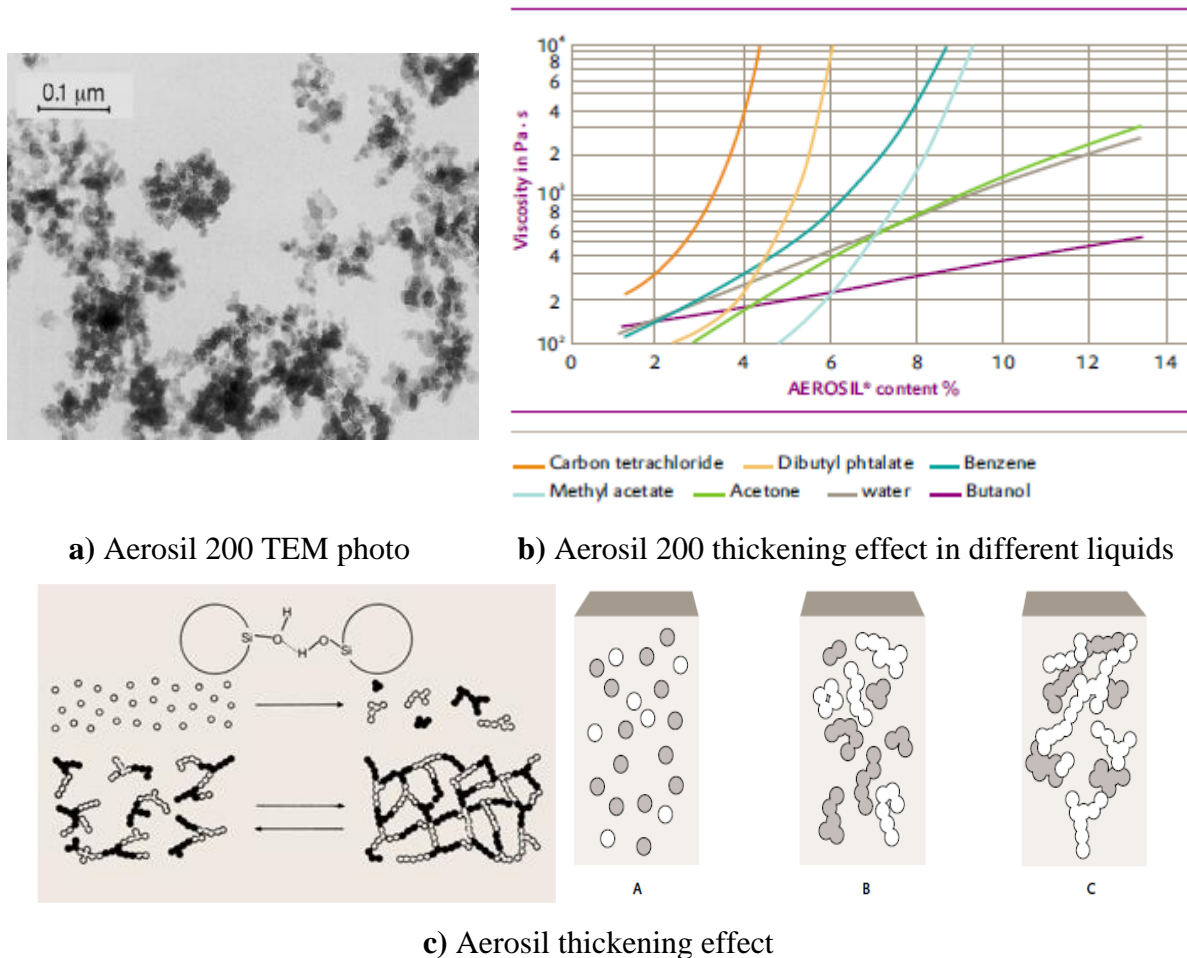


Figure 1. TEM photograph of Aerosil 200 thickener and thickening effect in different liquids [22]

In this experimental study, the effect of Aerosil additive on the mechanical properties of industrial materials manufactured with polyester matrix material was investigated and it was aimed to shed light on the properties of Aerosil doped composites in the literature. For this purpose, composites were produced by resin casting method by adding 1wt.%, 2wt.% and 3wt.% Aerosil by weight and their mechanical properties were investigated. Scanning electron microscopy was used to examine the fracture surfaces of the composites.

Experimental

Materials And Methods

Materials

Unsaturated polyester resin is a liquid that solidifies when hardener is added. This resin is a thermoset based resin formulated to cure at room temperature conditions. The unsaturated polyester resin used in the study was obtained from Boytek/ Istanbul. In order to harden and

cure the thermoset resin, hardener is added in certain proportions. The hardener used in this study is Methyl Ethyl Ketone Peroxide (MEKP). Aerosil additive is a colloidal silica with a density of 2.2 g/cm^3 , high purity (99.8% SiO_2 content) colloidal white powder, surface coated with silane. This product is a thickening fumed silica produced by Wacker with a BET surface area of $200 \text{ m}^2/\text{g}$. It was obtained from Plasto Company in Gebze/Istanbul. The polyester resin (Figure 2a), thickener Aerosil powder (Figure 2b) and particles (Figure 2c) used in the experiments are given in Figure 2 below.

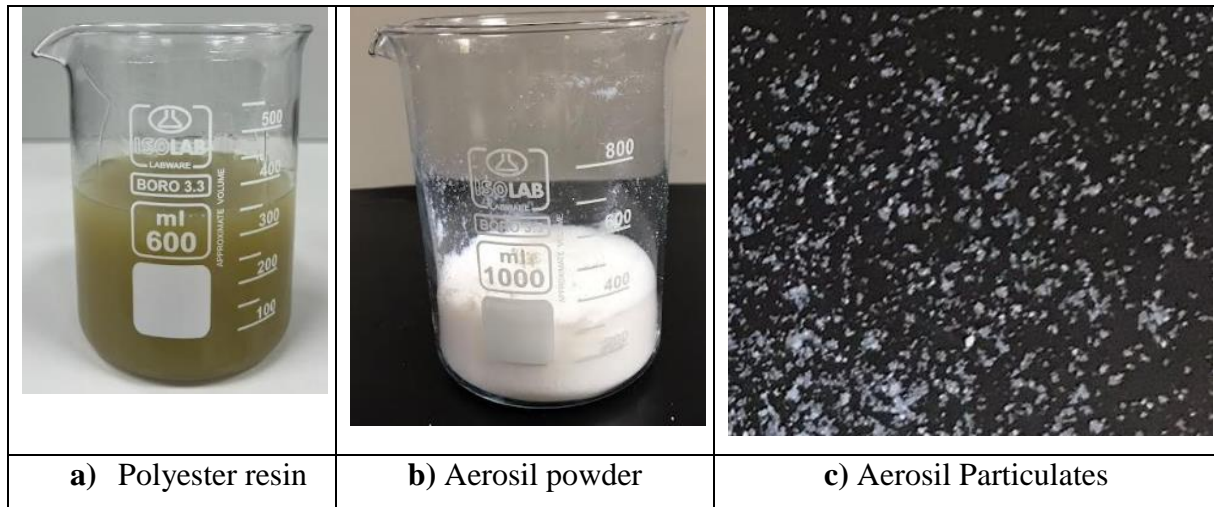


Figure 2. Visuals of the materials used in the experiments.

Preparation Of UP Based Composites

In the production of the specimens using the resin casting technique, pure polyester resin was first poured into moulds. The inorganic additives added to the liquid resin in the production of polyester-based Aerosil-added composite test specimens precipitate in the liquid resin due to the density difference. This is undesirable and a homogeneous distribution in the main polymer matrix is desired. For this reason, the fluidity of the liquid polyester resin needs to be adjusted. In order to achieve the desired viscosity, Aerosil was added to the resin at different ratios (1-3% by weight) and mixed in a mechanical mixer for 30 minutes. After mixing, each resin was immediately poured into moulds made of silicone rubber. The test specimens were kept at room temperature for at least 24 hours to produce polyester composites. The flexure and hardness test specimens were then placed in an oven at 70°C for 1 hour for complete curing. The test specimens were then conditioned in a room temperature of 23°C and 50% humidity for 3 days. The prescription of Aerosil fumed silica composite materials used in the experiments is given in Table 1 below. In the present study, the unsaturated thermoset polymer composites filled with fumed silica at different ratios by weight were first examined by scanning electron

microscope microstructure and EDS analysis was also performed. In the experimental study, the flexural and hardness properties of the composites produced in the following formulations were investigated.

Table 1. Composition of composite materials used in the experiments.

Test No	Material Compositions	Abbreviation
1	Pure unsaturated polyester resin	UP
2	1wt.% aerosil filled unsaturated polyester resin composite	UP/1%A
3	2wt.% aerosil filled unsaturated polyester resin composite	UP/2%A
4	3wt.% aerosil filled unsaturated polyester resin composite	UP/3%A

Mechanical Tests

Viscosity

Viscosity measurements of UP composites containing pure unsaturated polyester and different ratios (1-3wt.%) of thickener Aerosil were carried out in a Brookfield brand DV2T model rotary viscometer. Depending on the ambient conditions, the resin was brought to 25 ± 0.5 °C using the oven and refrigerator and mixed in a container for 30 seconds at a speed of 50 rpm and the viscosity value was determined.

Measurement

Hardness Test

Hardness measurements of UP-based composites containing Aerosil were performed in terms of Barcol hardness measurement. Hardness measurements were made in accordance with ASTM D2583 (TS EN 59) standards. Hardness measurements were taken from at least ten different points on the samples and the Barcol hardness of the sample was determined by averaging the hardness values taken from ten points.

Flexural Test

Three-point bending tests of UP/Aerosil doped composites were performed on a Zwick Roell Z250 tensile testing machine. Bending tests were performed by replacing the heads in the upper and lower jaws of the tensile testing machine with heads suitable for bending. Flexure test specimens were prepared in accordance with ISO 14125 (ISO178) standards. The schematic picture of the flexure test machine is given in Figure 3. Bending tests were performed at a test speed of 5mm/min. At least five test specimens were subjected to bending tests and the data obtained were recorded in the computer environment. Then the arithmetic means of the data obtained was taken.

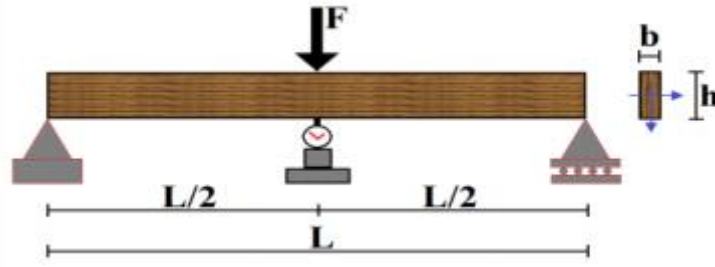


Figure 3. Schematic test setup for three-point bending test (ISO14125)

The flexural strength of composite materials with Aerosil thickener additives was calculated by the formula below.

$$\sigma = \frac{3PL}{2bh^2}$$

In the above mentioned equation:

σ is the flexural strength (MPa), P is the applied load (N), L is the distance between supports (mm), b is the width (mm) and h is the thickness (mm).

In addition, the deformation rate during the flexural test was calculated by the following formula.

$$\varepsilon = \frac{6Dh}{L^2}$$

Where ε is the strain in bending (deformation rate), D is the maximum bending of the centre of the specimen (mm), h is the specimen thickness (mm) and L is the span between the two supports.

SEM Microstructural Investigations

JEOL JSM-6060LV scanning electron microscope (SEM) was used to examine the fracture surface of the composite test specimens after the bending test. It was performed under a voltage of 15KV. In order to get good images from the fracture surface of the test specimens, each test specimen was sputter coated with gold in a gold plating device prior to SEM examinations. At the same time as the SEM images were taken, EDS analysis was performed to characterize the specimens.

Results And Discussion

The data obtained from the viscosity measurements of UP composites containing pure unsaturated polyester resin and Aerosil thickener at different ratios (1-3wt.%) using a

Brookfield/DV2T brand and model rotary viscometer are given in Table 2. As the rate of Aerosil thickener added to the matrix increased, the stirrer shaft speed was also reduced as the resin condensed or its fluidity decreased. As can be seen in Table 2, while the viscosity of unsaturated polyester base matrix was 1134 mPa.s, the viscosities of the composite resins were 1734, 2797 and 6860 mPa.s when the Aerosil thickener ratio added to the base matrix was increased by 1wt.%, 2wt.% and 3wt.%, respectively. When the increases in viscosity were compared with pure polyester viscosity, increases of 52.9%, 146.6% and 504.9% were observed for UP/1wt.% resin, UP/2wt.% resin and UP/3wt.% composite resin.

Table 2. Viscosity values of composite materials used in the experiments.

Test No	Material Compositions	Rpm	Viscosity, mPa.s	Rising in Viscosity (%)
1	UP resin	50	1134	-
2	UP/1% A composite resin	50	1734	52.9
3	UP/2% A composite resin	30	2797	146.6
4	UP/3% A composite resin	10	6860	504.9

Scanning electron microscope image and EDS analysis of UP composite containing 2wt.% aerosil are given in Figure 4. Figure 4a shows the broken surface SEM image of the sample. EDS analysis was taken from certain points on the figure. The EDS analysis of the polyester composite containing Aerosil is given in Figure 4a and the EDS analysis taken over the SEM image is given on the right side of the image. EDS analysis was performed at points 1, 2 and 3 on the surface. At points 1 and 2, EDS analysis was performed, and it was determined that the carbon (C) peak was effective. In other words, it is understood from this result that the main matrix is pure unsaturated polyester polymer. In Figure 4d, the Aerosil additive added to the polyester polymer is nanoparticle sized fumed silica and since it is inorganic, it is determined that Silicon is effective in EDS analysis.

The stress-strain relationship between unsaturated polyester and composites with different percentages of Aerosil additives are given in Figure 5a-d. Figure 4a shows the stress-strain curves of pure unsaturated polyester, Figure 5b shows UP composite with 1% Aerosil, Figure 5c shows UP composite with 2wt% Aerosil, Figure 5c displays UP composite with 3wt.% Aerosil. At least five specimens were tested in the experiments. In the graphs drawn, the arithmetic means of the data obtained was used.

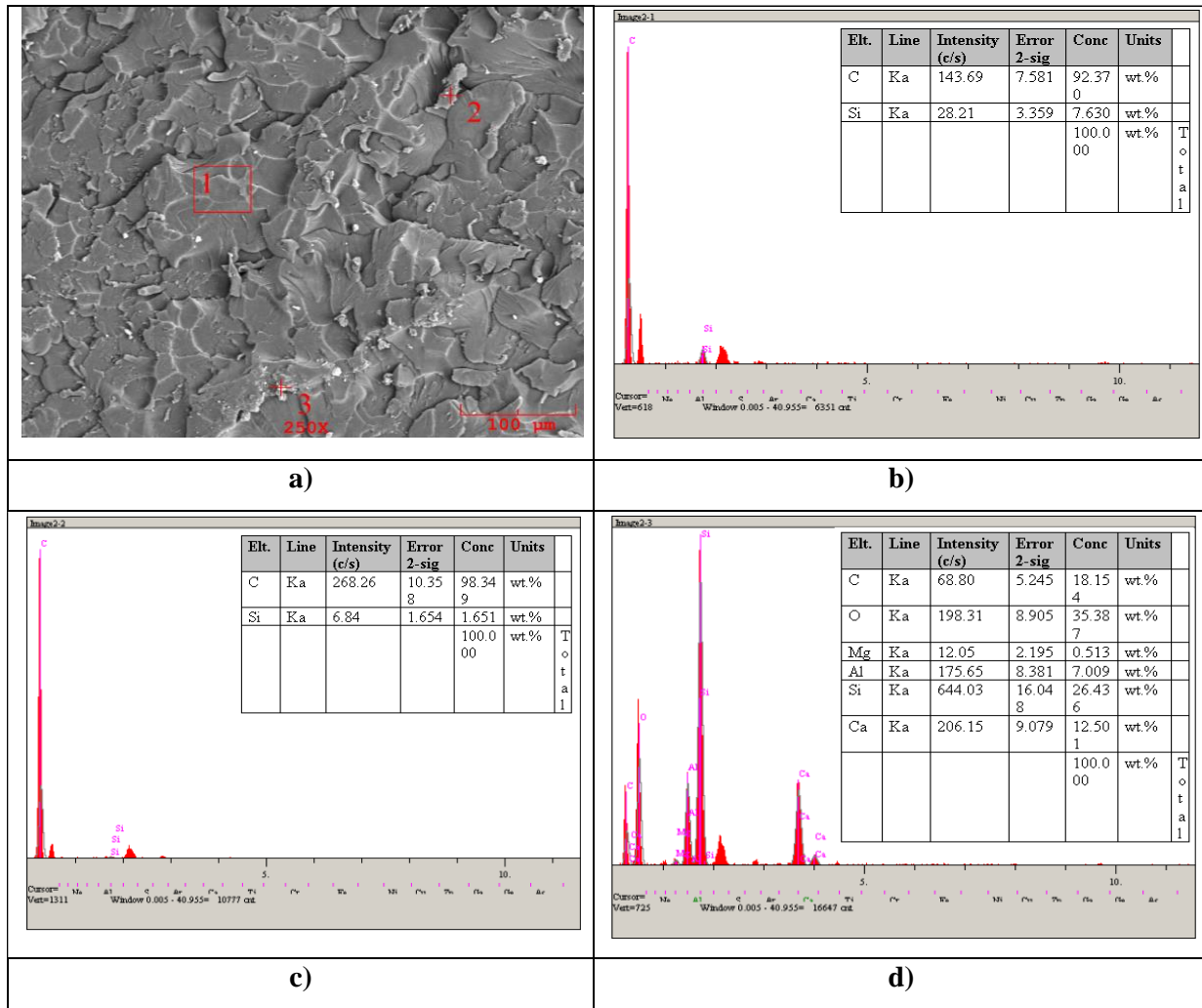


Figure 4. Scanning electron microscope image and EDS analysis of UP composite containing 2wt.% aerosil

Figure 6 shows the variation of flexural strength of unsaturated polyester composites containing 1, 2 and 3 wt% Aerosil additives. The flexural strength of the pure polyester was determined as 105 MPa. The highest flexural strength (122 MPa) was obtained in the composite containing 1% Aerosil, which is clearly seen in the figure. Compared to the flexural strength of pure polyester the flexural strength of the composite with 1wt.% Aerosil increased by 16.1%. As the Aerosil additive rate increased (2 and 3 wt.%), the flexural strengths of the composites were 116 and 92 MPa, respectively. In other words, the flexural strength values increased less than pure polyester. An increase in flexural strength of 10.4% was observed in Polyester composite with 2wt.% Aerosil additive. At 3wt.% Aerosil additive content, a decrease in the flexural strength of the composite was detected and decreased by approximately 12.3%. Sequeira et al [21] observed an increase in flexural strength of glass fibre reinforced and fumed silica filled (1% and 2% FS) polyester composite. An increase of 45% and 59% in flexural strength was

obtained by increasing the fumed silica content from 1% to 2%. These results are consistent with this study. However, Majeed et al [26] in their study with fumed silica observed that the flexural strength of UP/FS composites decreased with increasing fumed silica (from 1% to 2%).

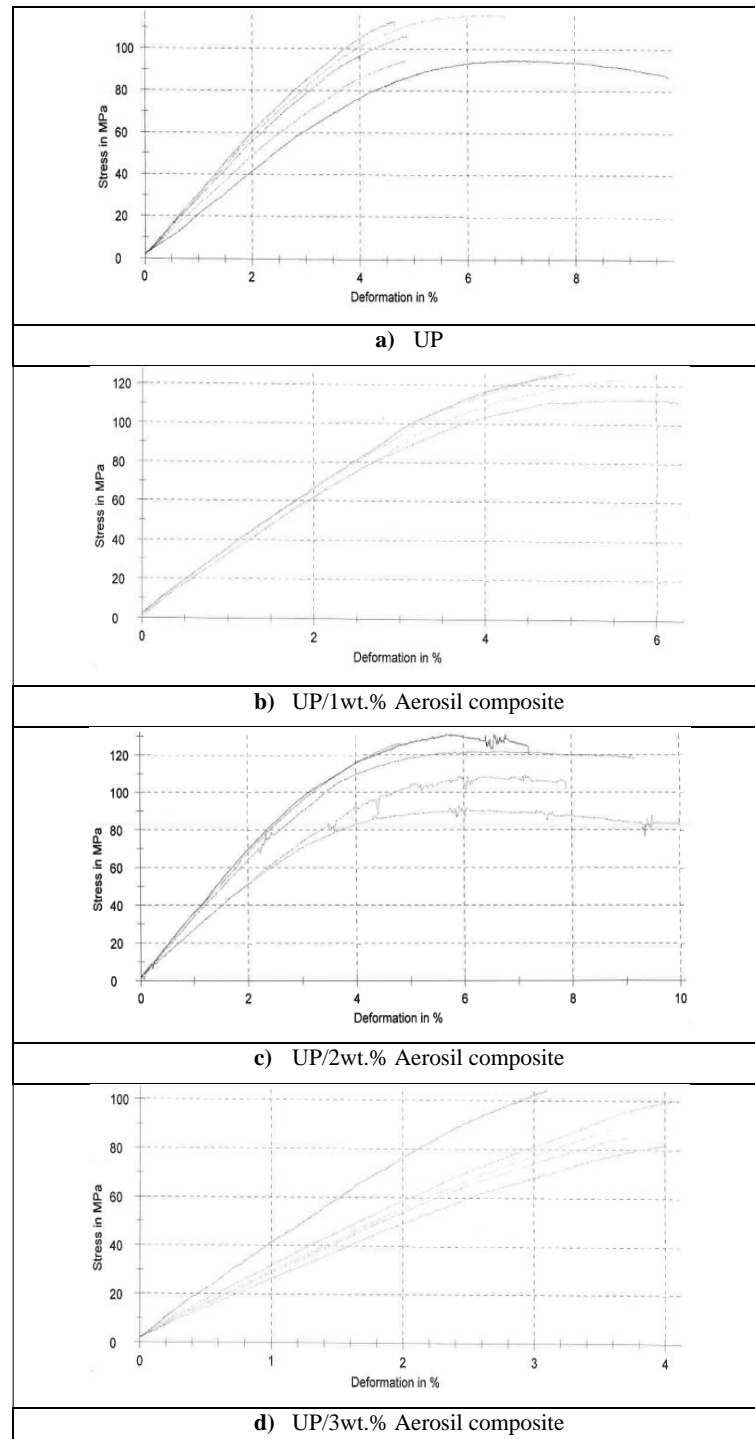


Figure 5. Stress and strain relationship in bending of unsaturated polyester composites filled with Aerosil at different ratios.

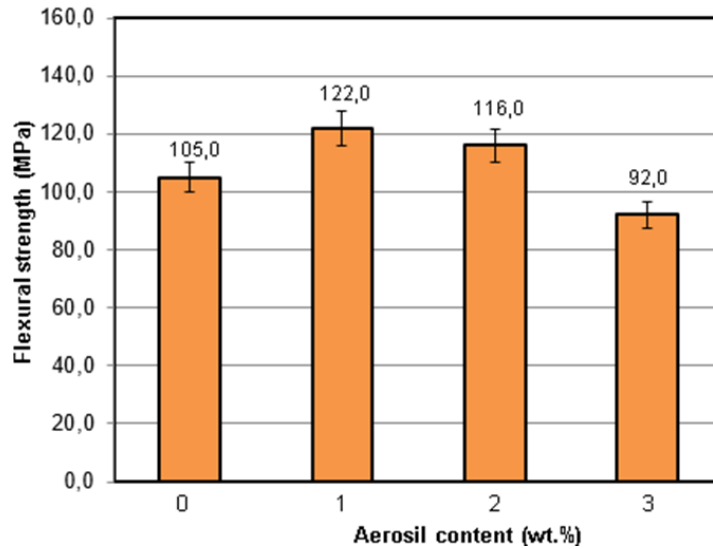


Figure 6. Effect of Aerosil thickener on flexural strength of unsaturated polyester resin

The variation of the flexural modulus of depending on the composition of unsaturated polyester composites containing Aerosil additives at different ratios (1, 2 and 3 wt%) is given in Figure 7. The flexural modulus of the pure polyester was determined as 2330MPa. The graph showing the flexural modulus is like the graph showing the flexural strength. In other words, as seen in the figure, 1wt.% Aerosil additive increased the flexural modulus of the composite and even reached the highest value (3510 MPa). Compared to the flexural modulus of pure Polyester, the flexural modulus of the composite with 1wt.% Aerosil additive increased by 50.6%. The flexural moduli of the composites were found to be 3340 and 2970 MPa as the Aerosil additives increased (2 and 3 wt%). When the flexural modulus was compared with the flexural modulus of pure polyester, the flexural modulus of UP composites containing 2wt.% and 3wt.% Aerosil increased by approximately 43.3% and 27.4%, respectively.

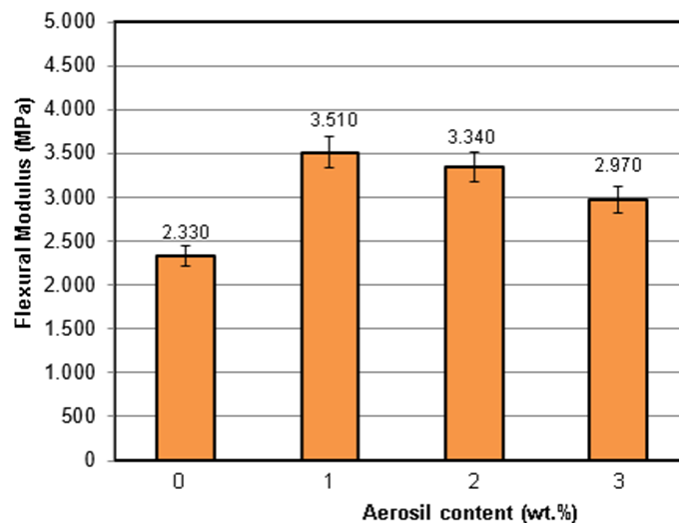


Figure 7. Effect of Aerosil thickener on the Flexural modulus of unsaturated polyester resin

When the results obtained are examined, Aerosil thickener added to the unsaturated polyester resin was an important factor in increasing the flexural modulus of the composites. Sequeira et al [21] investigated the mechanical properties of fumed silica filled (1% and 2% FS) composites with glass fibre reinforcement to polyester resin. In their study, they found that the flexural strength and flexural modulus of the composites increased. The reason was explained by the large surface area of fumed silica (particle size of approximately 12 nm), which allowed it to bond well with the matrix and increased the load carrying ability of the composite.

Figure 8 shows the variation of the deformation rate in bending of unsaturated polyester composites with 1,2 and 3 wt% Aerosil thickener additions according to the Aerosil additive ratio. When the figure is examined, the deformation rate of unsaturated polyester resin in bending is observed as 5.5%, while the deformation rates of composites containing 1,2 and 3wt.% Aerosil are observed as 5.4%, 6% and 3.7%, respectively.

The variation of hardness values of unsaturated polyester composites with 1, 2 and 3 wt.% aerosil thickener additions according to Aerosil additive ratio is given in Figure 9. In the figure, the hardness value of pure unsaturated polyester resin is 27.4 Barcol. However, it is seen that the hardness of the composites decreases with Aerosil additive added to the polyester matrix compared to pure polyester. Compared to the hardness of the pure polyester matrix, the hardness of the composites with 1, 2 and 3wt.% Aerosil thickener added decreased by 28.8%, 20.8% and 18.6%, respectively. However, while the hardness of the composite with 1wt.% Aerosil additive was 19.5 Barcol, when 1wt.% and 2wt.% Aerosil was added, hardness values increased by 11.2% and 14.3% compared to UP-1wt.%A composite hardness. Majeed et al[26] determined the Shore D hardness of unsaturated polyester as approximately 65 in their study with fumed silica, while the hardness values were determined as approximately 85, 85 and 75 with the addition of 1wt.%FS, 2wt.%FS and 3wt.%FS.

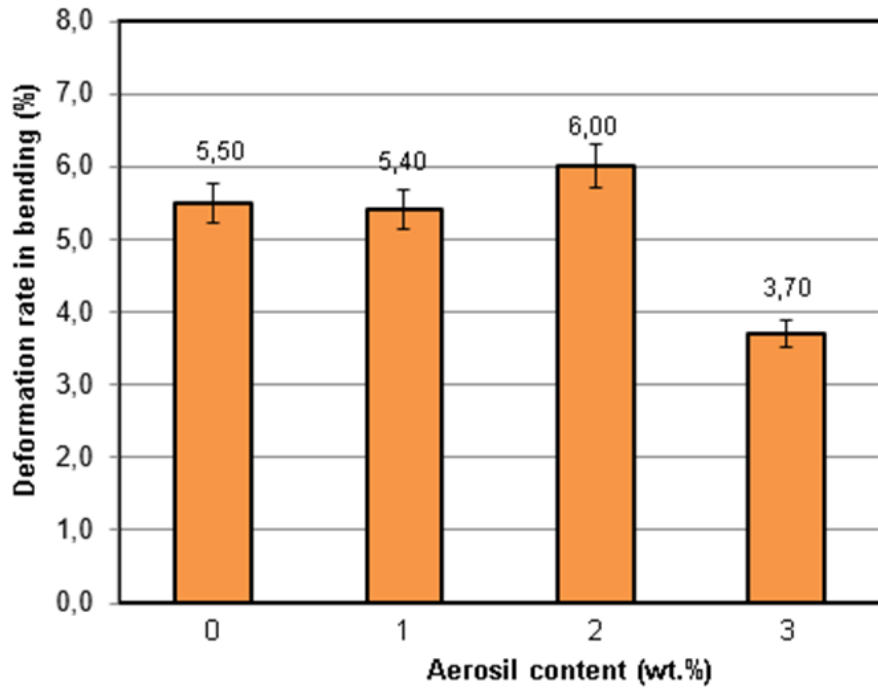


Figure 8. Effect of Aerosil thickener on the deformation rate of unsaturated polyester resin in bending

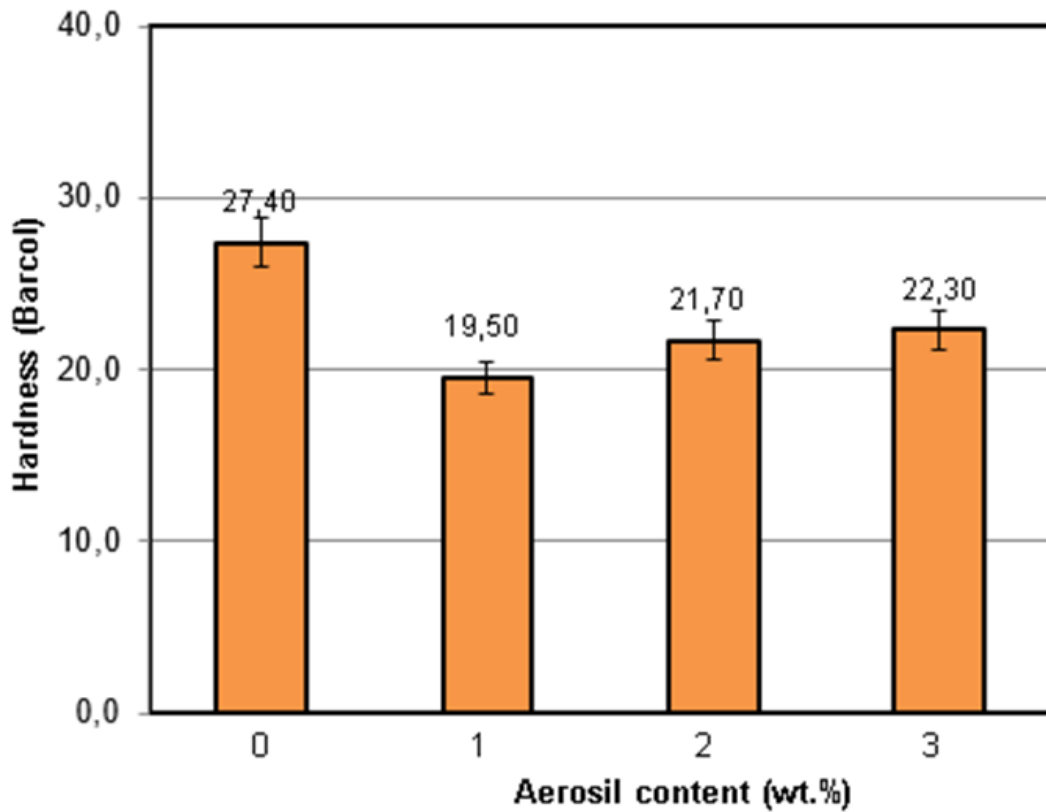


Figure 9. Effect of Aerosil thickener on the hardness of unsaturated polyester composites

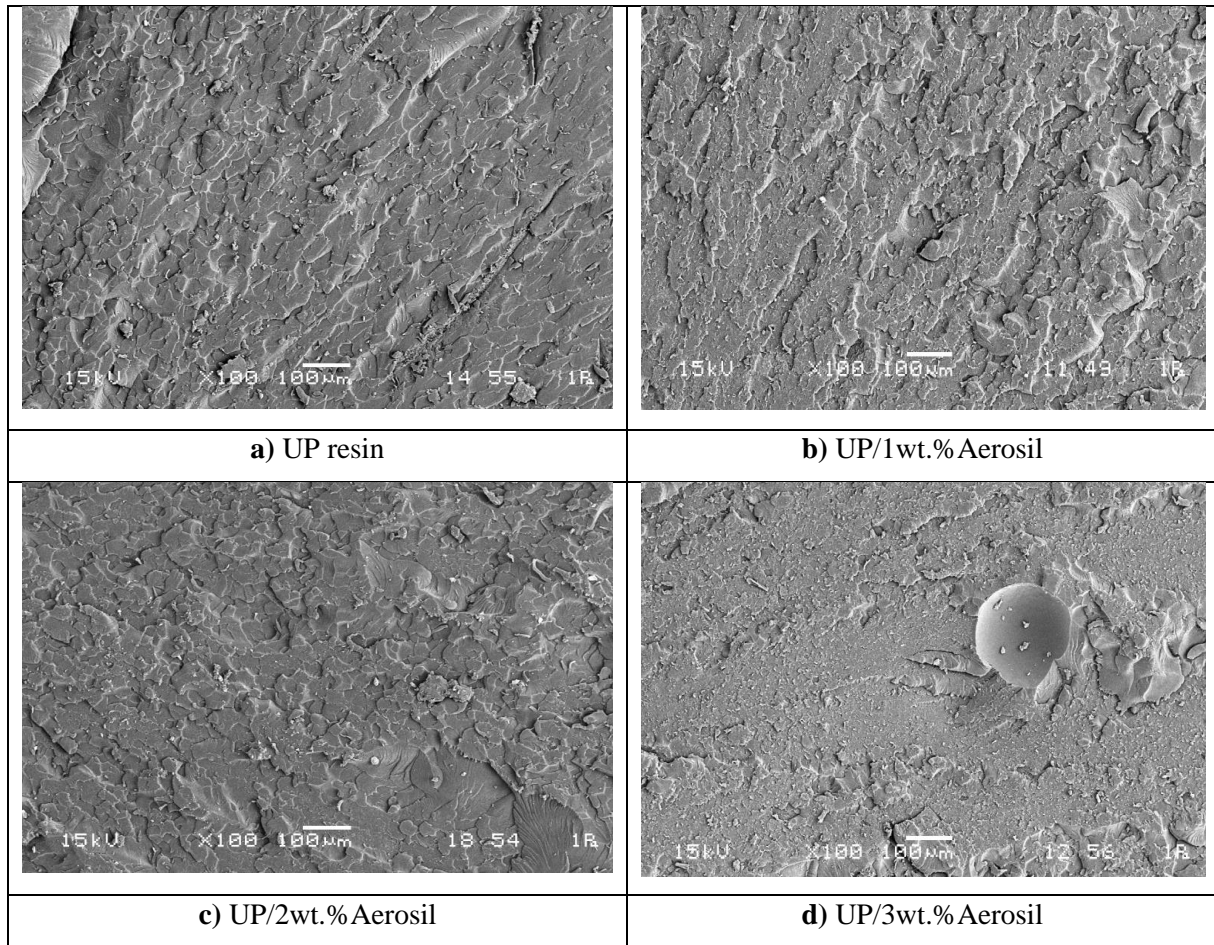


Figure 10. Scanning electron microscope image of the fracture surface of unsaturated Polyester composites filled with Aerosil at different ratios after bending test.

Figure 10 shows the fracture surface scanning electron microscope images of polyester composites filled with different ratios of Aerosil thickener. Figure 10a shows the fracture surface images of pure polyester, Figure 10b shows 1wt.% Aerosil composite, Figure 10c shows 2wt.% Aerosil composite and Figure 10d shows 3wt.% Aerosil filled composite. While almost similar deformed structure is observed in the images given in Figure 10a,b,c, in the microstructure image given in Figure 10d, it is observed that there are both pores in the matrix and embrittlement, that is, a smoother surface is formed.

Conclusions

The following conclusions were drawn from the study investigating the mechanical properties of UP/Aerosil composites.

1. The highest flexural strength (122 MPa) was obtained in UP/1wt.%erosil composite. Compared to the flexural strength of pure polyester, a 16.1% increase in flexural strength was observed.
2. UP/1wt.%Aerosil composite, the highest flexural modulus (3510 MPa) was obtained. Compared to the flexural modulus of pure Polyester, the flexural modulus of the composite with 1wt.% Aerosil additive increased by 50.6%.
3. The deformation rate of UP/1wt.%A and UP/2wt.%A composites with pure polyester varied between 5.4% and 6%, while the deformation rate of UP/3wt.%A composite was determined as 3.7%.
4. An increase in hardness values was observed when the Aerosil thickener additive ratio was increased by 1wt.%, 2wt.% and 3wt.%. Hardness values were determined as 19.5, 21.7 and 22.3 Barcol, respectively, depending on the increase in the additive ratio. However, the hardness values obtained with Aerosil additive are lower than the that of pure polyester (27.4 Barcol).
5. Aerosil additives of 1wt.%, 2wt.% and 3wt.% added to the main matrix decreased the fluidity of the resin and caused a significant increase in viscosity.
6. Scanning electron microscope examinations revealed both a smooth surface and pores in the matrix indicating brittleness in the UP/3wt.% Aerosil composite.

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**EFFECT OF MACRO PARTICLE SIZE BASALT AND SILICA POWDER
ADDITIVES ON MECHANICAL PROPERTIES OF UNSATURATED POLYESTER
COMPOSITES**

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Abstract

Thermoset-based composites are encountered in many stages of daily life and in industry. Among these, polyester and epoxy polymers show themselves in many areas from the aircraft and space industry to the construction industry, energy and maritime applications. However, composites are produced by adding some reinforcements and fillers to improve their weak properties. The additives added to the matrix structure in composites have a significant effect on the properties of the composite material. In this experimental study, the effect of basalt powder and silica fillers added to the unsaturated polyester (UP) resin as filling material on the mechanical properties of the composite was investigated. Basalt powder with a particle size of 250 μm and silica filler with an average particle size of 250 μm were added to the unsaturated polyester base matrix at 20 and 30 wt%. Basalt and silica added composites were produced by resin casting method. The mechanical properties of basalt and silica filled composite materials such as flexural strength, flexural modulus, deformation rate in bending and hardness were investigated. As a result, an increase was observed in the flexural modulus and hardness values of the composites depending on the basalt and silica filler content, while a decrease was observed in the flexural strength and deformation rates in bending. When the basalt filler was compared with the mechanical properties, higher flexural strength, flexural modulus and hardness values were obtained with silica filler. Lower values were obtained in the deformation rate in bending. Fractured surface microstructure investigations of silica and basalt filled UP composites were carried out using scanning electron microscopy.

Keywords: unsaturated polyester, basalt, thermoset, silica, composite, mechanical propertie

Introduction

Polymer materials are one of the indispensable materials of daily life with their lightness, ease of production, resistance to chemicals, colourability, transparency, and price/performance features. However, they also have disadvantages such as low mechanical properties, low thermal resistance, and low mould shrinkage. To improve these disadvantages, various additives are added to polymer matrix materials. These are sometimes fibres (such as glass fibre, carbon fibre, aramid fibre, etc.) and sometimes mineral additives (glass bead, talc, kaolin, CaCO_3 , silica, basalt, mica, etc.). Composite materials are produced by adding reinforcements, additives, and fillers to the main matrix at different ratios. Composites are the modern engineering materials of recent years. Compared to polymer, metal, and ceramic materials, they stand out in the industry with their low density, good mechanical properties, light weight, high wear resistance and resistance to chemicals. Composites consist of at least two components. One of them is the matrix and the other is the reinforcement, additive or fillers. The size, shape, distribution, and properties of additives affect the properties of composites [1,2].

Basalt is an environmentally friendly material and is non-toxic to living things [3-7]. Basalt has almost no heat conduction and is resistant to acidic, alkaline, and salty environments. The physical and chemical stability of basalt powder (BS) against the biological environment does not adversely affect the environment and does not harm live things [8]. In general, the hardness and high temperature (900°C) resistance of basalt probably comes from the silica in its structure. In addition, it has sound resistance and sufficient toughness. While there are many studies on silica filled polymers, there are also many studies on basalt fibre [9-17], but there are few studies on basalt powder fibre [18-21]. This experimental study was carried out to shed more light on the literature and to investigate the effect of basalt powder and silica filling on the mechanical properties of the composite produced when added to the polyester matrix.

In this experimental study, the mechanical properties of polyester composites with 20% and 30% basalt powder and the same proportions of silica additives were investigated. Bending strength, flexural modulus, stiffness, and deformation rate properties were investigated.

Experimental

Materials

In the study, basalt powder and silica were used as additives while unsaturated polyester (UP) thermosetting resin was used as the main matrix material. The matrix material is terephthalic based unsaturated polyester resin which is widely used in the pipe industry. The unsaturated

polyester resin used in the experiments is in liquid form and was purchased from Boytek/Istanbul,Türkiye. The silica used as additive material has an average particle size of 250 µm and was purchased from Kumsan Company from Istanbul. The sieve analysis of the silica additive was performed, and the results of the sieve analysis are given in Table 1 below.

Basalt powder used as a different additive material has an average particle size of 250µm. Sieve analysis of the basalt powder additive was also performed, and the results of the sieve analysis are given in Table 2 below. Basalt powder was obtained from Aydınlar Mining/Bursa/Turkey. Methyl Ethyl Ketone Peroxide (MEK-P) crosslinked agent was added to the resin at the rate of 2% to produce thermoset based composite. In addition, 1% cobalt octoate was added to accelerate crosslinking.

Table 1. Silica particle size analysis used in the experiments.

Mesh no	Particle size (µm)	Sand (%)
1(1000)	>=1000	0
2 (710)	1000-710	0.903
3 (500)	710-500	15.946
4 (355)	500-355	29.986
5 (250)	355-250	39.714
6 (180)	250-180	11.433
7 (125)	180-125	1.705
8 (90)	125-90	0.301
9 (63)	90-63	0.011
Pan	20-0	0.000

Table 2. Particle size analysis of basalt used in the experiments.

Mesh no	Particle size (µm)	Sand (%)
1(1000)	>=1000	0
2 (710)	1000-710	0
3 (500)	710-500	15.44
4 (355)	500-355	31.34
5 (250)	355-250	28.26
6 (180)	250-180	14.77
7 (125)	180-125	6.62
8 (90)	125-90	2.13
9 (63)	90-63	0.80
Pan	20-0	0.000

Preparation of UP based composites

UP based thermosetting polymer composites with different proportions (20wt% and 30wt.%) of basalt and silica powder additives were produced using silicone mould casting technique. For this purpose, first a thickener was added to the polyester resin and then basalt powder and silica additives were added at 20% and 30% by weight. Table 3 shows the recipe of the materials used in the experiments. The viscosity of liquid polyester resin in its pure form is around 400 mPa.s. To use it in composite production, the viscosity of the liquid polyester resin needs to be adjusted. For this purpose, a 2wt.% thickening additive was added to the resin and mixed in a mechanical mixer.

The viscosity of the liquid polyester resin with added thickener reached around 900 mPa.s. Basalt powder and SiO₂ were added to the prepared resin at different ratios and mixed in a mechanical mixer rotating at 650 rpm for 60 minutes. Methyl-ethyl ketone-peroxide (MEK-P) was added to the resin for crosslink formation and mixed for 30 seconds. The prepared mixture (with the addition of silica and basalt powder) was immediately cast into silicone moulds to prevent the polyester resin from settling. Flexure and hardness test specimens were produced by casting into moulds prepared in accordance with ISO standard. The cast specimens were kept at room temperature for about 8-10 hours. The composite production stages in the experiments are schematically shown in Figure 1. The test specimens were kept in an oven at 80 °C for 5 hours to complete crosslinking. Before the tests, the test samples were conditioned in a climate-controlled environment for 3 days.

Table 3. Composite materials used in the experiments and their abbreviations.

Test No	Materials	Abbreviation
1	Unfilled unsaturated polyester	UP
2	20wt.% basalt powder filled polyester composite	20BP/UP
3	30wt.% basalt powder filled polyester composite	30BP/UP
4	20wt.% silica filled polyester composite	20Si/UP
5	30wt.% silica filled polyester composite	30Si/UP

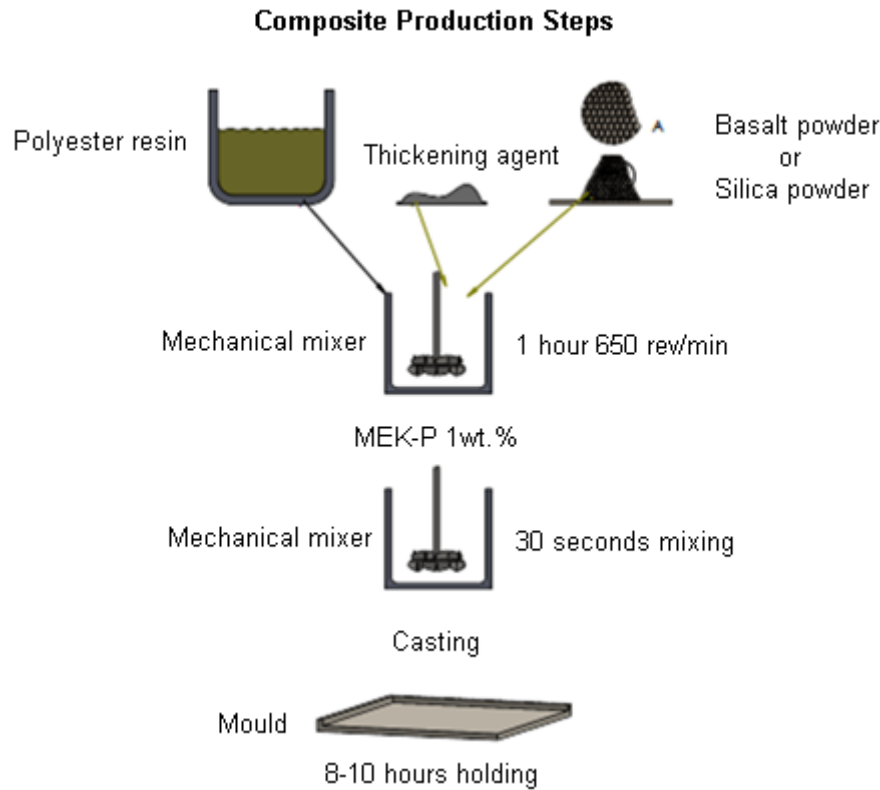


Figure 1. Schematic production steps of BP/UP and Si/UP composites

Mechanical Tests

Flexural Tests

Test specimens for flexural tests were made in accordance with ISO 14125 (ISO178) standards. Flexural tests of silicon dioxide doped unsaturated polyester composites were carried out on a Zwick Roell brand Z250 model universal tensile testing machine. A schematic view of the flexure test rig is given in Figure 2. Bending tests were carried out under ambient conditions at a bending speed of 5 mm/min. At least five test specimens were tested in flexural tests. The data obtained because of the test were recorded in computer environment. The data used in the experiments are the arithmetic mean of the data obtained in the bending test of five test specimens. Standard deviations were also determined. The figures in the experimental results section of the study are drawn according to the average values obtained on the device. The flexural strength of the composite materials produced was calculated using the formula below. All distances in the formula are taken in mm.

$$\sigma = \frac{3PL}{2bh^2}$$

In the equation given above, P is the load applied to the test specimen (N), L is the distance between two supports (span), b is the specimen width and h is the specimen thickness.

In addition, the deformation rate of composite materials during bending test was calculated using the following formula.

$$\varepsilon = \frac{6Dh}{L^2}$$

In the above equation, all distances are given in mm. In the equation, ε is the deformation rate or strain rate (%) in bending, D is the maximum amount of bending of the centre of the test specimen, h is the thickness of the test specimen and L is the span or distance between the two supports.

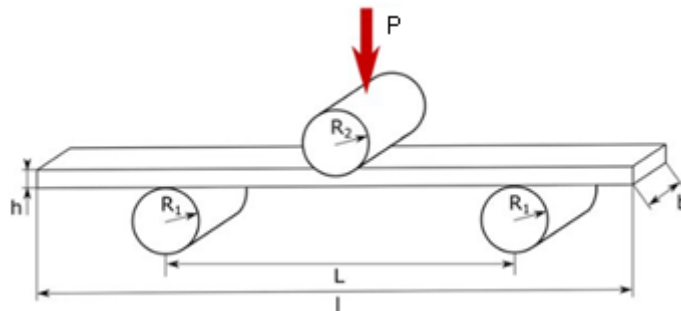


Figure 2. Schematic test rig for three-point bending test (ISO14125)

Flexural tests were carried out in a climate-controlled test environment under room temperature of 23 °C and 50% humidity conditions.

Hardness Test

Hardness test was performed in accordance with ASTM D2583 standards. Hardness measurements were measured in terms of Barcol hardness. Hardness measurements were made from at least ten different points of the test specimens and Barcol hardness was measured by taking the arithmetic mean of these values.

SEM Microstructural Investigations

The fracture surface microstructure examinations of the specimens taken after the test specimens were broken because of the bending test were carried out using a JEOL scanning electron microscope (SEM). The fractured surfaces were saw cut to the appropriate dimensions for SEM and then coated with gold by spraying method in a thin layer in the coating device.

After coating, microstructure examinations were carried out in the SEM device at an accelerating voltage of 10KV.

Results And Discussion

Figure 3 shows the variation of flexural strength of unsaturated polyester composites filled with different ratios of basalt powder and silica as a function of silica and basalt powder filler ratio. As can be seen in the figure, very little change was observed in the flexural strength of composites with 20wt.% and 30wt.% silica additives. In other words, compared to the flexural strength of pure polyester, the flexural strength of 20wt.% and 30wt.% silica filled polyester composites decreased slightly by 2.2% and 0.1%. However, the flexural strength of polyester composites filled with 20wt% and 30wt.% basalt powder decreased by 16.9% and 18.9%.

Flexural modulus of unsaturated polyester composites filled with 20wt% and 30wt.% basalt powder and silica is given in Figure 4. As can be clearly seen in the figure, the modulus of elasticity values of the composites produced increased significantly due to the increase in both basalt powder and silica additive ratio. The highest increase in flexural modulus was observed in SiO₂ filled composite material. Compared to pure polyester, the increase in flexural modulus was 65.8% and 155.9% for composites filled with 20wt% and 30wt.% SiO₂, respectively. Flexural moduli increment of basalt powder filled composite material was lower than SiO₂ filled composite material. Compared to the flexural modulus of pure polyester, the increase in flexural modulus was determined as 40% and 61.8% for composites with 20wt.% and 30wt.% basalt powder additives, respectively. In other words, when the flexural modulus changing of basalt powder filled composites and SiO₂ filled composites were compared, the flexural modulus values of the composites containing basalt powder were lower. This decrease was 15.5% and 36.9% for 20% and 30% filling rates, respectively.

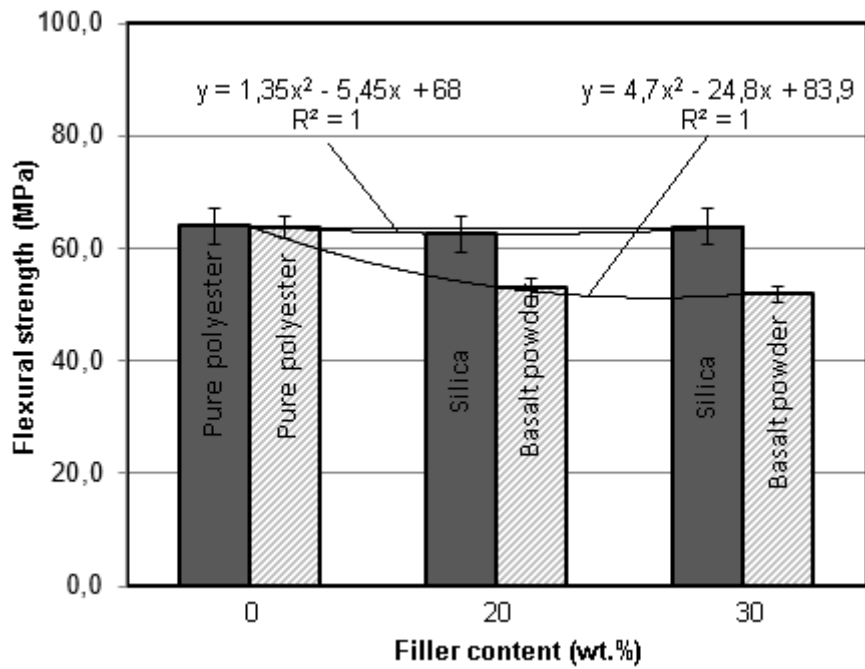


Figure 3. Variation of flexural strength of unsaturated Polyester composites containing different proportions of silica and basalt powder

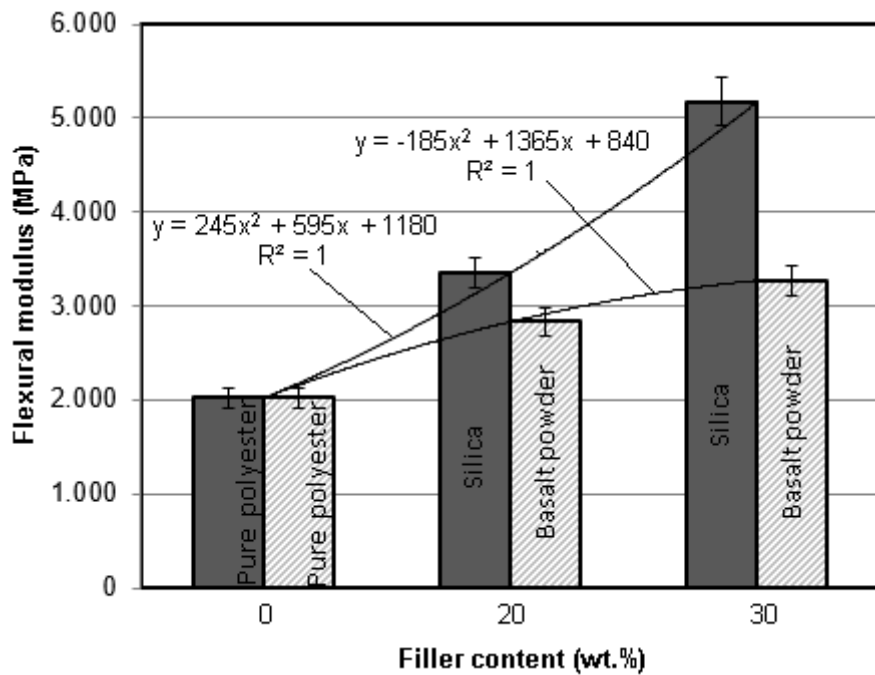


Figure 4. Variation of flexural modulus of unsaturated polyester composites filled with different proportions of silica and basalt powder.

Figure 5 shows the variation of the deformation ratio of unsaturated polyester composites filled with silica and basalt powder at different ratios with respect to silica and basalt powder filler ratio compared to pure polyester. As can be seen in the figure, the change in the deformation

ratio in the silica filled composite decreased with increasing SiO₂ filling ratio. This decrease was 37.9% and 55.1% for 20% and 30% SiO₂ filler, respectively. The change in deformation rate in basalt powder doped composites first decreased and then increased depending on the basalt powder filler rate. Compared to pure polyester, the decrease in deformation rate for 20wt.% basalt powder filled composite was 27.5% while the decrease in deformation rate for 30wt.% basalt powder filled composite was 13.8%. The maximum reduction in deformation rate was obtained in the SiO₂ doped composite. Compared to the basalt powder filled composite, the change in deformation rate for composites with 20wt.% and 30wt.% SiO₂ filler was 14.2% and 48% respectively. The composite materials become brittle as the SiO₂ and basalt powder added to the polyester resin increases. UP/SiO₂ composite was more rigid than UP/BP composite.

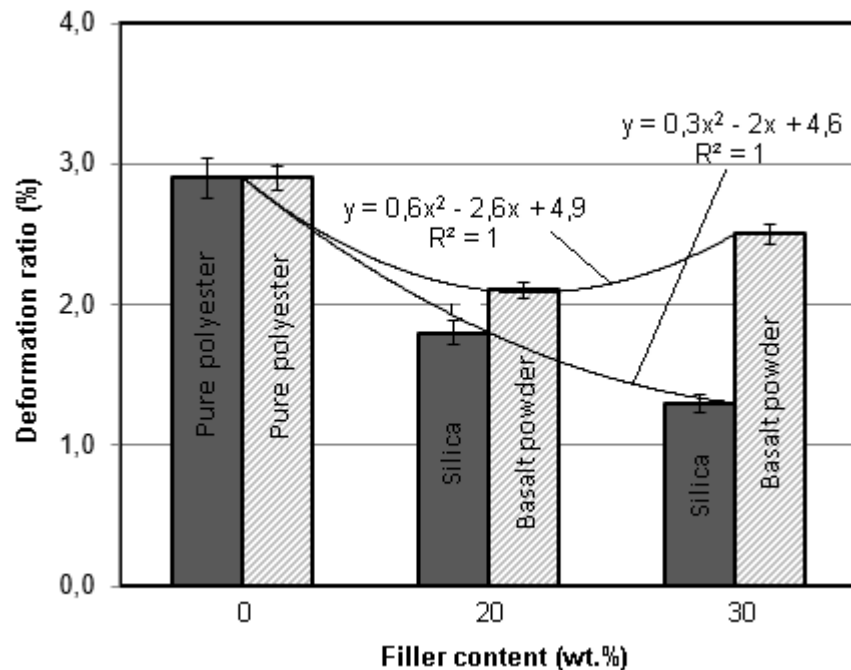


Figure 5. Variation of deformation rate in bending of unsaturated polyester composites filled with different proportions of silica and basalt powder.

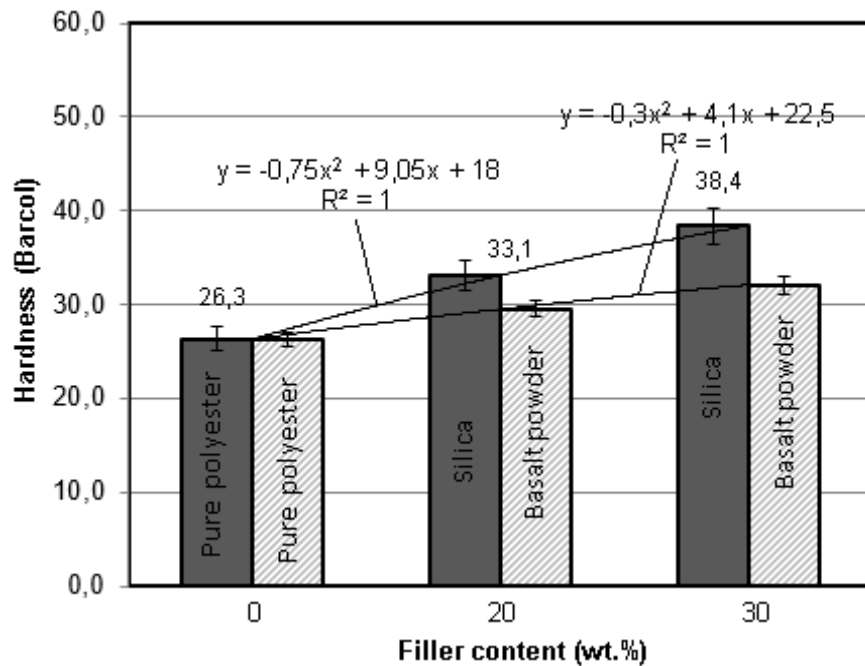


Figure 6. Variation of hardness of unsaturated polyester composites doped with different proportions of silica and basalt powder.

The variation of hardness of unsaturated polyester composites filled with different ratios of SiO₂ and basalt powder with respect to silica and basalt powder filler ratio is given in Figure 6. The hardness of composites filled with SiO₂ and basalt powder at different ratios of 20wt.% and 30wt.% increased proportionally. Compared to the hardness of unsaturated polyester, the hardness of basalt powder filled composite increased by 12.1% and 22% for 20wt.% and 30wt.% basalt filled composites, respectively. The hardness of SiO₂ filled composites increased by 25.8% and 46% for 20wt.% and 30wt.% SiO₂ filled composites, respectively. The SiO₂ filler added to the polyester caused the hardness of the composite to increase more. Compared to the hardness of the basalt powder filled composite, the hardness increases of the SiO₂ filled composites were 12.2% and 19.6% for 20wt.% and 30wt.% filler rates, respectively. The mechanical properties of 20wt.% and 30wt.% basalt and SiO₂ filled composites are given in Table 4.

Table 4. Mechanical properties of basalt and silica filled composites.

Materials	Flexural strength, MPa	Flexural Modulus, MPa	Deformation ratio (%)	Hardness (Barcol)
UP	63.9±16.3	2020±424	2.9±0.55	26.3±2.3
20BP/UP	53.1±8.9	2830±634	2.1±0.39	29.5±2.9
30BP/UP	51.8±11.9	3270±959	2.5±0.51	32.1±2.4
20Si/UP	62.5±5.2	3350±213	1.8±0.19	33.1±2.8
30Si/UP	63.8±6.6	5170±786	1.3±0.28	38.4±3.1

The fracture surface microstructure investigations of 20wt.% SiO₂ and basalt powder filled polyester composites were carried out by scanning electron microscopy and the microstructure images are given in Figure 7. Figure 7a,b shows the microstructure images of SiO₂ filled unsaturated polyester composite and Figure 7c,d shows the microstructure images of basalt powder filled unsaturated polyester composite. In Figure 7b, further magnification was used to investigate whether the SiO₂/polyester composite has good silica bonding to the polyester matrix. As seen in the figure, although there is good interfacial bonding in some regions, it is observed that the interfacial bonding is not good in some regions.

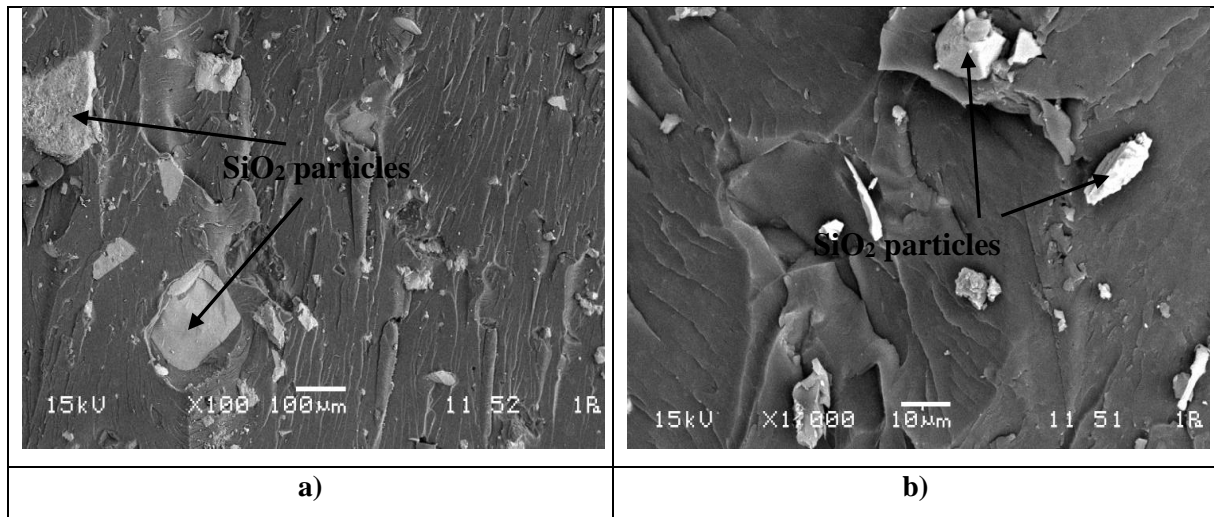


Figure 7. Scanning electron microscopy surface image of the fractured surface of UP composite filled with 20% SiO₂

Conclusions

The following conclusions were drawn from the study investigating the mechanical properties of UP/SiO₂ and UP/BP composites.

- Compared to pure polyester, the flexural strengths of 20wt.% and 30wt.% silica filled polyester composites decreased by 2.2% and 0.1%. However, the flexural strength of 20wt.% and 30wt.% basalt powder filled polyester composites decreased by 16.9% and 18.9%.
- The flexural modulus values of basalt powder filled composites were lower than SiO₂ doped composites. This decrease was 15.5% and 36.9% for 20wt.% and 30wt.% doping rates, respectively.
- The maximum reduction in deformation rate was obtained in the SiO₂ filled UP composite. Compared to the basalt powder filled composite, the change in deformation rate for composites with 20wt.% and 30wt.% SiO₂ filler was 14.2% and 48% respectively.

- The hardness of the composites filled with SiO₂ and basalt powder at different rates of 20wt.% and 30wt.% increased proportionally. Compared to the hardness of basalt powder filled composite, the hardness increases of SiO₂ filled composites were 12.2% and 19.6% for 20% and 30% filler rates, respectively.

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GÜLEF VE MUSALLAR KÖY ODA OYUNLARININ İD, EGO, SÜPEREGO BAĞLAMINDA DEĞERLENDİRİLMESİ*

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Özet

Kültür, bir toplum içerisinde bulunan duyuş, düşünüş birliğini oluşturan, gelenek durumundaki yaşantısını aktaran yapının genel adlandırmasıdır. Bu yapı aynı ortamı paylaşan bireylere kendi içinde çeşitli roller vererek topluluğa dahil eder. Birey, çevrenin ona verdiği rollere uyum sağlar. Aksi durumda -toplumun normlarının dışına çıktığında- toplumsal bir dışlanma ile karşı karşıya kalır. Çalışmanın metin örneklerinin kullanıldığı köy oda oyunları, geleneksel köy hayatında bireyin toplum içinde yapamayacağı şakaları, söz ve davranışları Freud'un terimiyle "id" ini ortaya çıkarma ve rahatlama alanının yaratıldığı ortamlardır. Her türlü resmi konum alaşağı edilir ve hiyerarşi tepetaklak edilir. Oyuna katılmak gönüllülük gerektirir. Oyun kurallarını kabul etmeyen ve oyun yöneticisi tarafından seçilmeyen oyuncular oyuna dahil edilmez. Böylece oyun yeri ve oyuncular bağlamdaki oyuna özel hale getirilir. Oyun an'ı ve normal hayat birbirinden ayrılır. Kolektif bilinç, bireyin baskıladığı duygu ve dürtülerini günlük yaşamda sergilemesine müsaade etmez. Ancak oyunların mekânsal bir sınırlılığının olması, bireyin oyun mekânında rahatlamasına imkân verir. Toplumsal normlar "ego" ve "süperego" ile bireyin kişiliğini sıkıştırır ve ona geleneğin kuralları çerçevesinde bir yaşam sunar. Buradan hareketle, çalışmada köy oda oyun metinlerindeki cinsellik, id ego ve süperego kavramları Freud'un psikanalitik çözümleme yöntemine göre incelenecektir. İncelenecek olan oyun metinleri Ezgi Metin Basat'ın *Köy Oda Oyunları ve Folklorun Tiyatrallığı* başlıklı çalışmasından alınacaktır.

Anahtar Kelimeler: Köy Oda oyunları, id, ego, süperego, psikanaliz.

**EVALUATION OF GULEF AND MUSALLAR VILLAGE CHAMBER GAMES IN
THE CONTEXT OF ID, EGO, SUPEREGO***

Abstract

Culture is the general designation of the structure that creates the unity of perception and thought in a society and conveys its traditional life. This structure includes individuals who share the same environment in the community by giving them various roles. The individual adapts to the roles given to him by the environment. Otherwise, when he goes beyond the norms of the society, he is faced with social exclusion. Village chamber games, in which the text samples of the study will be used, are environments where the jokes, words and behaviors of the individual in the traditional village life are created in Freud's term, "id" and relaxation area is created. The fact that the games are played in different environments for "female" "male" brings spatial comfort. The sexist approach of the society does not allow the suppressed emotions and impulses of the individual to come to the surface. The social structure always compresses the personality of the individual with the "ego" and often the "superego". In this study, the concepts of sexuality, id, ego and superego in the village room play texts will be examined according to Freud's psychoanalytic analysis methods.

Keywords: Village Chamber games, id, ego, superego, psychoanalysis

Giriş

Psikanaliz kavramı 19. yüzyılda Sigmund Freud tarafından ortaya çıkarılmıştır. Psikanaliz kelime anlamı olarak ruh (psyhke) ve çözümleme (analysis) anlamına gelmektedir. Psikanalizin temel amacı kişiliğin gelişim sürecindeki basamakları incelemektir. Gelişimdeki bu basamaklarda meydana gelen değişimler ve anormal tepkilerin kökeninde yatan sebepleri araştırır.

Psikanalitik kuramda öne çıkan bazı kavramlar vardır. Bu kavramlar kişiliğin gelişiminde oldukça önemlidir. Kavramlar, bilinç, ön bilinç, bilinçdışı, İd, Ego ve Süper Ego'dur. Freud, kişiliğin gelişimini evrelere ayırarak incelemiştir. Bunlar, Oral dönem, Anal Dönem, Fallik dönem, Latent dönem ve Genital dönemdir. Birey, kişiliğin gelişiminde bu dönemlerden herhangi birinde bir sıkıntı yaşarsa bazı savunma mekanizmaları geliştirir. Freud, edinilen savunma mekanizmalarının çocukluk döneminde ortaya çıktığını belirtmiştir. Çünkü bu dönemde çocuk, ebeveynlerine karşı bazı yönelimlerde bulunur. Kız çocukları anneyi rakip olarak görmekte ve babaya karşı bir hayranlık beslemektedir. Erkek çocukları ise anneye hayranlık duyup babayı kendisine rakip olarak görmektedir.* Ancak çocuğun içinde bulunduğu toplumsal yapı onun bu tür yönelimlerini hoş karşılamayacaktır. Çocuk da bu duygularını ego ve süper egonun gölgesinde tutarak bastırma yolunu tercih eder. Bu bastırma işlemi ancak kendisine rahatlamak için uygun bir mekân bulduğu anda tekrar eder. Bastırmanın ortadan kalktığı anları Bakhtin, karnaval tanımıyla açıklamıştır: Her türlü resmi konum ve ciddiyete yönelik alay, tüm hiyerarşilerin tepetaklak edilmesi, davranış kurallarının küfür, müstehcenlik, aşağılama, kabalıkla ihlali, bedensel iştahlara yönelik tüm aşırılıkların kutlanması biçiminde kendini dışa vuran bir halk bilincinin mekânıdır karnaval meydanı. (2001: 24).

Toplumsal baskılamanın yoğun olduğu kolektif yaşam ortamı olan köylerde, karnavalvari rahatlamamanın adresi köy oda oyunlarında bulunmaktadır. Kadınların ve erkeklerin ayrı ayrı oynadıkları ve oyun mekânının sadece hemcinslerine açık olması kadınlarda ve erkeklerde bastırılan dürtülerin açığa çıkacağı bir alan açmaktadır. Çalışmada bu oyunların içeriği psikanalitik bakış açısıyla değerlendirilecektir.

Psikanaliz Nedir?

Psikanaliz kavramı S. Freud tarafından kullanılmıştır. Psikanaliz, kişiliğin gelişimini ve bu gelişim aşamalarını inceler. Freud, psikanaliz kuramının temellerini hastalarıyla yaptığı

görüşmeler sonucunda atmıştır. Hastaların patolojik davranışlarının altında yatan sebepler, psikanaliz kuramının gelişimine destek olmuştur.

Psikanaliz, ruh (psykhe) ve çözümleme (analysis) sözcüklerinden oluşup, “ruh çözümlemesi” anlamına gelmektedir. Kavram için çeşitli tanımlamalar şöyledir: S. Freud tarafından 19. yüzyılın sonlarında ileri sürülen ve giderek yaygın kullanım alanı bulan; serbest çağrışım, telkin ve aktarım yöntemiyle nevrozların iyileştirilmesi temeline dayanan psikolojik tedavi yöntemidir. (Acar- Demir 1997:187).

Felsefe sözlüğünde Ahmet Cevizci ise psikanalizi: Özel olarak, Freud’un düşünce, çalışma ve eserleriyle birleştirilen psikoloji ve ruhsal tedavi anlayışı, genel olarak da Breuer ve Freud’un 1880 ve 1890’lı yıllardaki araştırma ve düşüncelerinden ortaya çıkan psikoloji akımı (1999:716) olarak tanımlamıştır.

Freud, ruhun topolojik yapısını incelemiştir. Zihni ilk olarak iki bölümden oluştuğunu ifade etmiştir. Bunlar, “bilinç” ve “bilinçdışı”dır. Freud, bu kavramlara Olgu Öykülerinde “Sıçanadam” olarak adlandırdığı nevrozlu hastasını incelerken ulaşmıştır. Daha sonraki incelemelerinde ruhsal aygıtı üç bölüme ayırır: Bilinç, ön bilinç ve Bilinçdışı. Freud’ a göre bilinç, bireyin o an farkında olduğu her türlü duyum ve yaşantılarının bulunduğu yerdir. Freud’a göre ruhsal yapı bir buzdağına benzemektedir. Buzdağında suyun üst kısmında görülen ve buzdağının ufak bir kısmını oluşturan yer bilinçtir. Suyun altında kalan ise bilinçdışıdır. (2022:76-77). Bu açıdan bakıldığında ruhun en önemli yeri bilinçdışıdır. Bireyin farkında olmadan sakladığı anı ve duyguların bulunduğu yer burasıdır. Bu kısımda istekler, dürtüler, korkular kısacası “id” in hâkim olduğu bir alandır. Bu alandaki duygular rüya yoluyla ortaya çıkar. Çünkü bastırılan bu dürtülerin günlük yaşamda ortaya çıkması bireyi olumsuz etkileyecektir.

Freud, incelemesini bir adım daha ilerletir ve kişiliğin yapısını üç ayrı evreye ayırır: İd (Haz İlkesi), Ego (Gerçeklik İlkesi) ve Süper Ego (Ahlak İlkesi).

İd (Haz İlkesi)

Bilinçaltında bulunan, bireyin içgüdülerini kapsayan, doğuştan gelen dürtüleri içerir. Nasıl ki bir bebek davranışlarının doğru mu, yanlış mı olduğunu sorgulamazsa id de bu tür sorgulamalara girişmez. Bireyin bu güdüleri kaybolmaz, doyurulmak ister. Çünkü bu bölümde boşalım arayan bir enerji vardır. Ancak bu boşalım gerekli şartlar sağlandığında ortaya çıkar. Freud, *dış gerçekliğin direnciyle sınırlandırılmayan, çaresizlik taleplerine kayıtsız, hiçbir mantık hatasıyla hükmedilemeyen id, esas olarak üretilen içgüdüleri doğrudan ifade eden*

birincil süreç olarak adlandırdığı şey tarafından yönetilir (2022:22) söylemiyle id'e bir açıklama getirir.

Freud, kültürel olayları incelemesine olanak sağlayan temel öncülü "süblimasyon" olarak adlandırır. Freud, bireydeki bastırılmış dürtülerin saklanması bu kavramla açıklamıştır. Süblimasyon, engellenmiş, sosyal açıdan doğru olarak kabul edilmeyen arzu ve isteklerin toplumsal yönden kabul edilebilir kanallara yönlendirilerek tatmin edilmesidir. Köy Oda Oyunları'nda, sosyal yaşam alanlarında sergilenemeyecek tavır ve davranışlar oyun anında meydana çıkar. Oyuncuların bu tavır ve davranışlarını Huizinga'nın oyun kavramına atıf yapılarak değerlendirilebilir: *Oyunun mekânsal sınırlılığı, zamansal sınırlılığından da çarpıcıdır. Her oyun ister maddi veya hayali ister keyfe göre saptanmış veya zorunlu olmuş olsun, önceden belirlenmiş kendi mekânsal alanının sınırları içinde cereyan eder.* (2006:27). Bu özel mekân içerisinde oyun başlar başlamaz gerçek yaşamdan kopuş yaşanır ve oyundaki her davranış "oyun" ve "oyunlaştırılmış mekâna" özel hale gelir. İd, bu mekânda istediğini yapma özgürlüğü kazanır. Çünkü oyuncular şöyle der: "*Oyunda küslük olmaz*". Yani her şey oyunun bir parçası gibi algılanmalıdır. Bastırılan dürtüler açığa çıkar ve oyun bitene kadar devam eder. Sosyal ortam davranışı yargılamaz. Oyunun bir parçası kabul eder. Oyunlarda yapılan esprilerin bilinçdışı ilişkisine bakıldığında da oyunlarda yapılan esprilerin alt metninde *esprili yargının içimizde ürettiği psikolojik tepki ve komedi duygusu, gerçeğin keşfedilmesi zincirine bağlıdır* (2022:12) açıklaması aranmalıdır. Bilinçdışının bastırıldığı, özellikle oyunlarda açığa çıkan cinsiyet ve cinsellik üzerine söylenen esprilerin olduğu görülür. Yapılan bu espriler bastırılmış (bilinç dışının) duygunun dışı vurumu olarak değerlendirilebilir.

Ego (Gerçeklik İlkesi)

Ego, Latince de "ben" demektir. Ego, İd ve dünya arasında arabulucu niteliğe sahiptir. Mantığa dayalı kararlar verir. Kimliğe hitap eden zevk ilkesine aykırı gerçeklik ilkesi olarak adlandırılır. Kendini korumak için hazzı geciktirme ihtiyacı, yerine getirilmeyen arzuların yarattığı endişeyi engellemek amacıyla yavaşça öğrenilir. Freud'un savunma mekanizmaları olarak adlandırdığı şey, olası çatışmalarda başa çıkmak için ego tarafından geliştirilir. (2022:23).

Köy Oda Oyunları bağlamında değerlendirilirse, birey kolektif yaşamında farklı cinsel yönelimlerini ve tercihlerini açıkça ifade edemez. Yönelimlerini ve dürtülerini "ego" ile kontrol altında tutar.

Süper Ego (Ahlak İlkesi)

Süper Ego yani üst ben, kişiliğin doğru ve yanlışları hakkında sosyal çevreyi izleyen bir yapıya sahiptir. Süper Ego, dünya görüşünün, normlarının anne ve babaların ve çevresinin yapıp

etmelerini erken yaşta içselleştirmesi üzerine kurulur. Bu son bileşen toplumun ahlaki emirlerinin içselleştirilmesiyle gelişim gösterir. Sadece kısmen bilinçli olan süperego, kimliğinde egoya karşı içe dönük olan ve suçluluk duygusu oluşturan belirli agresif unsurları ödünç alarak cezalandırma gücünün bir kısmını kazanır (2022:24).

İncelenen köy da oyunlarının, oyuncularını kolektif bilincin hâkim olduğu, bilinçdışının sürekli baskılandığı bir ortamda gerçekleşir. Bu durumda süper ego fazlasıyla gelişmiştir. Oyunlara, karşı cinsten kimse katılamaz/izleyemez. Mekân kapalı bir alandır. Çünkü toplum oyundaki davranışları “ayıp” olarak değerlendirir ve oyun bittiğinde aynı davranışlar sergilense kabul edilir olmaktan çıkacaktır.

Kısaca tanımları verilen kavramlar, oyun metinlerinde tespit edilen noktalarla örneklendirilerek açıklanacaktır.

Köy Oda Oyunları, şimdiki an’ı oyun mekânına dönüştürür. Mekânın kişiliğinin bastırılan bölümünü nasıl rahatlattığını Victor Turner “eşik” kavramı ile açıklamıştır: *eşiksellik toplumsal yapının, “yapısız”, hatta “antiyapı” alanıdır. Anti- yapı”nın ayinselleşmiş “kaos”u, “normal” kimlik ve rollerin tersyüz edilmesini gerektirir.* (Metin Basat 2022:56).



Fotoğraf24: Yüzük Oyunu’ndan sonra kurulan beş ayaklı masa¹*Yüzük Saklama Oyunu:*

Oyun bir nesnenin saklanması ve bulunması üzerine kurgulanmıştır. Oyun sırasında Tahir Ahmetbeşeoğlu, elindeki sopayla seyircilere ve yüzük arayanlara vurur. “Beş ayaklı masa oluşsun hemen” diyerek bağırdı ve yenilen grubun sedirde oturan oyuncularını hızlı bir biçimde kendilerini yere atıp sırtlarını birleştirerek bir masa oluşturdular. (...) Bu arama beş ayaklı masayı oluşturan oyuncularını sazı olarak kullanmasıyla bitti. Sazını akort yapmak için sırtlarına

bindiği oyuncuların kulaklarını bükerek ayar sesi yaptı. Bazen oyuncuların canlarını yaktı. (Metin Basat 2022:108). Eril bir ortamda oynanan bu oyunda erkeklerin vücutsal temasları, şiddetin ön planda olması ve bu davranışların komik unsur haline gelmesi özel alanda ortaya çıkan bastırılmış dürtülerin açığa çıktığının bir göstergesidir.

Duvar Örne Oyunu: Muhtar rolündeki oyuncu duvar örmek ister. Oyuncular arasından taş rolünü alacak kişiler seçilir ve duvar örme işlemi yapılır. Bu arada taşları oluşturan oyuncuların boyları farklı olduğu için çırağına “bu taşı biraz kaldıralım” dedi ve ayakları ve kalçası arasına tahtalar konuldu. Bu oyuncuların canını acıttı. Arada “bu taş biraz uzun” diyerek çekiçle tahtanın üzerinden oyuncuların kafasına vurdu. (Metin Basat 2022:109). Duvar örme oyununda da “insan bedeni üzerinden yapılan şakalar” ön plandadır. Köyün sosyolojik yapısı insan bedenini özgürce tanımak için imkân vermemektedir. Ne var ki bastırılan dürtüler rahatlama anında ilksel formda ortaya çıkmaktadır.



Fotoğraf 20: Kız Satma/Kız Kaçırma Oyunu²

Kız Satma/Kaçırma Oyununda, köyde yoksul bir adamın karısı öldükten sonra kızlarını zengin kişilerle evlendirme macerasını konu alır. Elindeki süpürgeyi saz olarak kullandı. Kadın kılığına giren iki erkek oyuncu gelinleri canlandırdı. Erkek oyuncular etek giyiyor; kendilerine balon, elma gibi nesne ve meyvelerden göğüs yapıyor ve başlarına başörtüsü bağlayıp yüzlerini kapatıyorlardı. (...) Sonra birden kadınlar seyirciler arasında gözlerine kestirdikleri kişilerin kucağına oturdular. (...) Burada gelinlerin aniden seyircinin kucağına oturması seyirci tarafından büyük bir kahkahayla izlendi. (Metin Basat 2022:111). Kız Satma oyununda bastırılmışlığın ortaya çıkmasının yanı sıra cinsel yönelimde de bir farklılık söz konusudur.

Freud'un Cinsellik Üzerine adlı yapıtında çocukluk döneminden gelen cinsel yönelimlerdeki farklılığın/ sapmanın oyun kişilerinde de olabileceğinin belirtisini veren davranışlar sergilenmektedir.



Fotoğraf 26: Ahır Satma oyunu³

Yine *Berber Oyunun* da köpek rolündeki oyuncular, havlamalar eşliğinde sedirde oturan seyircileri bacaklarından yakalayarak yere düşürürler. (Metin Basat 2022: 111). Kadın oyunlarından *Dam Satma* oyununda kadınların para vermek yerine genital bölgelerini ve kalçalarını göstererek “önüm arkam kapı” (Metin Basat 2022:118) söylemleri sosyal hayatta yapamayacakları bir esprinin oyun mekânında ortaya çıktığını gösterir.

SONUÇ

Köy Oda Oyunları, bedensel dönüşümün performansla sunulduğu tiyatral özellikler gösteren bir türdür. Bedenin değiştirilip dönüştürülmesi tiyatral yapı için anormal bir şey değildir. Ancak oyunların cinsiyet bağlamında ayrı ayrı mekânlarda oynanması, oynanan alana karşı cinsten birinin dahil olmasına izin verilmemesi oyunlara ve bir anda oyun mekânına dönüşen mekâna psikanalitik bir yaklaşımı beraberinde getirmiştir. Çünkü içinde bulunulan toplum çocukluk döneminden itibaren “süper ego” nun gelişmesini destekler niteliktedir. Fakat bireyin kişiliğinin bir parçası olan “id” hep onunladır. Uygun bir an, mekân bulduğunda ortaya çıkmaya hazırdır. Çıkmaya da ihtiyacı vardır. Freud'un da ifade ettiği gibi bir “enerji”dir ve akış bulduğu yerde ortaya çıkamaya hazırdır.

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SİMÜLASYON TEKNOLOJİSİNİN İLKOKUL MATEMATİĞİNE ETKİSİ

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Özet

Bu araştırmanın amacı ilkököl 2. sınıf öğrencilerine simülasyon destekli materyal ile öğretimin matematik dersi başarısına etkisini araştırmaktır. Bu araştırmanın yöntemi nicel araştırma yöntemlerinden yarı deneysel araştırma yöntemidir. Çalışma gruplarına ön test-son test deseni uygulanmıştır. Çalışma gruplarını, 2023-2024 sezonu Yozgat ili Aydıncık ilçesinde bulunan Şehit Bekir Şimşek İlkokuluna devam eden 2/A sınıfındaki 16 öğrenci ve 2/B sınıfındaki 22 öğrenci ile Samsun ili İlkadım ilçesi Maarif İlkokulu'na devam eden 2/A sınıfına devam eden 30 öğrenci ve 2/B sınıfına devam eden 33 öğrenci oluşturmaktadır. Her iki okulun 2/A şubelerinin ön test ortalaması 2/B şubelerine göre düşük olduğundan, 2/A şubeleri deney grubu, 2/B şubeleri ise kontrol grubu olarak seçilmiştir. 'Toplamı 100'e kadar olan doğal sayılarla eldesiz ve eldeli toplama işlemini yapar' adlı kazanımını deney grubunda simülasyon yöntemi ile, kontrol grubunda ise müfredatın önerdiği öğretim yöntemi kullanılmıştır. MEB matematik ders kitaplarında bulunan sorulardan seçim yapılarak dört alt başlık halinde bir başarı testi oluşturulmuştur. Bu başarı testi çalışma gruplarına bir hafta aryla tekrar uygulanmıştır. Veriler SPSS programı ile analiz edilmiş olup araştırma sonucunda simülasyon materyali ile öğrenim gören deney grubunun başarısının, müfredatın önerdiği yöntem ile öğrenim gören kontrol grubunun başarısına göre anlamlı düzeyde daha yüksek olduğu görülmüştür. Bu bulgular sonucunda MEB'in müfredatına simülasyon destekli materyal kullanımının eklenmesi önerilmektedir.

Anahtar kelimeler: Simülasyon, ilkököl, matematik, teknoloji

THE EFFECT OF SIMULATION TECHNOLOGY ON PRIMARY SCHOOL MATHEMATICS

Abstract

The purpose of this research is to investigate the effect of teaching simulation-supported material to primary school 2nd grade students on their mathematics course success. The method of this research is the semi-experimental research method, one of the quantitative research methods. Pretest-posttest design was applied to the study groups. The study groups consisted of 16 students in class 2/A and 22 students in class 2/B attending Şehit Bekir Şimşek Primary School in Aydıncık district of Yozgat province for the 2023-2024 season and 30 students in class 2/A attending Maarif Primary School in İlkadım district of Samsun province. and 33 students attending 2/B class. Since the pre-test average of 2/A branches of both schools was lower than that of 2/B branches, 2/A branches were chosen as the experimental group and 2/B branches were chosen as the control group. The learning outcome named 'Makes addition with and without carry with natural numbers whose sum is up to 100' was used with the simulation method in the experimental group, and the teaching method recommended by the curriculum was used in the control group. An achievement test was created under four subheadings by selecting questions from the MEB mathematics textbooks. This achievement test was re-applied to the study groups with a one-week interval. The data were analyzed with the SPSS program, and as a result of the research, it was seen that the success of the experimental group, which learned with the simulation material, was significantly higher than the success of the control group, which learned with the method recommended by the curriculum. As a result of these findings, it is recommended to add the use of simulation-supported materials to the curriculum of the Ministry of Education.

Keywords: Simulation, primary school, mathematics, technology

Giriş

Dünya'nın hemen hemen her yerinde öğrencilerin genelini matematik dersinde zorlandığı bilinmektedir. 1970 yılından itibaren Feierabend gibi bazı araştırmacılar öğrencilerin matematik dersine ait tutumlarını ölçmek için çalışsa da bu çalışmalar ayrıntılı olarak yapılmamıştır(García, Juárez, 2011). Türkiye eğitim sisteminde matematik öğretiminin amaçlarından biri de öğrencilerin matematiksel düşünme becerilerini geliştirip, genelleme, problem çözme, ilişkilendirme, akıl yürütme ve iletişim kurma gibi basit matematiksel becerileri ve bu becerilerle ilgili yeteneklerini gerçek hayatta karşılaştıkları problemlerinde kullanmalarını sağlamak yer almaktadır (Milli Eğitim Bakanlığı, 2013).

Türkiye de eğitim sistemine bakıldığında bu amaçların öğrencilere yeteri kadar kazandırılmadığı görülmektedir. Hangi yaşta ve sınıfta olursa olsun öğrencilerin özellikle matematik dersinde başarılı olamadıkları görülmektedir(Duran, Özden, & Yeşilyurt, 2023). 15 yaş öğrencilerin temel alanlarda öğrendiği kazanımları değerlendiren ve 2018 yılında gerçekleştirilen PISA (Programme For International Student Assessment) sonuçları bunu doğrulamaktadır. Araştırma sonuçlarına bakıldığında, OECD (Organization for Economic Cooperation and Development) ülkeleri arasında Türkiye matematik kazanımlarında yapılan sıralamaya göre 8 basamak ilerlese de 42. Sırada kendine yer bulabilmiştir (Milli Eğitim Bakanlığı, 2019). Öğrencilerin ülkemizde kazanım değerlerine bakıldığında ise 2023 yılı YKS sonuçlarına göre 2023-TYT'de sınava giren öğrencilerin temel matematik doğru cevap sayısı ortalamaları 8,218 ve AYT'de sınava giren öğrencilerin matematik testinin ortalaması 7,576 olarak belirtilmiştir. (Öğrenci Seçme ve Yerleştirme Merkezi, 2023).

Tüm bu sonuçlar karşısında son yıllarda Milli Eğitim Bakanlığı'nın bazı projeler ortaya koyduğu görülmektedir. Hızla gelişen teknolojinin eğitim öğretimi etkilemesi ve eğitim projelerinde yer alması kaçınılmaz bir durum haline gelmiştir. Matematik dersi öğretilirken kavramların soyut olmasından dolayı gerçek hayatta bu kavramların öğretilmesine yönelik uygun örnekler verilmesi güç olup teknolojinin ilerlemesi ile bu güçlük her geçen gün ortadan kalkmaktadır(Gök, 2019). Çünkü teknolojinin kullanım amacı eğitim öğretim gibi belirli bir durumun karmaşıklığını basitleştirmektir(Ulaşılmasının kolay olması ve maliyetinin düşük ve bazen de ücretsiz olmasından dolayı simülasyonlar eğitimde teknolojinin kullanımının en iyi örneklerinden biridir. Hızla gelişen teknoloji ile birlikte eğitim-öğretim metodlarındaki yeni arayışlar, matematik öğretiminin geleneksel yöntemlerle değil de animasyon ve simülasyonların kullanıldığı yöntemleri alternatif olarak ortaya çıkarmıştır (Gürbüz, 2007).

Ayrıca öğrenci merkezli olan simülasyon destekli yöntem uygulaması öğrencileri gerçek hayata hazırlayan ve hazırlarken de kazanımları yaparak ve görerek öğrencilere kazandıran ve öğrencilerin ilgisini artıran bir öğrenme ortamı sağlar(Demirel,2004; Miller,1987). Bu durumdan hareketle bu araştırmada öğrenci merkezli olan simülasyon destekli eğitimin öğrenci başarısına etkisi araştırılmıştır.

YÖNTEM

Araştırmanın Deseni

İlkokul 2. sınıf öğrencilerine simülasyon destekli materyal ile öğretimin matematik dersi başarısına etkisini araştırmak için yapılan bu araştırmada nicel araştırma yöntemlerinden ön test-son test modeline uygun yarı deneysel desen kullanılmıştır. Simülasyon ile desteklenen eğitim yöntemi ve Milli Eğitim Bakanlığı'nın önerdiği müfredatta yer alan yöntem bağımsız değişken olup öğrencilerin matematik başarısı bağımlı değişkendir.

Tablo 1: Araştırma Deseni

Gruplar	Ön Test	Uygulama	Son test
Kontrol Grubu	Başarı Testi	Meb Müfredat Yöntemi	Başarı Testi
Deney Grubu	Başarı Testi	Simülasyon Yöntem	Destekli Başarı Testi

Evren ve Örneklem

Araştırmanın çalışma gruplarını, 2023-2024 sezonu Yozgat ili Aydıncık ilçesinde bulunan Şehit Bekir Şimşek İlkokuluna devam eden 2/A sınıfındaki 16 öğrenci ve 2/B sınıfındaki 22 öğrenci ile Samsun ili İlkadım ilçesi Maarif İlkokulu'na devam eden 2/A sınıfına devam eden 30 öğrenci ve 2/B sınıfına devam eden 33 öğrenci oluşturmaktadır. Her iki okulun 2/A şubelerinin ön test ortalaması 2/B şubelerine göre düşük olduğundan, 2/A şubeleri deney grubu, 2/B şubeleri ise kontrol grubu olarak seçilmiştir.

Veri Toplama Aracı

Başarı testi soruları 4 alt başlık halinde Milli Eğitim Bakanlığı 2. Sınıf ders kitaplarından 'Toplamları 100'e kadar olan doğal sayılarla eldesiz ve eldeli toplama işlemi yapar' adlı kazanım konusundaki sorulardan seçilerek araştırmacılar tarafından başarı testi hazırlanmıştır.

Verilerin Analizi

Verileri analiz ederken SPSS programı kullanılmış ve ortalama, standart sapma, t-Testi ve f-Testi sonuçlarına bakılmıştır. Anlamlılık düzeyi 0.05 olarak belirlenmiştir.

BULGULAR

Öğrencilere uygulanan ön test sonuçlarına t-Testi uygulanmış olup veriler aşağıdaki tabloya aktarılmıştır.

Tablo 2: Ön Test T Testi Sonuçları

Okullar	Değişken	Gruplar	N	X	S	t	df	p
Şehit Bekir Şimşek İlkokulu	Başarı Testi	Deney Grubu1	16	48,56	28,46	-1,16	23,344	,258
		Kontrol Grubu1	22	57,90	17,74			
Maarif İlkokulu	Başarı Testi	Deney Grubu2	30	59,00	19,71	-1,13	61	,259
		Kontrol Grubu2	33	64,69	19,93			

Bağımsız örneklem T-Testi ön test sonucuna göre **birinci** örneklemden deney grubunun (ort.=48,56 ,SS.=28,46) ön test puanlarının aritmetik ortalaması kontrol grubuna(ort.=57,90 , SS.=17,74) göre daha düşük olduğu ve iki grup arasında anlamlı bir fark olmadığı sonucuna varılmıştır($p>,05$). İkinci örneklemden bağımsız T-Testi sonucuna göre ise deney grubunun (ort.=59,00 ,SS.=19,71) ön test puanlarının aritmetik ortalaması kontrol grubuna(ort.=64,69 , SS.=19,93) göre daha düşük olduğu ve iki grup arasında anlamlı bir fark olmadığı sonucuna varılmıştır($p>,05$).

Öğrencilere uygulanan son test sonuçlarına t-Testi uygulanmış olup veriler aşağıdaki tabloya aktarılmıştır.

Tablo 3: Son Test T Testi Sonuçları

Okullar	Değişken	Gruplar	N	X	S	t	df	p
Şehit Bekir Şimşek İlkokulu	Başarı Testi	Deney Grubu1	16	80,00	12,51	2,31	36	,027
		Kontrol Grubu1	22	69,09	15,55			
Maarif İlkokulu	Başarı Testi	Deney Grubu2	30	84,73	19,16	2,79	61	,007
		Kontrol Grubu2	33	70,33	21,56			

Bağımsız örneklem T-Testi son test sonucuna göre birinci örneklemdaki deney grubunun (ort.=80,00 ,SS.=12,51) son test puanlarının aritmetik ortalaması kontrol grubuna(ort.=69,09 , SS.=15,55) göre daha yüksek olduğu ve iki grup arasında anlamlı bir fark olduğu sonucuna varılmıştır($p<,05$). İkinci örneklemdaki son test bağımsız T-Testi sonucuna göre ise deney grubunun (ort.=84,73 ,SS.=19,16) son test puanlarının aritmetik ortalaması kontrol grubuna (ort.=70,33 , SS.=21,56) göre daha yüksek olduğu ve iki grup arasında anlamlı bir fark olduğu sonucuna varılmıştır($p<,05$).

Tablo 4. Ön Test Değişkenli Anova Testi Sonuçları

Değişken	Varyansın Kaynağı	Kareler Toplamı	sd	Kareler Ortalaması	F	p	η^2	Anlamlı Fark
Başarı Testi	Gruplararası	2840,186	3	946,729	2,148	,099	0,06	4>3>2>1
	Gruplarıçi	42750,725	97	440,729				
	Toplam	45590,911	100					

1=kontrol grubu1, 2=deney grubu1, 3=kontrol grubu2, 4=deney grubu2

Yukarıda öğrencilerin ön test puanlarının ANOVA sonuçları verilmiştir. Yapılan anova analizine göre yapılan ön test sonuçları arasında anlamlı bir ilişki olmadığı sonucuna varılmıştır, $F(3,97)=2148$, $p>0,05$

Tablo 5. Son Test Değişkenli Anova Testi Sonuçları

Değişken	Varyansın Kaynağı	Kareler Toplamı	sd	Kareler Ortalaması	F	p	η^2	Anlamlı Fark
Başarı Testi	Gruplararası	4652,309	3	1550,770	4,564	,005	0,12	3>1>4>2
	Gruplarıçi	32959,018	97	339,784				
	Toplam	37611,327	100					

1=kontrol grubu1, 2=deney grubu1, 3=kontrol grubu2, 4=deney grubu2

Yukarıda öğrencilerin son test puanlarının ANOVA sonuçları verilmiştir. Analiz sonuçlarına göre öğrencilerin son test sonuçları arasında anlamlı bir fark olduğu sonucuna varılmıştır, $F(3,97)=4,56$, $p<,05$. Yani öğrencilerin matematik başarıları verilen yönteme bağlı olarak anlamlı bir şekilde değişmektedir.

SONUÇ VE ÖNERİLER

Öğrencilere ‘Toplamları 100’e kadar olan doğal sayılarla eldesiz ve eldeli toplama işlemini yapar’ adlı kazanım kazandırılmak istenmiştir. Araştırmada simülasyon teknolojisinin kullanıldığı yöntem ile ders gören öğrencilerin, MEB müfredatının önerdiği yöntem ile ders gören öğrencilerden daha başarılı olduğu ve anlamlı bir farklılık olduğu görülmüştür. Buradan da anlaşıldığı üzere çoğu öğrencinin zorlandığı matematik dersini, öğrencilere teknolojik simülasyonlarla somutlaştırarak ve oyunlaştırarak çok daha kolay ve eğlenceli bir şekilde öğretmenin mümkün olduğu görülmüştür.

Bu sonuçla birlikte araştırmada şu öneriler yapılabilir ;

İlkokul matematik müfredatında simülasyon etkinliklerinin desteklenmesi ve artırılması sağlanmalıdır.

Sınıf öğretmenlerine simülasyon destekli eğitimle ilgili hizmet içi eğitimler verilmelidir.

EBA içeriklerinde simülasyon çeşitliliğinin tüm kademelerde artırılması sağlanmalıdır.

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SİMÜLASYON TEKNOLOJİLERİNİN İLKOKUL FEN DERSİ ÜZERİNDEKİ ETKİLERİ

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Özet

Bu araştırmanın amacı simülasyon destekli materyallerin ilkökul 4. sınıf öğrencilerinin fen bilgisi dersindeki başarıları üzerine etkisini araştırmaktır. Araştırma yöntemi nicel araştırma yöntemlerinden yarı deneysel araştırma yöntemidir. Araştırmanın yapılacağı çalışma grupları Van'ın Özalp ilçesi Yukarı Tulgalı ve Aşağı Tulgalı köyü ilkokullarında 2023-2024 eğitim öğretim yılında 4. sınıfta bulunan öğrenciler olarak belirlenmiştir. Araştırmada Yukarı Tulgalı ilkokulunda bulunan 23 öğrenci, Aşağı Tulgalı ilkokulunda bulunan 15 öğrenci yer almaktadır. Gruplara uygulanan ön test sonuçları doğrultusunda iki grup arasında anlamlı bir farklılık olmadığı anlaşılmıştır. Araştırmada deney grubu olarak ön test sonuçları ortalaması daha düşük olan Yukarı Tulgalı İlkokulu öğrencileri, kontrol grubu olarak Aşağı Tulgalı İlkokulu öğrencileri belirlenmiştir. Araştırmada fen bilgisi dersinde yer alan “Kuvvetin, cisimlere hareket kazandırmasına ve cisimlerin şekillerini değiştirmesine yönelik deneyler yapar.” kazanımı deney grubunda simülasyon yöntemi ile kontrol grubunda ise müfredatın önerdiği yöntem kullanılarak işlenmiştir. Araştırmada uygulanan başarı testi MEB fen bilimleri ders kitabında yer alan sorular kullanılarak oluşturulmuştur. Başarı testi öğrencilere bir hafta ara ile uygulanmıştır. Başarı testinden elde edilen sonuçlar SPSS programı ile analiz edilmiştir. Araştırmadan elde edilen sonuca göre deney grubunun başarısının kontrol grubuna göre anlamlı derecede daha yüksek olduğu gözlenmiştir. Bulgular sonucunda simülasyon destekli materyal kullanımının teşvik edilmesi önerilmektedir.

Anahtar kelimeler: Fen bilimleri, simülasyon, ilkökul

EFFECTS OF SIMULATION TECHNOLOGIES ON PRIMARY SCHOOL SCIENCE COURSES

Abstract

The purpose of this research is to investigate the effect of simulation-supported materials on the success of 4th grade primary school students in science lessons. The research method is a semi-experimental research method, one of the quantitative research methods. The study groups in which the research will be conducted were determined as students in the 4th grade in the 2023-2024 academic year at Yukarı Tugalı and Aşağı Tugalı village primary schools in Özalp district of Van. The research included 23 students from Yukarı Tugalı primary school and 15 students from Aşağı Tugalı primary school. According to the pre-test results applied to the groups, it was understood that there was no significant difference between the two groups. In the research, the students of Yukarı Tugalı Primary School, whose pre-test results average was lower, were determined as the experimental group, and the students of Aşağı Tugalı Primary School were determined as the control group. In the research, "He conducts experiments on the force causing objects to move and changing the shapes of objects" in the science course. The acquisition was processed using the simulation method in the experimental group and the method recommended by the curriculum in the control group. The achievement test applied in the research was created using the questions in the Ministry of Education science textbook. The achievement test was administered to the students one week apart. The results obtained from the achievement test were analyzed with the SPSS program. According to the results obtained from the research, it was observed that the success of the experimental group was significantly higher than the control group. As a result of the findings, it is recommended to encourage the use of simulation-supported materials.

Key words: Science, simulation, primary school

Giriş

Teknoloji hayatımızın her alanında neredeyse bir zorunluluk haline gelmiştir. Bireyler iletişim kurmak, sosyalleşmek, günlük işlerini yapmak, keyifli vakit geçirmek, alışveriş yapmak, bilgiye ulaşmak için teknolojiyi kullanmaktadırlar. Günümüzde dijitalleşen dünyanın bir zorunluluğunu oluşturan teknoloji bütün alanlara dahil olduğu gibi eğitim ve öğretim etkinlikleri kapsamında da geniş bir yere sahiptir (Ünal & Yeşilyurt, 2021; Akar & Yeşilyurt, 2020; Turhan & Yeşilyurt, 2020). Dolayısıyla teknoloji bu kadar hayatımızın içindeyken eğitimi teknolojiden bağımsız düşünmek neredeyse imkansızdır. Teknolojinin bu kadar hızlı gelişimi eğitimde de gelişmeyi beraberinde getirmektedir. Artık teknolojinin eğitimin içinde olması bir seçenekten çok zorunluluk haline gelmektedir (Çetin & Karataş, 2020).

Son dönemlerde teknolojinin ilerlemesine paralel olarak okullarda, bilgisayar destekli öğretim faaliyetlerin yer almakta; öğretmenler tarafından sık sık kullanılmaktadır (Yeşilyurt, 2021; Yüksel, Yılmaz & Yeşilyurt 2022). Dolayısıyla farklı branşlarda kullanılan teknolojik araç ve gereçler, bilgisayar destekli öğretim yöntemleri, simülasyonlar sayesinde çocukların ilgili derse karşı olan motivasyon ve tutumlarının arttığı gözlemlenmektedir. Bu sebeple eğitimin her alanında teknoloji kullanımı hızlı bir şekilde katlanarak ilerlemektedir ve dijital araçlar ve gereçler kullanılarak işlenen derslerin sayısı artmaktadır. Dolayısıyla kullanılan bu araç ve gereçler çocuklara yaparak ve yaşayarak öğrenme imkanı sunmaktadır (Duyar & Altaş & Yeşilyurt, 2023). Ayrıca bilgisayar destekli öğretim yöntem ve teknikleri ile çocuklar bireysel öğrenme hızlarına uygun olarak kendi kendilerine de öğrenme imkanı bulmaktadırlar (Uşun, 2000). Okullardaki derslere güncel teknolojilerin dahil edilmesi büyük önem taşımaktadır (Güven & Sülün, 2012).

Simülasyonlar, gündelik yaşamda karşılaşılabileceğimiz karışık ve anlaması zor olan olay ve durumları daha kolay bir şekilde algılamamızı sağlamaktadır. Simülasyonlar sayesinde çocuklar yaparak yaşayarak öğrenme deneyimi yaşayacakları için karşılaştıkları problemlerde daha etkili ve kalıcı çözümler geliştireceklerdir (Bozkurt, 2008). Nitekim simülasyondan faydalanarak işlenen derslerde çocukların akademik olarak başarılarının yükseldiğini gösteren çalışmalarda mevcuttur (Sezgin, 2002; Tezcan & Yılmaz, 2003; Yang et al, 2003). Ayrıca Fen Bilimleri dersi kapsamı düşünüldüğünde simülasyonun avantajları oldukça önemli boyuttadır. Örneğin, derslerin güvenli bir şekilde işlenmesi, olayları hızlandırıp/yavaşlatabilme seçeneklerinin olması, günlük hayatta öğrencinin karşılaşma ihtimalinin çok küçük olduğu bir olayı gözlemleyebilmeleri, karışık olay veya durumların daha basitleştirilerek aktarılması bu avantajlardan bazılarını oluşturmaktadır (Roblyer, 2003). Simülasyon sayesinde çocuklar

vakitten de kazanıp, kendi bireysel öğrenme hızlarına göre öğrenme fırsatı yakalayabilmektedirler (Hegarty,2004). Simülasyonlar Fen bilimleri dersinde, kavranılması zor olan konuları basitleştirerek çocukların seviyelerine indirip öğrenme şansı tanımaktadır (Minaslı, 2009).

Dünyadaki ülkeler arasında bilim ve teknoloji alanında oluşan rekabetin, son dönemlerde fen eğitimin önemini de arttırdığı vurgulamaktadır (Çepni & Çil, 2016; Bayrak & Erden, 2007). Dolayısıyla teknoloji ile bilimdeki gelişmeleri takip edebilmek için ülkelerin fen eğitiminde farklı yöntemler geliştirmeyi hedefledikleri görülmektedir (Bayram, Patlı & Savcı, 1998). Bunun yanında önemli teknolojik gelişmelere imza atan ülkeler arasında bulunmanın okullardaki fen eğitimin niteliğine de bağlı olduğunu fark eden ülkelerin eğitim sistemlerinde ve programlarında çeşitli yöntemler araştırdıkları söylenmektedir (Çepni & Çil,2016). Kuvvetli bir toplum yaratabilmek için şüphesiz bireylerin nitelikli bir fen eğitimi almaları gerekmektedir (Eş & Sarıkaya, 2010). Fen eğitimin niteliğini arttırabilmek için de derslerde teknolojik destekli materyallere yer verilmelidir. Bu sayede çocuklar fen bilimleri dersini daha dikkatli dinleyecekleri için kalıcı öğrenme sağlanacaktır. Doğası gereği yaşamla iç içe olan fen bilimleri derslerine teknolojiyi entegre etmek çocuklar için oldukça faydalı olacaktır.

2.YÖNTEM

Bu bölümde araştırmanın modeli, evreni, örnekleme, veri toplama aracı ve verilerin analizi bulunmaktadır.

2.1.Araştırmanın Modeli

Yapılan araştırmada nicel araştırma yöntemlerinden, Ön Test -Son Test kullanılarak kontrol ve deney grubu belirlenerek, yarı deneysel araştırma yöntemi kullanılmıştır. Araştırmada çalışılan gruplar seçkisiz atama yöntemi ile belirlenmiştir. Gruplar belirlendikten sonra gerçekleştirilen ön test sonuçlarından ortalaması daha düşük olan şube deney grubu; ortalaması daha yüksek olan şube kontrol grubu olarak belirlenmiştir (Tablo 1). Kontrol grubunda eğitime müfredata göre genel yöntemlerle devam edilmiştir. Deney grubunda ise öğrencileri daha aktif tutacak, görsel anlamda destekleyecek ve ilgilerini çekecek etkileşimli etkinliklerle eğitime devam edilmiştir. Kullanılan etkileşimli etkinliklerde EBA platformundan yararlanılmıştır.

Tablo 1:Ön Test Ortalamaları

Okul	Gruplar	Ön Test	N	X
Yukarı İlkokulu	Tulgalı 1	Başarı Testi	23	27,608
Aşağı İlkokulu	Tulgalı 2	Başarı Testi	15	35,666

2.2.Araştırmanın Örnekleme

Araştırmada çalışma grubu, 2023-2024 eğitim-öğretim yılı içerisinde Van'ın Özalp ilçesinin Yukarı Tulgalı ve Aşağı Tulgalı İlkokullarında bulunan 38 dördüncü sınıf öğrencisinden oluşmaktadır. Bu öğrenciler araştırmanın çalışma şartları, ulaşım kolaylığı gibi sebeplerden dolayı kolay ulaşılabilir örnekleme yöntemi ile belirlenmiştir.

2.3.Veri Toplama Aracı

Araştırmada veri toplama aracı olarak kullanılan başarı testi EBA platformunda bulunan dördüncü sınıflar Fen Bilgisi dersi “kuvvetin etkisi” konusunun alıştırma testlerinden faydalanılarak oluşturulmuştur. Başarı testi toplamda 14 sorudan oluşmaktadır ve araştırmacılar tarafından ön test ve son test olarak deney ve kontrol grubuna uygulanmıştır.

2.4.Verilerin Analizi

Başarı testi sonucunda elde edilen veriler SPSS programına girilmiş ve analizler bu program üzerinden gerçekleştirilmiştir. Ön test verileri elde edildikten sonra iki grup arasında anlamlı bir fark olup olmadığına bakılmıştır. İki grup arasında anlamlı bir fark olmadığı gözlenmiştir ($p>0.05$). Son test sonuçları elde edildikten sonra başlangıç durumları ve son durum arasındaki farkı görmek için T testi yapılmıştır.

BULGULAR

Araştırma kapsamında elde edilen ön test verileri ile gerçekleştirilen t testi sonuçlarına Tablo 2’de yer verilmiştir.

Tablo 2: Ön Test Bağımsız T Testi Sonuçları

Okullar	Değişken	Gruplar	N	X	SS	t	df	p
Yukarı İlkokulu	Tulgalı Ön Test	Deney	23	27,608	12,601	-1,768	36	,085
Aşağı İlkokulu	Tulgalı Ön Test	Kontrol	15	35,666	15,337			

Ön test sonuçlarından elde edilen verileri incelediğimizde iki grup arasında ortalamaları bakımından ciddi bir fark olmadığı ve başlangıçta grupların seviyelerinin birbirine yakın olduğu görülmektedir. Bağımsız T testi sonucunda elde edilen verilerden de görüldüğü gibi p değeri 0,05’den büyüktür yani iki grup arasında anlamlı bir farklılık bulunmamaktadır ($p=,085$).

Araştırma kapsamında elde edilen son test verileri ile gerçekleştirilen t testi sonuçlarına Tablo 3’te yer verilmiştir.

Tablo 3: Son Test Bağımsız T Testi Sonuçları

Okullar	Değişken	Gruplar	N	X	SS	t	df	p
Yukarı İlkokulu	Tulgalı Son Test	Deney	23	79,130	7,485	9,387	77	,000
Aşağı İlkokulu	Tulgalı Son Test	Kontrol	15	54	8,904			

Tablo 3’te verilen bilgiler incelendiğinde deney ve kontrol grubunun son test sonuçları arasında anlamlı bir farklılık olduğu görülmektedir($p=,000$). Bu duruma göre deney grubu öğrencilerinin incelenen kazanım konusunda daha yüksek bir akademik başarıya ulaştıkları ortaya çıkmıştır.

TARTIŞMA, SONUÇ VE ÖNERİLER

Araştırma kapsamında simülasyon materyallerinden EBA’nın ilkokul dördüncü sınıf öğrencilerinin fen bilimleri dersindeki akademik başarıları üzerine etkileri incelenmiştir. Bu doğrultuda gerçekleştirilen ön test sonuçlarına göre başlangıç durumunda iki grup arasında anlamlı bir farklılık bulunamamıştır. İki gruptan ön test sonucu ortalaması daha düşük olan grup

deney grubu diğerk grup ise kontrol grubu olarak belirlenmiştir. Başlangıç durumları benzeşik olan bu gruplarda iki farklı şekilde öğretim gerçekleştirilmiş olup sonrasında son test uygulanmıştır. Deney grubunda öğretim EBA platformu desteği ile yapılırken kontrol grubunda öğretim müfredata uygun şekilde ve simülasyon materyalleri kullanılmadan gerçekleştirilmiştir. Bunun sonrasında gerçekleştirilen son test sonuçlarına bakıldığında iki grup arasında anlamlı bir farklılık olduğu gözlenmiştir. Deney grubunun akademik başarısında ciddi bir artış olmuş, kontrol grubuna nazaran daha yüksek bir akademik başarı seviyesine ulaştıkları görülmüştür. Buna göre EBA platformu desteği ile gerçekleştirilen eğitimin simülasyon kullanılmadan gerçekleştirilen eğitime göre daha etkili bir öğretim sağladığı ortaya çıkmıştır.

Araştırma sonucunda ulaşılan bilgi literatürde bu konuda gerçekleştirilmiş diğerk araştırmaları destekler niteliktedir. Teknolojik materyaller kullanılarak gerçekleştirilen öğretim öğrenciler üzerinde daha etkili olmakta, öğrencilerin derse daha çok ilgilerini çekmekte, derste daha aktif olmalarını sağlamakta ve daha yüksek bir akademik başarıya ulaşmalarını sağlamaktadır. Tüm bunlar göz önünde bulundurularak öğretmenlerin;

- öğretim esnasında mümkün olduğunca teknolojik materyalleri kullanmaya özen göstermeleri,
- öğrencileri teknolojik materyalleri kullanmaya teşvik etmeleri önerilmektedir.

Aynı zamanda teknolojik materyaller konusundaki bilgi eksikliğini gidermek amacıyla Halk Eğitim Merkezleri veya Milli Eğitim bünyesinde bu alandaki kursların artırılması, bu kurslara ulaşımın kolaylaştırılması ve katılımın teşvik edilmesi önerilmektedir.

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COENZYME Q10

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Abstract

One naturally occurring antioxidant that is produced by living things is coenzyme Q10 (Coq10). "Q" stands for quinone group and "10" for the quantity of isoprenyl units at the end. In all cells, Coq10 performs a variety of essential roles in both mitochondria and extramitochondrial processes. The coenzyme is known to directly mediate the expression of numerous genes and functions as a fat-soluble antioxidant. Coq10 can shield cell function from oxidative stress because of its strong free radical scavenging action, which has been shown to preserve mitochondrial membrane potential and prevent DNA damage and protein oxidation. It is mostly found in high-energy-requiring organs like the liver, kidney, and heart, where there are lots of mitochondria. It is a redox agent that helps with the creation of ATP in these organs. One significant fat-soluble antioxidant is coenzyme Q10. Their job is to shield membranes from free radical-induced oxidative damage. Coq10 has the ability to successfully stop oxidation of lipids and proteins as well as damage to DNA. The majority of the daily required quantity of Coq10 is generated by the body, with small amounts coming from the diet. The liver seems to be the primary location of Coq10 biosynthesis in the body when taking into account tissue Coq10 levels and organ weight. All cells' metabolism depends heavily on Coq10, and a lack of it is linked to the etiology of certain diseases. General information on coenzyme Q10 is provided in this article.

Keywords: Coq10, Oxidative Stress, Coq10 Deficiency, Antioxidant

Introduction

Natural antioxidants like Coenzyme Q10 (Coq10) are produced by living things (Ulla et al., 2017). The quinone group is denoted by the letter "Q," and the number of isoprenyl units at the tail end is indicated by the letter "10." This is a 1,4-benzoquinone (Lee et al, 2013). In all cells, Coq10 performs a variety of essential roles in both mitochondria and extramitochondrial processes. Coq10 is a fat-soluble antioxidant that plays a significant role in fatty acid, pyrimidine, and lysosomal metabolism in addition to its critical role in mitochondrial oxidative phosphorylation. It also directly regulates the expression of numerous genes, including those linked to inflammation (Hargreaves et al., 2020). Although CoQ10 is frequently referred to be similar to vitamins, it is not a vitamin by definition because it is made by different bodily tissues (Acosta et al., 2016). The liver, kidney, and heart—organs with high energy needs—are home to a large number of mitochondria, which is where coq10 is mostly found. As a mobile redox agent, Coq10 contributes significantly, along with other molecules, to the movement of electrons along the electron transport chain in the mitochondria, which leads to the generation of ATP (Bhagavan and Chopra, 2006). Furthermore, Coq10 has the ability to shield cell function from oxidative stress due to its strong free radical scavenging action, which maintains mitochondrial membrane potential by reducing DNA damage and protein oxidation. (Ulla et al., 2017; Bhagavan and Chopra, 2006; Noh et al., 2013). In addition to serving as an electron carrier in the respiratory chain of the mitochondria during the generation of ATP, reduced (ubiquinol) Coq10 is a significant antioxidant. Coq10 shields membranes from oxidative damage brought on by free radicals and is found in both cellular and intracellular membranes, such as those found in mitochondria, lysosomes, peroxisomes, and endoplasmic reticulum (Crane, 2001). The only antioxidant that is fat-soluble and produced internally is coenzyme Q10 (Mantle and Hargreaves, 2023).

OXIDATIVE STRESS

The imbalance between reactive oxygen species (ROS) and antioxidant enzyme levels is known as oxidative stress (Silva et al., 2022). Antioxidant-rich compounds like Coq10 help lessen the cellular imbalance brought on by elevated ROS. Because Coq10 protects mitochondrial functioning and has antioxidant action, it plays a role in controlling redox homeostasis.

As a significant lipid-soluble antioxidant, coenzyme Q10 guards against oxidative stress brought on by free radicals in both mitochondrial and extra-mitochondrial (Golgi apparatus, lysosomes, endoplasmic reticulum, and peroxisomes) cellular membranes (Hargreaves, 2003). By boosting the cellular defense system, dietary substances with antioxidant capacity can lower

oxidative stress and prevent oxidative damage and related disorders (Valko et al., 2007; Petrou and Terzidaki, 2017).

According to De Barcelos and Haas (2019), Coq10 can successfully stop oxidation of lipids and proteins as well as damage to DNA. Numerous plants, animals, and other living things contain the vital vitamin component coq10 (Dimozi et al., 2015; Kim et al., 2019). In humans and other mammals, ubiquinone is the most prevalent oxidized form of Coq10. However, its quickly reduced active form, ubiquinol, functions as an antioxidant by scavenging free radicals to guard against lipid peroxidation by regenerating tocopherol, thereby averting oxidative stress-induced cell damage (Yasukazu et al, 2006; Martin et al, 2007). Additionally, Coq10 serves as an oxidative inhibitor of proteins and DNA, a cofactor in the synthesis of ATP, a membrane stabilizer, and a crucial component in the transport of oxidative phosphorylation in mitochondria (Ayer and Macdonald, 2015)

Because Coq10 is lipophilic, it absorbs more readily when consumed with fatty meals and does so in a manner akin to that of lipids in the gastrointestinal system (Raizner, 2019). Pancreatic and bile secretions assist in its absorption in the small intestine. Coq10 is converted to ubiquinol after absorption and then carried to the liver (Bhagavan and Chopra, 2006).

All tissues have different quantities of Coq10; tissues with high energy needs or metabolic activity, such as the heart, kidney, liver, and muscle, have the highest concentrations of Coq10 (Taylor, 2018). According to Qu et al. (2018), Coq10 is mainly found in these tissues as ubiquinol and is mainly concentrated in mitochondria, indicating its significance in mitochondrial activity.

While the exact daily requirement for Coq10 is unknown, estimates suggest that it is roughly 500 mg/day based on a 2000 mg total body pool and a four-day average tissue turnover period (Weber et al, 1997). The majority of the daily requirement for Coq10 is produced by the body, with a little amount (about 5 mg) coming from the diet (Weber et al, 1997). While Coq10 is produced in a variety of tissues, the kidney, heart, skeletal muscle, and liver are the main places where it is present in large concentrations (Martelli et al, 2020). Nonetheless, based on organ weight and tissue Coq10 levels ($\mu\text{g/g}$ tissue), the liver seems to be the primary location of Coq10 production in the body (Hargreaves et al, 2020).

COQ10 DEFICIENCY

Primary and secondary Coq10 deficiencies are the two main categories of Coq10 deficiency (Potgieter et al, 2013). Mutations in genes related to the Coq10 biosynthesis pathway result in primary Coq10 deficit (Salviati et al, 2017). According to Salviati et al. (2017), a mutation in

any one of these genes can lead to a shortfall in Coq10 status. At least 10 genes are necessary for the production of functioning Coq10.

Thus far, mutations in the following ten genes have been found in humans: Coq4 (Bosch et al., 2018), Coq5 (Malicdan et al., 2018), Coq6 (Doimo et al., 2014), Coq7 (Freyer et al., 2015), Coq8A (Chang et al., 2018), Coq8B (Feng et al., 2017), and Coq9 (Duncan et al., 2009).

Mutations in genes unrelated to the Coq10 biosynthesis pathway or non-genetic factors linked to a variety of illnesses are the causes of secondary coenzyme q10 deficiency (Yubero et al, 2018). Mutations in the APTX gene, which encodes the protein aprataxin in ataxia oculomotor aprataxin 1 disorder, and in the BRAF gene, which encodes the serine/threonine-protein kinase B-Raf enzyme in cardiofaciocutaneous syndrome, are two examples of secondary Coq10 deficiency resulting from such genes (Castellotti et al, 2011; Aeby et al, 2011). 2007).

Certain pharmacotherapies, including statins and the antidepressant amitriptyline, have also been linked to a secondary deficiency in Coq10 status (Neergheen and Hargreaves, 2018). According to Hargreaves et al. (2005), statins selectively block HMG-CoA reductase, the enzyme that limits the manufacture of cholesterol, with the aim of targeting the liver. Given that the routes for the manufacture of cholesterol and Coq10 are similar, a reduction in HMG-CoA reductase activity may hinder the biosynthesis of Coq10.

Due to their high energy requirements, primary Coq10 insufficiency can affect any area of the body, however it most commonly affects the brain, muscles, and kidney tissues. The symptoms differ in terms of intensity and duration (Salviati et al, 2017). A variety of additional neurological symptoms, including ataxia, can result from a lack of Coq10 in the brain tissue. Coq10 deficiency in cardiac tissue causes heart muscle weakness, which is a feature of hypertrophic cardiomyopathy, and in renal tissue causes nephrotic syndrome and renal failure (Salviati et al, 2017).

Chronic kidney disease (Hargreaves et al., 2019), liver disease (Hargreaves and Mantle, 2019), cardiovascular disease (Mantle, 2015), type II diabetes (Mantle, 2017), mitochondrial myopathies (Hargreaves, 2014; Yubero et al., 2016), and critical illnesses (Mantle and Hargreaves, 2019) are among the conditions that commonly cause secondary Coq10 deficiencies.

CONCLUSION

All cells' metabolism depends heavily on Coq10, and a lack of it is linked to the etiology of certain diseases. Elevations in oxidative stress may lead to Coq10 depletion. It is not surprising that Coq10 loss is linked to a wide range of illnesses given the significance of Coq10 in cell

function (Hargreaves et al, 2020). There have been reported randomized controlled trials that support Coq10 in several illnesses, with varying degrees of success (Mantle et al., 2023). This could be connected to several unresolved concerns that are still being investigated, including the best way to administer the supplement and the various tissues' capacities to absorb Coq10 following its absorption from the digestive system (Mantle and Dybring, 2020). The hypothesis that Coq10 may lower morbidity and death and enhance quality of life is supported by research findings. Some studies' conclusions, meanwhile, were derived from preclinical or clinical research using different endpoints. Future attention to this matter is required. Lastly, more randomized research should be done to assess if COQ10 supplementation affects survival.

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İMALAT SİSTEMLERİ İLE TÜMLEŞİK ÇALIŞABİLEN BİR MOBİL ROBOTUN ENERJİ TÜKETİMİNİN DENEYSEL İNCELENMESİ

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Özet

Modern imalat sistemlerinde, ürünler; farklı imalat rotalarını takip ederek, delme, kesme, boyama vb. çeşitli işlemlerin ardından nihai ürün haline gelmektedir. Esnek imalat sistemleri olarak sınıflandırılan bu sistemlerde hızlı, güvenilir, kaliteli ve ekonomik üretim koşulları elde edilmektedir. Genel olarak bir esnek imalat sistemi; bilgisayar kontrollü makinelerin, konveyör bantların, endüstriyel robotların, mobil robotların ve diğer cihazların birleşiminden meydana gelmektedir. Çeşitli imalat tekniklerine kolaylıkla uyarlanabilen esnek imalat sistemleri; üretim verimliliğini de artırmaya yardımcı olmaktadır. İmal edilen ürün çeşitlerinin artması ve imalat senaryolarının değişmesine kolayca uyum sağlaması nedeniyle bu sistemler, klasik imalat sistemlerine göre büyük avantaj sağlamaktadırlar. Fabrikalar, depolar, dağıtım ve aktarma merkezleri gibi parça taşımının yoğun olduğu alanlarda, mobil robot olarak tanımlanan Otomatik Yönlendirmeli Araçlar yaygın biçimde kullanılmaktadır. Üretime entegre mobil robotların kontrolünde üretim planlamasını dikkate alan rota organizasyonunun yanı sıra ilgili robotun batarya durumu ve şarj senaryolarının da göz önünde bulundurulması gerekmektedir. Bu çalışmada, laboratuvar ortamında bir imalat sistemi ile entegre edilmiş Robotino mobil robotu kullanılarak deneysel çalışmalar gerçekleştirilmiştir. İlk olarak belirlenen örnek bir yörüngede mobil robot sabit bir hızla hareket ettirilerek, enerji tüketiminin belirlenmesine yönelik robot bataryasının elektriksel parametreleri ölçülmüştür. Deneysel imalat sistemi ve mobil robot belirlenen bir üretim senaryosu çerçevesinde çalıştırılmıştır. Mobil robotun hareket ve kontrol görevlerini yerine getirirken enerji tüketimi dikkate alınarak, bu değer belirlenen kritik seviyeye ulaşması durumunda mobil robotun şarj istasyonuna geri dönmesi sağlanmıştır. Şarj istasyonuna dönen robot, şarj edildikten sonra görevini kaldığı yerden tamamlamaktadır. Gerçekleştirilen çoklu denemelerde robot kontrolünün planlandığı biçimde gerçekleştirildiği gösterilmiştir.

Anahtar Kelimeler: Mobil Robot, Kontrol, Enerji Tüketimi, Batarya Modelleme

EXPERIMENTAL INVESTIGATION OF THE ENERGY CONSUMPTION OF A MOBILE ROBOT INTEGRATED WITH MANUFACTURING SYSTEMS

Abstract

In modern manufacturing systems, goods become final products after various processes such as drilling, cutting, painting, etc. by following different manufacturing routes. In these systems, which are classified as flexible manufacturing systems, fast, reliable, high-quality, and economical production conditions are achieved. In general, a flexible manufacturing system consists of a combination of computer-controlled machines, conveyor belts, industrial robots, mobile robots, and other devices. These manufacturing systems that can be easily adapted to various manufacturing techniques also help increase production efficiency. They provide a great advantage over classical manufacturing systems as the variety of products produced increases and they easily adapt to changing manufacturing scenarios. Automated Guided Vehicles, defined as mobile robots, are widely used in areas where parts transportation is intense, such as factories, warehouses, distribution centers, and transfer centers. In the control of mobile robots integrated into production, in addition to the route organization that takes production planning into account, the battery status and charging scenarios of the relevant robot must also be taken into consideration. In this study, experimental studies were carried out using the Robotino mobile robot integrated with a manufacturing system in a laboratory environment. First, the robot was moved at a constant speed in a determined sample path, and the electrical parameters of the robot battery were measured to determine energy consumption. The experimental manufacturing system and robot were operated within the framework of a determined production scenario. While executing the motion and control tasks, the mobile robot takes into account its energy consumption. In the event that this consumption reaches a predetermined critical level, the robot is programmed to return to the charging station. Upon returning to the charging station, the robot completes its task from where it left off after being recharged. Multiple experiments have demonstrated that the robot control is executed as planned.

Keywords: Mobile Robot, Control, Energy Consumption, Battery Modeling

Giriş

Endüstriyel robotlar, otonom veya önceden programlanmış görevleri yerine getirebilen elektromekanik cihazlardır. Güncel tanımı ile robotlar, elektronik ve mekanik birimlerden oluşan, algılama yeteneğine sahip olan ve programlanabilen cihazlardır. Robotlar, mevcut yapılarına, çalıştıkları ortamlara veya görevlerine göre gruplandırılmaktadır. Özellikle mobil robot olarak adlandırılan, yani hareket edebilen ve parça taşıma görevini yerine getirebilecek robotların yörünge veya rota olarak adlandırılan hareket planlanması önemli bir araştırma konusudur.

Mobil robot entegrasyonu gerçekleştirilmiş bir üretim sisteminde, üretim planlama en önemli problemdir. Wiendahl vd., (2015); üretim planlamanın temel amacını, daha büyük dağıtım kapasitesi arayışı olarak mümkün olan en düşük lojistik ve ürün ile güvenilirlik maliyeti olarak formüle edilebileceğini belirtmişlerdir. Literatürde, parça taşımayı etkin olarak yerine getirecek üretim planının oluşturulmasına yönelik, birçok teorik optimizasyon algoritması önerilmiştir. Üretim hattında kullanılması gereken robot sayısı ve zaman gecikmelerini en aza indirmek için bir matematik model önerilmiştir. Bu çalışmada dinamik araç paylaşımı için sezgisel bir algoritma da önerilmiştir (Huisman vd., 2004). İm ve arkadaşları tarafından otomatik olarak araç engelleme ve dağıtım sürelerini en aza indiren malzeme taşıma sistemleri için etkili bir araç gönderme kuralı önerilmiştir (Im vd., 2009). Başka bir çalışmada ise verimliliği artırmak, dağıtım maliyetini en aza indirmek, makinelerin ve Otomatik Yönlendirmeli Araçların eşzamanlı programlanması için yerçekimsel bir arama algoritması tasarlanmıştır (Nageswararao vd., 2017). Bu tür problemleri çözmek için genetik algoritma (Baker vd., 2003), benzetilmiş tavlama algoritması (Tavakkoli-Moghaddam vd., 2006), karınca kolonisi optimizasyonu (Donati vd., 2008) ve kombinasyonu çoklu sezgisel algoritmaların analizi (Tan vd., 2006) gibi birçok algoritma önerilmiştir. Dal-sınır ve dinamik programlama gibi kesin algoritmalar, küçük ölçekli üretim planlama optimizasyon problemleri için iyi bir çözüm kalitesine sahiptir, ancak ölçek arttığında hesaplama karmaşıklığı da katlanarak artmaktadır. Akıllı algoritmalar karmaşık ve büyük ölçekli problemlerin çözümünde iyi bir performansa sahiptir. Bununla birlikte, her algoritmanın kendi eksiklikleri vardır. Örneğin, genetik algoritma erken yakınlaşmaya yatkındır ve hesaplama etkinliği düşüktür; karınca kolonisi algoritması ise yakınsaklıkta yavaştır ve yerel optimum içine düşmek kolaydır. Bu nedenle, en iyi çözümü elde etmek için algoritmaları geliştirmek gerekmektedir.

Üretim planlama optimizasyon teorileri ile ilgili yukarıdaki çalışmalar geleneksel üretim hatlarındaki malzeme dağıtım sorunlarına odaklanmaktadır. Modern imalat sistemlerinde, Endüstri 4.0 ve nesnelerin interneti (IoT) konseptine uygun olarak, veri toplama, prosesin ve üretim verimliliğinin izlenmesi, mobil robotların konumlarının ve görevlerinin izlenmesine imkan sunan sistem konfigürasyonlarına ihtiyaç duyulmaktadır. Bu yeni konsept uygun olarak yapılan bir çalışmada, her türlü üretim kaynağını görsel olarak yönetmek ve kontrol etmek için kablosuz sensör ağlarına ve Radyo Frekansı ile Tanımlamaya (Radio Frequency Identification - RFID) dayalı bir gerçek zamanlı konum sistemi (Real Time Location System - RTLS) önerilmiştir (Zhong vd., 2012). Huang ve arkadaşları; boyalı gövde depolamasının görselleştirilmesini ve kontrol edilebilirliğini geliştirmek için bir RFID etkin gerçek zamanlı izleme sistemi geliştirmiştir (Huang vd., 2017). Diğer bir çalışmada ise üretim planlama verisinin toplanması ve lojistik durum bilgisinin çıkarılması için bir yöntem önerilmiştir Atölye lojistiğinin sağlıklı durumu, istasyon ve malzemelerin lojistik verilerinin tespiti ile değerlendirilmiştir (Tang vd., 2014). Min ve arkadaşları, imalat sistemlerindeki enerji tüketiminin planlanması ile çevresel faydalar elde edileceğini belirtmişlerdir (Min vd., 2014). İmalat sistemlerini “temiz imalat” olarak isimlendirebilmek için atık ve emisyon oranı düşük, ürün çıktısı çok ve çevre dostu olması gerektiğine değinilmiştir. IoT ile birlikte imalat sanayinin akıllı sensörler, RFID vb. tekniklerle enerjiye duyarlı üretim planlaması yapılabilmektedir (Ma vd., 2019).

Mobil robot entegrasyonunda bir diğer önemli konu ise robotun enerji depolama sistemi ve bu sistemin yönetimidir. En yaygın kullanılan enerji depolama sistemleri bataryalar olmakla beraber bu sistemlerin karakteristiklerini belirlemede maliyet, kullanım ömrü, boyut, bakım ve enerji yoğunluğu ön plana çıkmaktadır (Rashid vd., 2018). Batarya enerji yönetiminde batarya modelleme büyük bir önem taşımaktadır. Bataryaların şarj ve deşarj durumlarında kapasiteleri değiştikçe çıkış gerilimleri de değişiklik göstermektedir (Jongerden vd., 2009). Geçtiğimiz yıllarda literatürde çeşitli batarya modelleri önerilmiş ve geliştirilmiştir. Genel olarak bu modeller; kimyasal modeller, ampirik modeller, stokastik modeller, elektrik devre modelini içeren soyut modeller ve hibrit modeller olarak sınıflandırılabilir (Tao vd., 2017). Bu modeller batarya davranışını simüle etmeyi ve kullanılabilir batarya kapasitesi, gücü vb. özellikleri doğru şekilde tahmin etmeyi sağlamaktadır (Jongerden vd., 2008). Bu sayede mobil robotlar, mobil cihazlar, elektrikli araçlar gibi batarya kullanan teknolojilerde oluşturulan modeller ile tüketimler belirlenmekte ve bu tüketimler doğrultusunda batarya enerji ve şarj yönetimi

yapılmaktadır. Çalışma kapsamında FESTO FMS ve Robotino (Festo, 2021) mobil robotu kullanılarak deneysel batarya modeli oluşturulmuş ve batarya durumuna göre hareket kontrolü gerçekleştirilmiştir.

2. MATERYAL VE YÖNTEM

Çalışma kapsamında Bursa Teknik Üniversitesi, Mekatronik Mühendisliği laboratuvarlarında yer alan esnek imalat sistemi ve Robotino mobil robot kullanılmıştır. Şekil 1’de ilgili laboratuvarda bulunan Festo Didactic tarafından geliştirilen esnek üretim sistemi görülmektedir (Festo, 2021).



Şekil 1. Festo MPS500 esnek üretim sistemi (Festo, 2021).

Genel olarak bir esnek üretim sistemi; bilgisayar kontrollü makinelerin, konveyör bantların, endüstriyel robotların, mobil robotların ve diğer cihazların birleşiminden oluşmaktadır. Çeşitli imalat tekniklerine kolaylıkla adapte edilebilen esnek üretim sistemleri; üretim hızını, kalitesini ve verimliliğini de artırmaya yardımcı olmaktadır. İmal edilen ürün çeşitlerinin artması ve üretim senaryolarının değişmesine kolayca uyum sağlaması nedeniyle, klasik üretim sistemlerine göre büyük avantaj sağlamaktadırlar. Şekil 2’de Festo Didactic tarafından geliştirilen ve taşıma işlemlerini gerçekleştiren Robotino mobil robotu görülmektedir (Festo, 2021).



Şekil 2. Robotino mobil robotu (Festo, 2021).

Robotino mobil robotu, Festo Didactic tarafından eğitim, simülasyon ve araştırma amaçlarıyla üretilmiştir. Yüksek hassasiyeti ve üstün hareket kabiliyetleri sayesinde endüstride otomatik yönlendirmeli araç olarak da kullanılabilir. Birçok mekanik sistemin ve çeşitli sensörlerin rahatlıkla entegre edilebilmesi, kullanıcı dostu programlama arayüzü ve kontrol imkanı sağlamasından dolayı endüstride ve eğitimde oldukça talep görmektedir. Basic ve Premium olarak iki çeşidi bulunan bu mobil robot; çeşitleri arasında işlemci hızı, motor gücü, desteklenen sensör sayısı ve montaj kulesi gibi farklılıklar göstermektedir.

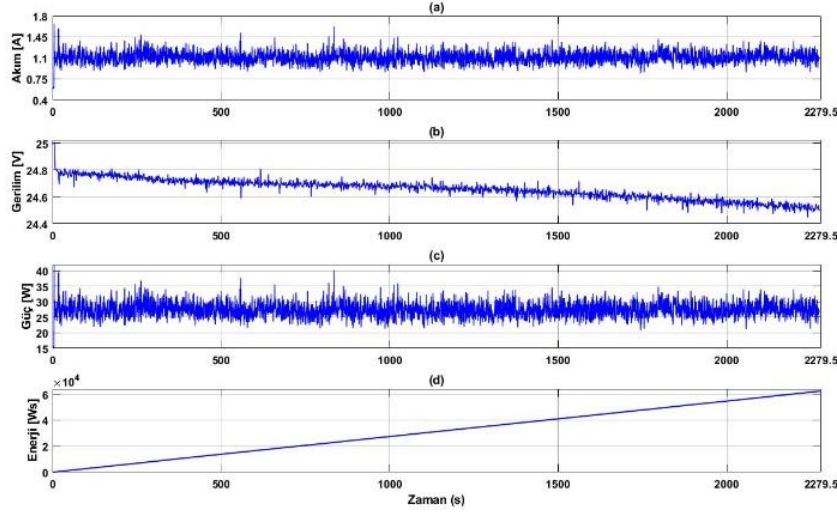
3. ROBOT BATARYASININ ENERJİ TÜKETİMİ

Robot içerisinde Leoch LP12-9 marka ve modelinde 12 V değerinde iki adet seri bağlı kurşun-asit yapılı batarya sistemi bulunmaktadır. Bataryaların nominal kapasitesi 9 Ah'dir (Leoch, 2021). Negatif yüklü elektrodunda süngersi kurşun kullanılırken pozitif elektrotta kurşun dioksit (PbO₂) kullanılan kurşun-asit bataryalar, gelişmiş teknolojilerinin yanı sıra yaygın olarak kullanılan düşük maliyetli enerji depolama birimidir. Kurşun-asit bataryalar güvenli çalışma bandında çalışabilmesi için nominal kapasitesinin %20'sine kadar deşarj edilmesi uygundur (Jongerden vd., 2008, Tezde ve Okumuş, 2018)

Batarya sisteminin kapasitesini belirlemek için Şekil 3'te gösterilen 6500 mm uzunluğundaki güzergahta robot; sabit 250 mm/s hızda çalıştırılmıştır. Şekil 4'te deney süresi boyunca robotun, batarya sisteminden çektiği akım, gerilim, güç ve enerji ifadeleri gösterilmektedir. Şekle göre robotun başlangıç durumunda batarya devresinin uç gerilimi 25 V olarak ölçülmüştür. Batarya devresinin uç gerilimi 24,5 V olduğunda robot bekleme (stand-by) durumuna geçmektedir. Bu süre boyunca robot 17,32 Wh'lik ($6,235 \times 10^4$ Ws) enerji tüketimi gerçekleştirmiştir.

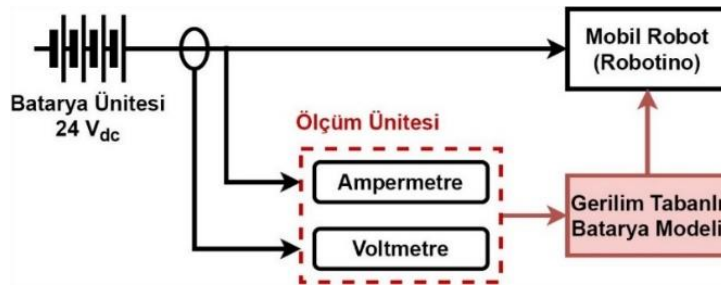


Şekil 3. Robotino test güzergahı.

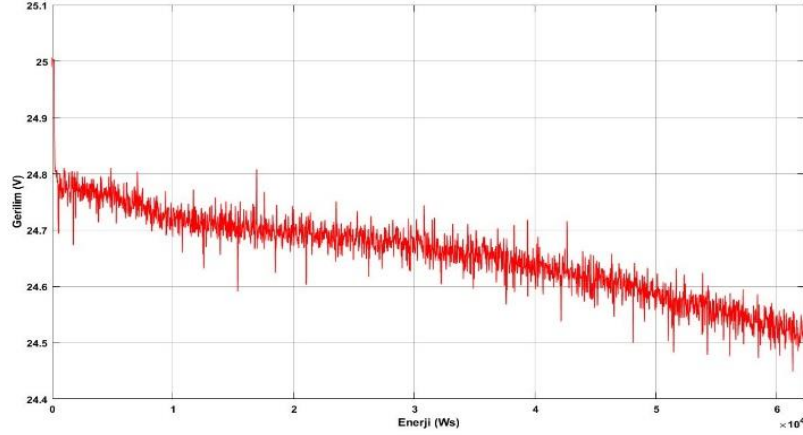


Şekil 4. Robotun hareket testi boyunca (a) akım (b) gerilim (c) güç (d) enerji değişimi.

Kurşun-Asit bataryaların kapasitesini belirlemek için kullanılan temel yöntemlerden gerilim tabanlı kapasite belirleme yöntemi, batarya deşarj oldukça gerilimin de düşmesi prensibine dayanmaktadır (Khaligh ve Li, 2010). Genel olarak bataryanın elektromotor kuvveti, terminal gerilimine eşit sayılmaktadır. Ancak kapasite sifıra yaklaştığında terminal gerilimi aniden düşmektedir (Sato vd., 2002). Bu çalışmada ise gerilim ve enerji tüketimi ilişkisi prensip alınmıştır. Böylece tüketilen enerjiye karşılık gelen anlık gerilim değerleri ölçümler sonucu Şekil 4'te elde edilen değerler doğrultusunda modellenmiştir. Ayrıca belirli bir kesme gerilimi ayarlanarak kapasitenin sifıra düşmesi engellenmiştir. Şekil 5'te oluşturulan modelin blok şeması gösterilmektedir. Ayrıca, oluşturulan bu modelde gerilimin enerji tüketimine göre değişimi de Şekil 6'da gösterilmektedir.



Şekil 5. Batarya modeli blok şeması.

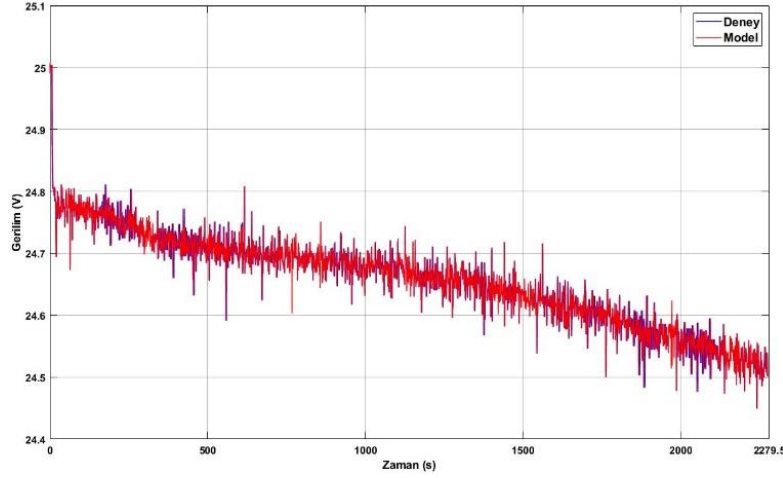


Şekil 6. Bataryanın enerji durumuna göre gerilim değerleri.

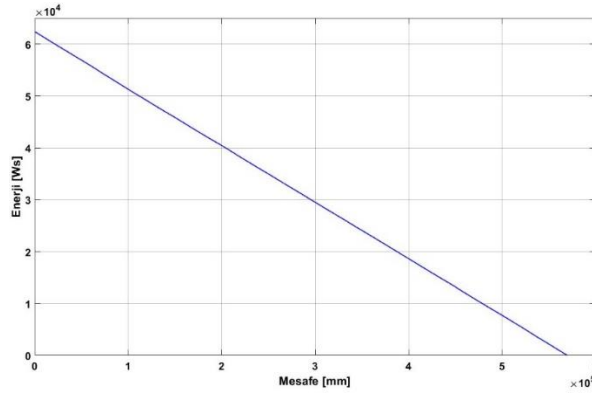
Bataryalar aşırı şarj/deşarj edildiklerinde plakalarında aşınma gerçekleşebilir ve bunun sonucunda kimyasal değişimler meydana gelerek bataryanın şarj kapasitesi düşmektedir (Tezde ve Okumuş, 2018). Bataryanın derindeşarjının önlenmesi ve robotun tekrar şarj istasyonuna en uzak mesafede dahi ulaşmasını sağlamak için gerilim 24,55 V'a düştüğünde robot şarj istasyonuna gitmektedir. Gerilimin sürekli olarak değişmesi dikkate alınarak, robot batarya sisteminin gerilimi 10 s boyunca 24,55 V altında çalışması durumunda robot şarj istasyonuna gitmeye karar vermektedir. Ayrıca, Şekil 7'de robotun test süresi boyunca deneysel olarak gözlemlenen gerilim değişimi ve modelleme sonucu elde edilen gerilim değişimi gösterilmektedir.

Robot, 17,32 Wh'lik enerji tüketimi süresince 250 mm/s sabit hızla çalıştığında $5,69 \times 10^5$ mm'lik bir mesafe boyunca hareket etmektedir. Şekil 8'de enerji durumuna göre robotun alabileceği mesafe gösterilmektedir. Ayrıca enerji durumu ve mesafe arasındaki ilişki matlab "curve fitting" uygulamasının kullanımı ile birinci dereceden polinom şeklinde modellenmiştir. Burada; P enerji kapasitesi olup birimi Ws'dir. d ise alınan mesafe olup birim mm'dir.

$$P = -0,1092 \times d + (6,23 \times 10^{-4})$$



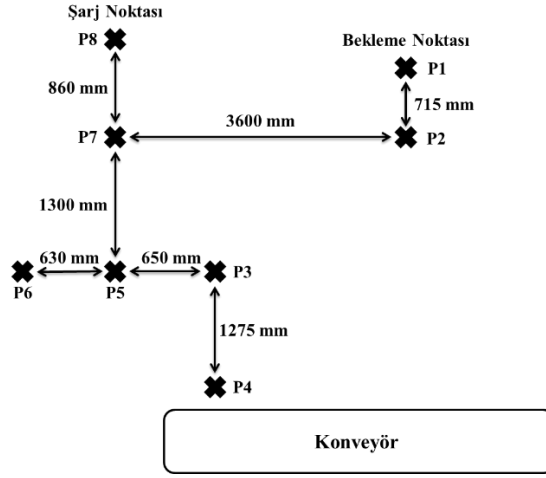
Şekil 7. Bataryanın deneysel ve benzetimsel gerilim değişimi.



Şekil 8. Enerji durumuna göre alınan mesafe.

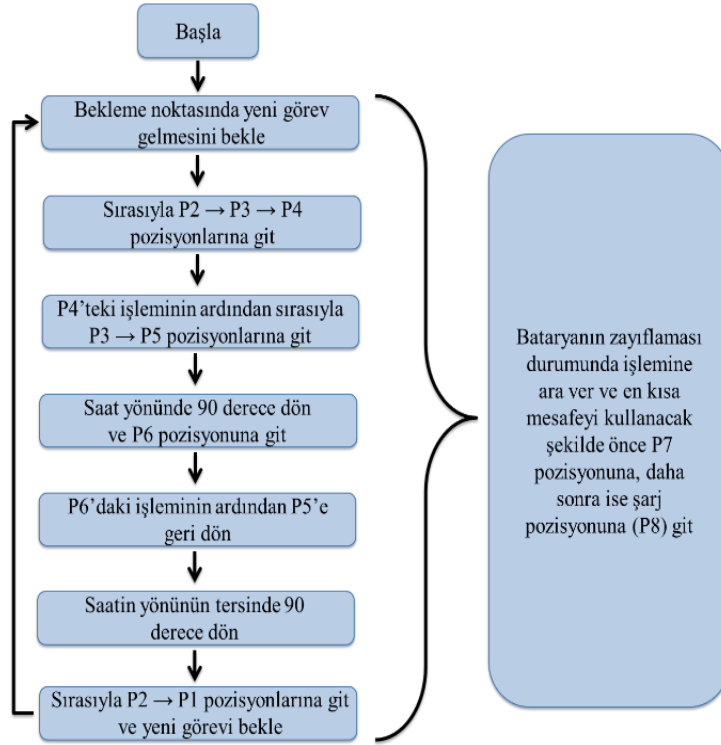
4. ÜRETİM SİSTEMİNE ROBOT ENTEGRASYONU

Çalışmada gerçekleştirilecek üretim senaryoları için, Robotino mobil robotunun yörünge planlaması hazırlanmıştır. Robotino'nun hareketlerinin kontrolünü sağlamak için, Robotino View programı içerisindeki "Odometry" bloğu kullanılmıştır. Odometry, mobil robotun hareketi esnasında, robotun x ve y eksenlerindeki mesafe değişimleri ile kendi eksenine etrafındaki rotasyon açısındaki değişiminin bilgilerini veren bir sensördür. Robotun ortamdaki hareketini gerçekleştirmesi için laboratuvar içinde sekiz adet pozisyon belirlenmiştir. Bu pozisyonların temsili görünümü Şekil 9'da verilmiştir.



Şekil 9. Laboratuvardaki pozisyonlar ve mesafeler.

Belirlenen pozisyonlara göre Robotino'nun Odometry sensöründen gelen verilerle mesafe değişimleri belirlenerek, her bir pozisyona ulaşıldığında Odometry sıfırlanmış ve robotun gideceği rotaya göre hangi yönde ne kadar hareket edeceği programlanmıştır. Robotino, bataryalarının doluluk oranına göre ya şarj noktasına gidip kendini şarj etmeli ya da gerçekleştireceği görevlerini tamamlayıp bekleme noktasına gitmelidir. Bu işlemler için oluşturulmuş algoritma Şekil 10'da görülmektedir. Robotino için oluşturulan algorithmada, robot ilk olarak başlangıç pozisyonunda beklemektedir. Yeni bir görev bilgisi alındıktan sonra, robot bu işlemi gerçekleştirmek için ilgili konuma gider, burada işlemi tamamlar ve bekleme noktasına geri döner. Robotino içerisindeki bataryaların durumu, hareketin her aşamasında kontrol edilmektedir. Bataryalarda düşüş tespit edildiği anda, robot bulunduğu konumdan şarj ünitesinin bulunduğu konuma hareket eder ve burada şarj işlemi tamamlanana kadar bekler. Şarj işlemi bittikten sonra ise işlemine en son kaldığı yerden devam ederek görevini tamamlar.



Şekil 10. Robotino hareket algoritması.

Robotino mobil robotu için oluşturulan hareket algoritmasına uygun olarak Robotino View yazılımında kontrol programı oluşturulmuştur. Programda yer alan “batarya” bloğu ile Robotino'nun bataryaları her adımda kontrol edilirken, diğer adımlarda ise robotun gerçekleştireceği görevler ve hareketler bulunmaktadır. Robotino View yazılımında oluşturulan program sonucunda, robotun çalışması esnasında gerçekleştirdiği hareketler Şekil 11’de sunulmuştur. Robotun bataryalarının ideal şekilde çalıştığı durumda, robot şarj noktasına uğramadan hareketini tamamlar ve bekleme noktasına geri döner.

Mobil robotun bataryalarında düşüş algılandığında, robot bulunduğu konumdan Şekil 12’de görülen şarj istasyonuna gider ve bataryalarını doldurduktan sonra ise işleme kaldığı yerden devam eder.



Şekil 11. Robotun çalışması esnasındaki hareketleri.



Şekil 12. Robotun şarj edilmesi.

5. SONUÇLAR

Sanayide dijital dönüşümün hızlanması ile uzaktan erişimin arttığı, üretimin anlık izlenerek üretim verimliliğinin maksimuma ulaştırıldığı akıllı fabrikalar için kontrol, otomasyon ve yönetim sistemlerinin oluşturulması konuları önem kazanmıştır. Bu kapsamda, esnek imalat sistemleri ve bu sistemlerle bütünleşik çalışan mobil robotların kontrolü hem sanayiden hem de akademiden yoğun ilgi çekmektedir. Modern üretim tesisleri için bir diğer önemli konu ise enerji tüketimi ve enerji verimliliği konularıdır. Sunulan çalışmada deneysel bir esnek üretim

sisteminin bulunduđu laboratuvar ortamındaki mobil robotun, üretim sisteminde montajı tamamlanmış parçaları alma, depoya bırakma ve şarj istasyonu noktaları arasındaki hareketi planlanmıştır. Mobil robot için enerji tüketimi deneysel olarak modellenmiştir. Enerji tüketimini dikkate alan hareket planlamasına yönelik algoritma gerçekleştirilmiş ve başarılı olarak çalıştığı gözlemlenmiştir.

6. TEŞEKKÜR

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BİR ARAYÜZ OLARAK KARAGÖZ PERDESİNİN İNCELENMESİ

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ÖZET

Karagöz oyunu, kendine has perdesi, perdenin arka tarafında yanan mumdan oluşan bir ışığı ve renklendirilmiş bir deriden yapılmıştır. Bir çubukla beraber ışığın önünde hareket eden figürleriyle ve birçok aksesuarıyla dikkat çekmektedir. Somut Olmayan Kültürel Miras içerisinde bulunan Karagöz oyunu, hem tasavvuf ile bağlantılı hem de dünyevi olaylar ile ilgisi bulunmaktadır. Bir ışık kaynağının can üflediği tasvir olarak karşımıza çıkan Karagöz oyunu tasvirlerin canlanmasıyla beşeri özellikler göstermektedir. Oyunun başlangıcında da bu perdenin ibret perdesi olduğundan bahsedilmektedir. Bu açıdan bakıldığında Karagöz perdesinin beşeri bir dünyaya dönüştüğü görülmektedir. Bu dünya ise tüm sanatsal biçimlerin ve içeriklerin belirlendiği gibi dönemini mekân ve zamanını yansıtan önemli bir bağlamdır. Burada İstanbul mahallelerinin yaşam biçimleri, insanları, ekonomik durumları, okur-yazarlık oranları, kadın-erkek ilişkileri ve farklı milletlerden insanların bir arada yaşamları aktarılmaktadır. Bu yönüyle düşünüldüğünde Karagöz oyunu sırlı bir ayna gibi görülmektedir. Bir tarafında tasavvufi bir anlamla yüz yüze gelirken bir diğer tarafta tamamen beşeri yüzünü göstermektedir. Tam da bu çift yönlülüğü ile Karagöz oyunu dünyevi ve kutsal arasında bir arayüz özelliği kazanmaktadır. Karagöz oyununa bir arayüz olarak dünyevilik ve kutsallık arasında bir ara mekân özelliği taşımaktadır. Aslında gölge oyunu halk bilimsel çalışmalarda geleneksel tiyatro türleri üzerinden çözümlenirken bir taraftan da tasavvuf ile olan bağları üzerinden de irdelenmektedir. Özellikle bir ışık kaynağı tarafından ruhları oluşan tasvirlerin tasavvufi düşüncenin “özden var olma” ve “öze dönüş” fikirlerini görselleştirmesi bu açıdan dikkate değerdir. Bu düşünce temelinde Karagöz oyununun biçim ve içeriği bir yanıyla kutsal diğer yanıyla beşeri olduğundan hareketle bir arayüz olarak incelenmiştir.

Anahtar Kelimeler: Karagöz oyunu, perde, arayüz, mekân, dünyevi, kutsal

EXAMINATION OF THE KARAGÖZ SCREEN AS AN INTERFACE

Abstract

The Karagöz play has its own curtain, a light made of a burning candle behind the curtain, and is made of colored leather. It attracts attention with its figures moving in front of the light with a stick and many accessories. Karagöz play, which is included in the Intangible Cultural Heritage, is related to both Sufism and worldly events. Karagöz play, which appears as a depiction of a light source breathing life, shows human characteristics with the animation of the depictions. At the beginning of the play, it is mentioned that this curtain is a lesson curtain. When viewed from this perspective, it can be seen that the Karagöz screen has transformed into a human world. This world is an important context that reflects its period, space and time, as well as determining all artistic forms and contents. Here, the lifestyles of Istanbul neighborhoods, their people, their economic situation, literacy rates, male-female relations and the coexistence of people from different nationalities are conveyed. When considered from this aspect, the Karagöz play is seen as a glazed mirror. While it faces a mystical meaning on one side, it shows its completely human face on the other side. With this duality, Karagöz play becomes an interface between the secular and the sacred. As an interface to the Karagöz play, it has the feature of an intermediate space between worldliness and holiness. In fact, while shadow play is analyzed through traditional theater types in folkloric studies, it is also examined through its ties with Sufism. It is noteworthy in this respect that the depictions, whose souls are formed by a light source, visualize the ideas of "existence from the essence" and "return to the essence" of Sufi thought. On the basis of this idea, the form and content of the Karagöz play was examined as an interface, considering that it is sacred on one side and human on the other.

Keywords: Karagöz game, curtain, interface, place, earthly, sacred

Giriş

Karagöz, Türk halk zekâsının bir temsili olarak karşımıza çıkmaktadır. Türk halkında olaylardan sürekli komedi oluşturma yeteneği, dram yaratma yeteneğinden üstündür. Karagöz’de Türk halkının bu komedi zekâsını sahneye yansıtmaktadır. Bu zekâ, insanların topluluk hayatından kaptıkları gülünç huyları ustalikle perdeye aksettirmesidir. Karagöz; dalkavukluk, kurnazlık, sahte kahramanlık, menfaatçilik, kavgacı vb. rolleriyle devamlı komik sahneler üreten bir tiptir. Karagöz aynı zamanda saf ve temiz ruhlu, olayların gülünç taraflarını büyük ustalikle yakalayan, zeki fakat okumamış, âlim değil ama irfan sahibi Türk halkının temsilidir. Hacivat ise iyi eğitim görmüş, bilgili, insanlar arasında arabuluculuk yapan, dilde yabancı kalmış kelimelere yer veren, her bakımdan maddeci ve çıkarıcı hüviyettir. Karagöz ve Hacivat özellikleri bakımından birbirlerine zıt tiplerdir (Sevilen, 1986).

Karagöz oyununda karşımıza çıkan bu tiplerin bir arayüz olarak dünyevilik ve kutsallık arasında bir ara mekân olarak bakılması amaçlanmaktadır. Aslında gölge oyunu halk bilimsel çalışmalarda geleneksel tiyatro türleri üzerinden çözümlenirken bir taraftan da tasavvuf ile olan bağları üzerinden de irdelenmektedir. Özellikle bir ışık kaynağı tarafından ruhları oluşan tasvirlerin tasavvufi düşüncenin “özden var olma” ve “öze dönüş” fikirlerini görselleştirmesi bu açıdan dikkate değerdir. Somut Olmayan Kültürel Miras içerisinde bulunan Karagöz oyunu hem tasavvuf ile bağlantılı hem de dünyevi olaylar ile ilgisi bulunmaktadır. Karagöz oyunlarının bu yönden önemi oldukça fazladır. Bir ışık kaynağının can üflediği tasvir olarak karşımıza çıkan Karagöz oyunu tasvirlerin canlanmasıyla beşeri özellikler göstermektedir. Oyunun başlangıcında da bu perdenin ibret perdesi olduğundan bahsedilmektedir. Bu yönden Karagöz oyunlarının günlük yaşantımızdaki ibret olayları içermesi ve benzerlik göstermesi onun önemini göstermektedir.

Bu çalışmada, Özgür Taburoğlu’nun “*Dünyevi ve Kutsal*” adlı eserinden Dünyevi ve Kutsal üzerine inceleme yaptıktan sonra Karagöz’ü çeşitli yazarlardan okuyarak bilgi sahibi olunmuştur. Karagöz’de tasavvuf ve dinî konuları ile dünyevi hâldeki konular karşılaştırılmıştır. Karagöz’ün her iki arada kalması ve sosyal mesajlar vermesi incelenmiştir.

2. ARAŞTIRMA VE BULGULAR

Karagöz oyununa bir arayüz olarak dünyevilik ve kutsallık arasında bir ara mekân olarak bakılması amaçlanmaktadır. Aslında gölge oyunu halk bilimsel çalışmalarda geleneksel tiyatro türleri üzerinden çözümlenirken bir taraftan da tasavvuf ile olan bağları üzerinden de irdelenmektedir. Özellikle bir ışık kaynağı tarafından ruhları oluşan tasvirlerin tasavvufi

düşüncenin “özden var olma” ve “öze dönüş” fikirlerini görselleştirmesi bu açıdan dikkate değerdir.

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3. BİR ARAYÜZ OLARAK KARAGÖZ PERDESİ

Bu çalışmada daha çok Özgür Taburoğlu'nun *Dünyevi ve Kutsal* isimli kitabında tartıştığı ara biçim kavramı üzerinden Karagöz oyunu incelenecektir. Araştırmada biçim ve içerik olarak Karagöz'ün kutsallık ve dünyevilik arasında bir ara biçim olduğu fikri üzerinden durulacaktır. Özgür Taburoğlu sosyal bilimler literatüründe dünyeviliği, çoğunlukla kutsal olanın dışında kalan dindışı alan olarak tarif eder. Dünyevilik kutsal olmayandır. Kutsallıktan uzaklaşma gayretinin sonucudur. Oysa dünyeviliğin ve kutsallığın sınırları bu kadar kolay belirlenemez. Bu kavram çifti ara bir bölgede Agamben'in kullandığı anlamda istisnai bir mekânda birbirine karışır. Bu karşılaşmanın sonucunda ara biçimler çıkar. Hem kutsal hem de dünyevi varlıklar olan ara biçimlerin bir yüzü yere, diğeri ise sonsuzluğa, kutsallığa değer (Taburoğlu, 2008).

Bu çalışmada da yukarıda alıntılanan fikirden hareketle gölge oyununa bir arayüz olarak dünyevilik ve kutsallık arasında bir ara mekân olarak bakılması amaçlanmaktadır. Aslında gölge oyunu halk bilimsel çalışmalarda geleneksel tiyatro türleri üzerinden çözümlenirken bir taraftan da tasavvuf ile olan bağları üzerinden de irdelenmektedir. Özellikle bir ışık kaynağı tarafından ruhları oluşan tasvirlerin tasavvufi düşüncenin “özden var olma” ve “öze dönüş” fikirlerini görselleştirmesi bu açıdan dikkate değerdir. Bu nedenle bazı fetvalarda karşımıza çıkan gölge oyununun olumlanması fikri de aslında bu kaynaktan beslenmektedir

Teknik açıdan bakıldığında bir ışık kaynağının can üflediği tasvirler olan Karagöz oyunu, tasvirlerin canlanmasıyla beşeri özellikler kazanmaktadır. Henüz oyunun giriş kısmında bu perdenin bir ibret perdesi olduğu ve anlayanlar için önemli değerler barındırdığı vurgulanmaktadır. Bu açıdan bakıldığında Karagöz perdesinin beşeri bir dünyaya dönüştüğü görülmektedir. Bu dünya ise tüm sanatsal biçimlerin ve içeriklerin belirlendiği gibi dönemini mekân ve zamanını yansıtan önemli bir bağlamdır. Burada İstanbul mahallelerinin yaşam biçimleri, insanlarını, ekonomik durumlarını, okur-yazarlık oranlarını, kadın-erkek ilişkilerini, farklı milletlerden insanların bir arada yaşamları aktarılmaktadır. Bu yönüyle düşünüldüğünde

Karagöz oyunu sırlı bir ayna gibi düşünülebilir. Bir tarafında tasavvufi bir anlamla yüz yüze gelirken bir diğer yüzünde tamamen beşeri yüzünü gösterir. Tam da bu çift yönlülüğü ile Karagöz oyunu dünyevi ve kutsal arasında bir arayüz özelliği kazanmaktadır.

Taburoğlu'na göre ara biçimlerin bir yüzü kutsallıkta diğer yüzü zındık, dünyevi taraftadır. Bir tarafı sonsuzluktayken diğer tarafı şimdi ve buraya bakar. Ara biçimler yer ve ötesi arasında dururlar. Bu yönden de hayaletlere benzerler. Hem şimdi ve burada gibidirler hem de değildirler. Ara biçim ne kutsaldır ne zındık ne de tam olarak maneviyat alanına aittir. Geçirgendir ama tam olarak maddesiz, cisimsiz de değildir. Ara biçimlerin bu arada kalmış varlığı, kutsal ve dünyevi ikiliğini, karşıtlığını geçersizleştirir (Taburoğlu, 2008). Karagöz'e bu yönüyle bakıldığında tam da bu arada kalma haliyle karşılaşmak mümkündür. Çünkü bir ibret perdesi olan ve ışığın gücünden can bulan suretler bir anlamda olabildiğince manevi alana aitlerken diğer taraftan Karagöz'ün bir türlü iş bulamayışı, karısının onu evden atışı ve sırf para kazanabilmek uğruna "görmüş geçirmiş" Hacivat'ın arkadaşına türlü oyunlarla iş buluşu olabildiğince dünyevi konulardır. Bu aradalık ise söz konusu oyuna güçlü bir yapı kazandırmaktadır. Her ne kadar bu oyunların günümüzdeki metinlerinde eleştirel düşüncenin izleri kolaylıkla silinemese de bu oyunların oynandığı bağlam düşünüldüğünde kahvehane gibi politik ve cinselliğin rahatça dile getirildiği eril alanlar olduğu dikkati çeker. Bu yönüyle Karagöz'ün derdinin yalnızca bir iş bulma sorunu olamayacağı da açıktır. Bu oyunların bağlamları tam da dünyevilik ve kutsallık arasında gidip gelen diyalogların döndüğü ve arayüzlerin hayat bulduğu sosyal mekânlardır. Çünkü Taburoğlu'nun da ifade ettiği gibi dünyevi kültürün öznesi, taşıyıcısı kalabalıklar ya da halktır. Halk toplumsal bir özne olarak ilk karşılaşmada çok belirsiz, eğreti ve fazlaca büyük görünür. Örneğin Bahtin Rönesans boyunca çok kısa bir süre kendi yaşam biçimi ve politik tasavvuruyla ortaya çıkmış, sonra geri çekilmiş bir dönemin insanından söz eder. Bu insan türü ya da tiplene halk adamıdır (Taburoğlu, 2008). Buradaki dünyevilik mevzusunun kesişim noktalarından birisi ise Bahtin'in karnavalesk kavramıdır.

Karagöz oyununa bu açıdan bakıldığında Taburoğlu'nun bahsettiği dünyeviliğin öznesi olan halk ya da taşıyıcı kalabalıkla daha Hacivat ve Karagöz'ün ilk diyaloglarından itibaren karşılaşılır. Bu Karagöz'ün karşılaştığı her tip üzerinden hatta bazı oyunlarda sadece sesini duyduğumuz karısı üzerinden anında dikkat çekmektedir.

Karagöz'ün kutsal yanı başka bir ifadeyle aynanın sırlı tarafında ise onun tasavvufi özelliği dikkat çekmektedir. Sabri Esat Siyasvuşgil'in Karagöz ile ilgili düşünceleri kutsal yönüne işaret etmesi açısından oldukça önemlidir:

“Bizde ve umumiyetle bütün şarkta hayal oyunlarının ekser seyircileri garbın kukla tiyatrolarını dolduranlar gibi, sadece güllüp eğlenmek ve hoşça vakit geçirmekle iktifa etmezler; bilakis kendilerini mistik bir havayı nesim’i içinde hissederek perdeden yaradılışın sırrı, cüz’i irade ve kader, maverai alem gibi insanın ruhunu kıvrandıran muammaların herhangi bir şekilde halini beklerler” (Siyavuşgil, 2002).

Siyavuşgil’in ifadeleri göz önünde tutularak perdenin aslında bir anlamda mistik bir havanın yaşandığı ancak bu mistizmin dünyevi sorunlarla bütünleşerek aktarıldığını söylemek mümkündür. Buradaki bu ikilik ise tam da kendisinin bir ara biçim olarak değerlendirilmesini sağlamaktadır. Diğer tarafta Hacivat’ın “Huzuru hazıran,vakti sefayı merdan,hıncırdı, kafidir, laindir şeytan. Şeytanın dinsizliğinden rahmanın birliğine, Şevketlû, kudretlû Efendimizin eriki devletine” diyerek yere kapanışı da onun oyunun kutsallığına yaptığı vurgu biçiminde okunabilir. Bütün bunların yanı sıra tasavvuf düşüncesinin sembolik kavramlarının da karagöz oyununda sıkça kullanıldığı görülmektedir. Pakize Aytaç, “*Karagöz’ün Perde Gazellerinde Tasavvuf*” isimli makalesinde bu sembolleri değerlendirir. Ona göre ayna, tecelli, perde, nur, çerağ, suret, hayal gibi tasavvufi sembollerin hepsini karagöz perde gazellerinde bulmak mümkündür. (Aytaç, 2006) Örneğin “Cihan’a benzedüp Şey Küşteri bu perdeyi kurmuş\Müşabih eylemiş ecnâsa tasviri ne dikkattir” dizeleri kutsallık ve dünyevilik arasındaki bağı açıklaması açısından dikkat çekicidir. Bu dizelerden de anlaşıldığı gibi Hayalilerin piri olarak kabul edilen Şey Küşteri dünyaya benzeterek kurduğu perde de yaratılmış her şeyi büyük bir dikkatle tasvir etmiştir.

Gölge tiyatrosunun tasavvufi yönü sebebi ile bazı din adamlarının da Karagöz oynatımına cesaret ettikleri, üstelik 16. asır da din adamlarından Şeyh Şâzili’nin “*İnsanların ahlaki terbiyeleri bakımından Karagöz’ü çok lüzumlu bularak vaazdan daha faydalı bir telkin aracı olduğuna inandığı*” yazılı kaynaklarda belirtilmektedir (Sevin, 1968). Karagöz’ün kurucusu olarak kabul edilen Şeyh Küşteri’de bu konuya örnek olarak verilebilir. Şeyh Küşteri’nin Karagöz oyunu sayesinde insanların doğru yolu bulmaları için “âlemin yaratılışı ve yaratılanların hayatı” en iyi şekilde canlandırarak gösterileceğini ileri sürmüştür. Şunu da belirtmek gerekir ki İslâm dini tiyatroya en baştan beri bütün olarak karşı değildir. Ancak tiyatro gösterilerinin İslâm’ın gerektirdiği hususlara karşı olmaması gerekmektedir.

Karagöz oyunu ilk gösterisinden itibaren kendini dini görüş ve kontrollerin içinde bulmuştur. Karagöz oyunları, daha rahat gösteri yapabilmesi ve gelişebilmesi için tasavvufi, dini ve ibret karakterini gözle görülebilir şekilde genişletmek zorunda kalmıştır. Bundan dolayı uzun zamanlar süren bu akış içinde Karagöz’ün kendine mahsus bir gösteri kalıbına girdiği millilik,

ruh, renk ve estetik kazandığı görülmektedir. Perdeye çıkan ilk figür olan Hacivat, gösteriyi tasavvuf mesajlı ve Şeyh Küşteri'yi anmalı perde gazeli ile açıp bitiş kısmında da dualara yer vermektedir. Her oyunun başında Hacivat'ın kullanmış olduğu "Hay Hak!" girişi üzerinde durulacak bir husustur. "Hayy" ve "Hak", İslam dininde Allah'ın isimlerinden ikisidir (Oral, 1996). Hacivat'ın Hayy ve Hak sözleri kimi araştırmacılar tarafından sofiyane çılgılığı ve İslâmiyet'in taassubuna karşı bir savunma olarak görülürken kimileri ise gösterideki seyircilere karşı mahcup olmamak için Allah'tan yardım istemek olarak düşünmüşlerdir.

Gölge oyunlarındaki perde gazellerinde, açılıştaki dualarda, muhavereler ve bitişlerde hemen hemen hepsinde ibret motiflerini, tasavvuf ve din açısından bağlantısız ve ilgisiz görmek nerdeyse mümkün değildir. Bu oyunların din ile görünür derecede bir ilgisi bulunmasa dâhi perdelerdeki gösterilerin dünyanın bir aynası olarak görülmesi tasavvuf bağlantılı, dini görüş ve düşüncelerden ayırmanın mümkün olmayacağı muhakkaktır.

Karagöz oyununun dünyevilik yüzüne bakıldığında ise ilk olarak gündelik hayatın bir sunumu çıkmaktadır. Gündelik hayatın sunumunu ise Bahtin'in karnavalesk kavramlarıyla birlikte düşünmek mümkündür. Bahtin'e göre karnaval gülüşü tüm halkın gülüşüdür. İkincisi bu gülüşün ufku evrenseldir. Yeni karnavala katılan katılmayan herkese yönelen gülüştür. Üçüncüsü ise bu gülüş müphemdir. Başka bir ifadeyle hem neşeli ve zafer dolu hem alaycı ve taklitçidir. Söyler ve inkâr eder, gömer ve hayat verir. Gülüşü olumsuz olan modern yergici kendini alay nesnesinin yukarısında bir yere yerleştirirken ona karşıdır. Dünyanın komik yüzünün bütünselliği böylece yıkılır ve komik olarak ortaya çıkan şey kişisel bir tepki haline gelir. Halbuki halkın komik müphem gülüşü tüm bir dünyanın bakışını ifade eder ve ona gülen adam aynı zamanda onun bir parçasıdır (Bahtin, 2005). Bahtin'in ifadeleri göz önünde tutularak karnaval gülüşünün izleri karagöz oyununda kolayca takip edilebilir. Gerek Karagöz ve Hacivat'ın birbirini tersinlediği gerek ters yüz olmuş bir dünya varlığını bu oyunlarda da göstermektedir. Örneğin zaman zaman Karagöz'ün kadın kılığına girmesi ve hatta Ters Evlenme oyununda Neredeyse Tuzsuz Deli Bekir'le evlenmek zorunda kalışı karnavalesk unsurlara örnek olarak gösterilebilir.

Osmanlı coğrafyasından bugüne kadar oynanan bu oyunlar en geniş şekliyle insan hayatlarına etki etmiştir. Bu oyunlardaki tipler ve olaylar toplum içindeki çarpıklıklara değinerek alay ve gülünç durumlar ortaya çıkarmıştır. Oyunlarda insanların belli başlı zaafaları ibret için abartılarak gülünç hâle getirilmiş ve seyirciye aktarılmıştır. Karagöz oyunları ile günümüz gündelik hayatımızda cereyan eden olaylar arasında benzerlikler görülmektedir. Mesela "*Kanlı Nigar*" adlı oyunda Nigâr isimli bir kadın bir mahalleye yerleşir. Nigar, yerleştiği bu

mahalledeki bütün erkekleri soymaktadır. Oyunda bu olay karikatürize edilerek erkeklerin düştüğü durum ve Nigar gibi kadınların ahlaksızlıkları alaya alınmaktadır. Osmanlı döneminde de İstanbul kadısına giden bir arzuhâlde Arap Fatma adındaki bir kadının ahlâksız hâl ve tutumları bütün İstanbul halkına ve İstanbul erkeklerine “İllallah” ettirmiş, bulunduğu evden kendisini çıkarmak isteyen kişilere ağıza alınmayacak hakaretler ettiği anlatılmaktadır. Aynı olay 17. yüzyılda Nefi'nin Siham'ı Kaza adlı eserinde de rastlanılmaktadır. Karagöz'deki Kanlı Nigar tipi Nefi'de Kirli Nigar olarak adlandırılarak karşımıza çıkmıştır (Töre, 2016).

4. SONUÇ

Geleneksel Tiyatromuz içerisinde önemli bir yere sahip olan Karagöz oyununu bir arayüz olarak dünyevilik ve kutsallık arasında bir ara mekân hüviyetinde incelenmiştir. Karagöz perdesi halk bilimsel çalışmalar arasında bir yandan geleneksel tiyatro türleri üzerinden değerlendirilirken diğer yandan da tasavvuf ile olan bağlantısı üzerinde durulması gerekmektedir. Karagöz perdesine her ne kadar Osmanlı döneminde devlet tarafından sıcak bakılmamış olsa da bir o kadar da değer görmüştür. Bunun nedeni bir ışık kaynağı tarafından oluşan ruhların tasvirlerindeki özden var olma ve öze dönüş fikirleri şeyhülislam tarafından verilen fetvalarda Karagöz oyunlarının olumlanması sonucunu ortaya çıkarmıştır.

Karagöz oyunu bir nevi yaşanan gerçek hayattan izler taşımaktadır. Bu izler şaka, gülünç, komik ve alaylı yollarla perdede sahnelenmiştir. Karagöz oyunları her ne kadar dönemsel şartların kurbanı olmuşsa da kendi öz benliğini korumaya çalışmıştır. Bazı dönemlerde çeşitli cinsel ve küfürlü şakalardan, insanların çalışma zamanlarını Karagöz izlemekle geçirmesinden, dine uygun olmayan olaylardan ötürü vb. yollardan karşı çıkmış olsa da her dönem kendinden bahsettirmeyi sağlamıştır. Kutsal ile dünyeviliği bir arada yaşayan Karagöz oyunu zaman zaman bir aradalık içerisinde de kalmıştır. Karagöz oyunu bu aradalık içerisinde her zaman güçlü çıkmayı bilmiş ve sosyal mesajlarını her iki arada da devam ettirmiştir. Karagöz oyunu, Somut Olmayan Kültürel Mirası Temsili Listesi'ne adını 2009 yılında yazdırmış ve bundan sonraki süreçlerde de çocuklara ve yetişkinlere çeşitli eğlenceler ve içerikler sunacaktır.

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OKULÖNCESİ DÖNEMDE ÇOCUKLARDA SALDIRGAN DAVRANIŞLARA ETKİ EDEN ETMENLERİN SİSTEMATİK GÖZDEN GEÇİRİLMESİ

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Özet

Okulöncesi dönem, insan yaşamında tüm gelişim alanlarında hızlı bir ilerlemenin ve büyümenin yaşandığı, yetişkinlik döneminde de insanlarla uyumlu yaşayabilmenin ve ruh sağlığının, uyum becerilerinin yerinde olmasının temellerinin atıldığı önemli bir dönemdir. Bu dönemde çocuklarda gelişimsel beklendik davranışlar dışında bazı uyumu zorlaştıran davranış problemleri görülebilmektedir. Bu davranış problemlerinden “saldırganlık” bireysel ve toplumsal hayat boyutunda kritik öneme sahiptir. Çocuğun hayatında sürekli hale gelebilecek saldırganlık yönelimi ve saldırganlık davranışının temeli okul öncesi dönemde başlamaktadır. Bu dönemdeki çocukların akranlarına uyguladıkları fiziksel ve ilişkisel saldırgan davranışların çeşitli değişkenlerle ilişkili olarak ortaya çıktığı görülmektedir. Bu bazı değişkenlerinde etkisiyle çocuk saldırgan davranışlara yönelim gösterebilmekte ve bunu ileriki yaşlarında da devam ettirip kalıcı hale getirebilmektedir. Bu araştırmanın amacı, Türkiye’de okulöncesi çağındaki çocuklarda saldırganlık davranışı üzerine etki eden faktörleri ele alan deneysel, yarı deneysel ve deneysel olmayan araştırma deseni kullanılarak yapılan çalışmaların incelenmesidir. Araştırma modeli sistematik gözden geçirmedir. Literatür taraması için Ulakbim ve Google Akademik veri tabanlarından yararlanılmıştır. 2013-2023 yıllarında yayınlanan Türkçe makalelerde tarama belirlenen anahtar kelime olarak belirlenen beş tarama kriteri olan “Çocuk, Okulöncesi, Saldırganlık, Problem davranışlar, Öfke kontrolü” kullanılarak gerçekleştirilmiştir. Veri tabanlarından ulaşılan çalışmalar dâhil etme ve dışlama kriterlerine göre indirgenerek toplam on iki çalışma belirlenmiş ve bu çalışmalar sistematik gözden geçirme yöntemi çerçevesinde incelenmiştir. Okulöncesi dönemde çocuklarda görülen saldırgan davranışlarda; ebeveyn tutumlarının etkisi, teknoloji kullanımı ve buna bağlı olarak dijital oyun bağımlılığı ve oyun çeşitlerinin etkisi, çocukların temel sosyal beceri düzeyleri içinde yer alan çocuğun duygu ifade becerisi ve duygularını düzenleme beceri düzeyleri, okulöncesi dönem çocuklarının mizaç özellikleri ve çocukların cinsiyet farklılığı gibi birçok faktörle ilişkisi olduğu belirlenmiştir.

Anahtar Kelimeler: Okul öncesi, Çocuk, Saldırganlık, Problem davranışlar, Öfke kontrolü

**SYSTEMATIC REVIEW OF THE FACTORS AFFECTING AGGRESSIVE
BEHAVIOR IN CHILDREN DURING THE PRESCHOOL PERIOD**

Abstract

Preschool period is an important period in human life where rapid progress and growth is experienced in all areas of development, and the foundations of being able to live in harmony with people and having good mental health and adaptation skills in adulthood are laid. During this period, children may experience some behavioral problems that make adaptation difficult, apart from developmentally expected behaviors. "Aggression", one of these behavioral problems, is of critical importance in individual and social life. The basis of aggression orientation and aggressive behavior, which can become permanent in the child's life, begins in the preschool period. It is seen that the physical and relational aggressive behaviors that children in this period apply to their peers occur in relation to various variables. With the influence of some of these variables, the child may tend to engage in aggressive behavior and may continue this behavior in later years and make it permanent. The purpose of this research is to examine the studies conducted using experimental, quasi-experimental and non-experimental research designs on factors affecting aggressive behavior in preschool children in Turkey. The research model is systematic review. Ulakbim and Google Scholar databases were used for literature review. The screening of Turkish articles published between 2013 and 2023 was carried out using the five screening criteria "Child, Preschool, Aggression, Problem behaviors, Anger management" as the determined keywords . A total of twelve studies were identified by reducing the studies obtained from the databases according to the inclusion and exclusion criteria , and these studies were examined within the framework of the systematic review method. Aggressive behaviors seen in children in the preschool period; It is related to many factors such as the effect of parental attitudes, technology use and the resulting effect of digital game addiction and game types, the child's emotional expression ability and emotion regulation skill levels, which are among the basic social skill levels of children, temperament characteristics of preschool children and gender differences of children. has been determined.

Keywords: Preschool, Child, Aggression, Problem behaviors, Anger management

Giriş

Okulöncesi dönem (erken çocukluk dönemi), tüm gelişim alanlarında hızlı bir ilerlemenin yaşandığı gelişimsel açıdan oldukça kritik, önemli ve büyüleyici bir dönemdir (Kandır & Alpan, 2008; Major vd., 2020; Oruç vd., 2011). Bu dönem kişiliğin, karakterin, ilgilerin kısaca yetişkinlik yaşamının temellerinin atıldığı dönemdir. Bu dönemde gelişim görevlerini olumlu bir seyrinde tamamlanması, yetişkinlik yaşamında kalıcılığı olacağından oldukça önemlidir. Uzun yıllara dayalı araştırmalarda çocukluk yıllarında kazanılan davranışların büyük bir kısmının yetişkinlikte, bireyin kişilik yapısını, tavır, alışkanlık, inanç ve değer yargılarını biçimlendirdiği gözlenmiştir. Bu açıdan okulöncesi dönemdeki eğitim, çocuğun ileriki yaşamını etkileyecek önemli bir süreçtir (Oktay, 1999).

Bu dönemde doğru olmayan disiplin ve eğitim yöntemleri, çocuğun davranış problemleri geliştirmesine neden olacaktır. En genel tanımıyla davranış problemi ise, çocuğun büyümesini ve gelişim sürecini olumsuz etkileyen, çevreyle olan uyumunu zorlaştıran, işlevsel olmayan ya da zarar verici olan ve çok sıklıkla görülen davranışlar olarak tanımlanmakta (Woolfolk vd., 2010, Cooper, 2011'den; İşmen Gazioğlu vd., 2018). Bu davranış problemlerinden en önemlisi de saldırganlıktır. Çünkü saldırganlık, Freud'un da belirttiği gibi, doğuştan getirilen bir dürtü olsa da, kontrol edilmezse tehlikeli bir hale dönüşerek insanın hem kendisine, hem de çevresine çok zarar verir.

Saldırganlığın doğuştan gelen bir özellik olduğunu bilsek de, bazı etkenlerin bu davranışta etkili olduğu da gözlemlenmektedir. Saldırganlığın nedenlerine yönelik çalışmalar, saldırganlığı içgüdüsel, genetik, öğrenmeye dayalı ve çevresel etmenlerle de etkilendiği görülmektedir. Saldırganlıkla ilgili çalışmalarda saldırganlıkla ilgili sınıflandırmalar yapılmaktadır. Ancak okulöncesi döneme baktığımızda ise en çok fiziksel ve ilişkisel saldırganlık gözlenmektedir. Fiziksel saldırganlık türünde; tekme atma, vurma, itme, tokat atma gibi daha çok gözlenebilen, fiziksel olarak gerçekleşen ve zarar verici bir saldırganlık türüdür (Crick ve Grotper, 1995). İlişkisel saldırganlık ise davranışı gösteren kişinin, başka kişinin ilişkilerine zarar vermek amacıyla bilinçli olarak yaptığı yalan söyleme, dışlama, dedikodu yapma, iftira atma, yok sayma, uzak durma ve başkalarına dışlatma, sır yayma, oyunlarına ve etkinliklerine almama gibi davranışlardır (Crick ve Grotper, 1995).

Çocukta gözlemlenen saldırgan davranışı tanımlanma süreci davranışla ilgili yapılacak müdahalenin etkinliği açısından oldukça önemlidir. Problem olarak ortaya çıkan bu davranışın

“problem” olup olmadığını belirleyebilmek için davranışın “altı aydan daha uzun bir sürede görülüyor olması” kriterinin göz ardı edilmemesi gerekmektedir (İşmen Gazioğlu vd., 2018). Çocukta gözlenen saldırgan davranışları tek bir neden üzerinden değerlendirmek doğru değildir. Çocuğun saldırgan davranışlarının gerçek nedenlerinin ne olduğu, çocuğun bu davranıştan ne elde etmeye ya da neyden kaçınmak için kullanmaya çalıştığına anlamak önemlidir. Her yaşta saldırgan davranışlarla mücadele etmek önemli olmakla birlikte okulöncesi dönem, yetişkinliğin temellerinin atıldığı kritik bir dönem

olduğundan bu davranışların kalıcı olmaması adına saldırgan davranışlara neden olan etkenlerin belirlenmesi oldukça önemlidir.

Yukarıda belirtilen hususlar göz önüne alındığında okulöncesi (erken çocukluk dönemi) dönem yetişkinlik döneminde bu davranışların kalıcı olması ihtimalinden dolayı kritik öneme sahiptir. Bu noktada, çocuklarda saldırgan davranışlara etki eden etmenleri belirlemek çalışmaya değer bulunmaktadır.

Bu çalışmanın amacı, Türkiye’de okulöncesi çağındaki çocuklarda saldırganlık davranışı üzerine etki eden faktörleri araştırmak üzere yapılan deneysel, yarı deneysel ve deneysel olmayan çalışmaların incelenmesidir. Bu amaçtan yola çıkarak bu araştırmada aşağıdaki sorulara yanıt aranmaktadır:

1. Okulöncesi dönemde saldırgan davranışların ortaya çıkmasının çocukların duygu ifade etme ve duygu düzenleme becerileriyle ilişkisi var mıdır?
2. Okulöncesi dönemde çocukların saldırgan davranışlarıyla cinsiyet arasında bir ilişki var mıdır?
3. Okulöncesi dönemde saldırgan davranışların ortaya çıkmasının dijital oyun bağımlılığı ve oyun türleriyle ilişkisi var mıdır?
4. Okulöncesi dönemde saldırgan davranışların ortaya çıkmasında ebeveyn tutumlarının etkisi var mıdır?
5. Okulöncesi dönemde saldırgan davranışların ortaya çıkmasında mizaç özellikleriyle arasında bir ilişki var mıdır?

ARAŞTIRMA

STRATEJİSİ

Bu çalışma, Türkiye’de okulöncesi çağındaki çocuklarda saldırganlık davranışı üzerine yapılan deneysel, yarı deneysel ve deneysel olmayan çalışmaların Prizma analiz yöntemli Sistematik review yöntemi inceleyen bir çalışmadır. Literatür taraması için Google Akademik ve Ulakbim kullanılarak 2013-2023 yıllarında yayınlanan Türkçe makaleler ve tezler belirlenen anahtar

kelimeler (çocuk, okulöncesi, saldırganlık, problem davranışlar, öfke kontrolü) kullanılarak taranmıştır. Dahil etme dışlama kriterleri uygulanarak toplam on iki çalışma, bu çalışmaya dahil edilmiştir. Bu çalışma herhangi bir gruplandırma yapılmadan incelenmiştir. Bu araştırmada araştırma konusu ve yöntemi belirlendikten sonra şu aşamalarda ilerlemiştir:

DÂHİL ETME VE AYIRT ETME KRİTERLERİ

Bu çalışmada dahil etme kriterleri saldırganlık ile bağlantılı olabileceği düşünülen (1) çocuklarda görülen saldırgan davranışlarda anne-baba tutumlarını inceleyen çalışmalar (2) çocuklarda saldırgan davranışlar üzerinde teknoloji kullanımının etkisi çalışmaları (3) çocuklarda saldırgan davranışlar ve mizaç özelliklerini inceleyen çalışmalar (4) çocuklardaki saldırgan davranışlarda çocukların duygu düzenleme ve sosyal becerilerinin gibi etkisine ilişkin çalışmalar, (5) çocuklarda görülen saldırgan davranışlar ve cinsiyet faktörü arasındaki ilişkiye yönelik çalışmalar gibi anahtar kelimeleri içeren makaleler dahil edilmiştir. Orta çocukluk, ergenlik, lise çağı, ilk yetişkinlik ve orta yaş gibi konunun dışına çıkan anahtar kelimeleri barındıran makaleler ayırt edilmiştir. Ayrıca arama yapılan anahtar kelimelerin sadece bir tanesine sahip birçok araştırma ile karşılaşılmış olup bu makaleler yine yapılan çalışmadan ayırt edilmiştir. Ayrıca araştırma sürecinde zamanın sınırlı olmasından dolayı çeviri yapmanın zaman alacağı düşünülüp yazım dili İngilizce olan makalelerde araştırmaya dahil edilmemiştir.

BULGULAR

Araştırmanın amacı doğrultusunda klinik olmayan okulöncesi dönem çocukları, öğretmenleri ve anne babaları örneklerde okulöncesi dönem çocuklarda saldırgan davranışlara etki eden etmenleri ilişkisel tarama modeli kullanarak inceleyen çalışmaların özelliklerini belirlemek üzere ulaşılan 5 çalışmanın sistematik analiz sonuçları Tablo 1’de verilmektedir.

Tablo 1: Okulöncesi Dönem Çocuklarda Saldırgan Davranışlara Etki Eden Etmenler İlişkisel Tarama Modeli Kullanarak İnceleyen Çalışmaların Özellikleri

Yazar, Yıl, Yer	Araştırılan Tema	Orneklem Grubu	Veri Toplama Aracı	Ulaşılan Sonuç
Ersan, 2017 Denizli/Türkiye	Okul öncesi dönem çocuklarının duygu ifade etme ve duygu düzenleme becerilerinin saldırganlıklarını yordama gücü incelenmiştir.	15 resmi anaokulunda eğitim alan 427 kız ve 436 erkek olmak üzere toplam 863 çocuktan oluşturulmuştur.	“Kişisel Bilgi Formu” “Çocuk Duygu İfade Etme Ölçeği Anne Formu” , “Duygu Düzenleme Ölçeği” “Okul Öncesi Sosyal Davranış Ölçeği Öğretmen Formu”	Okul öncesi çocuklarının olumsuz duyguları ifade ve baş etme düzeyleri ile fiziksel ve ilişkisel saldırganlık düzeyi arasında anlamlı bir ilişki bulunmuştur.
Kaya,2020 İstanbul/Türkiye	Okul öncesi dönemdeki çocukların fiziksel ve ilişkisel saldırganlıkları ile mizaç özellikleri arasındaki ilişkisinin incelenmesidir.	48-72 ay aralığındaki 231 çocuktan oluşmaktadır.	“Kişisel Bilgi Formu” “Okul Öncesi Sosyal Davranış Ölçeği Öğretmen Formu” ve “Çocuklar İçin Kısa Mizaç Ölçeği”	Fiziksel ve ilişkisel saldırganlık ile tepkisellik, sebatkarlık ve ritmiklik mizaç özellikleri arasında anlamlı bir ilişki belirlenmiş olup, sıcakkanlılık mizaç ile saldırganlık türleri arasında bir ilişki gözlenmemiştir.
Uysal ve Dinçer,2013 Ankara/Türkiye	Okul öncesi dönem çocuklarının saldırgan davranışları ile cinsiyet ilişkisinin incelenmesidir.	MEB’e bağlı iki bağımsız anaokulunda yer alan 60-72 aylık 56 erkek 65 kız toplam 121 çocuktan oluşturulmuştur.	“Kişisel Bilgi Formu” ve “Okul Öncesi Sosyal Davranış Ölçeği Öğretmen Formu”(OÖSDÖ-ÖF)	Okulöncesi dönem erkek çocukların fiziksel; kızların ise ilişkisel saldırganlık davranışları sergiledikleri, erkeklerin saldırgan davranışları genel olarak daha fazla gösterdiği gözlenmiştir.

Gölge,2022
İstanbul/Türkiye

Okulöncesi dönem Anaokuluna devam eden 5-6 yaş grubu 249 çocuk ve anne-babaları arasındaki teknoloji kullanımı ilişkisinin yordamasıdır.

“Kişisel Bilgi Formu”
“36-72 Aylık Çocuklara Yönelik Saldırganlık Yönelim Ölçeği”,
“Okul Öncesi Dönem Çocukları Dijital Oyun Bağımlılık Eğilimi Ölçeği (DOBE)” ve
“Çocukların Tercih Ettiği Oyun Türleri Formu”

Dijital oyun ve teknoloji kullanımı ile genel saldırganlık arasında %26,9, fiziksel saldırganlık ile %32, ilişkisel saldırganlık ile %17, nesnelere/eşyalara yönelik saldırganlık alt boyutu ile pozitif yönlü anlamlı ilişki bulunmuştur.

Yıldızbaş ve Şahin Sak,2020
Sakarya/Türkiye

Okul öncesi dönem çocuklarının saldırgan davranışlarıyla ilgili anne baba tutumları arasındaki ilişkiyi incelenmesidir.

3- 6 yaş arası 506 çocuk ve anne- babalarından oluşmaktadır.

“Kişisel Bilgi Formu”
“Ebeveyn Tutumları Ölçeği” (Karabulut Demir ve Şendil, 2008) ve
“Saldırganlık Yönelim Ölçeği”
(Kaynak, Kan ve Kurtulmuş, 2016)

Demokratik anne-baba tutumu ile çocuklardaki saldırganlık yönelimi arasında negatif yönlü, otoriter tutum ve saldırganlık yönelimi arasında pozitif ilişki olduğu görülmektedir.

Sistematik gözden geçirme çalışmamız için koyduğumuz kriterler sonucunda 2013-2023 yılları arasında okulöncesi dönemde saldırgan davranışları ele alan on iki çalışma incelenmiştir.

Birinci problem cümlesi doğrultusunda yapılan çalışmalar incelendiğinde (Ersan,2017) ilişkisel tarama modeline dayanmaktadır. İlişkisel tarama modeliyle iki ya da daha fazla sayıda değişken arasındaki ilişkileri analiz etmek ve neden sonuç ile ilgili sonuçlar elde etmek amaçlanmıştır.

Araştırmada veri toplama araçları olarak; Okul Öncesi Sosyal Davranış Ölçeği-Öğretmen Formu, Çocuk Duygu İfade Etme Ölçeği-Anne Formu ve Duygu Düzenleme Ölçeği kullanıldığı görülmüştür. Çalışmada çocukların saldırganlık düzeyleri fiziksel ve ilişkisel saldırganlık türleriyle; çocukların duygu ifade etme becerileri mutlu, üzgün, öfkeli ve korkmuş duyguları ve bu duyguları düzenleme becerileri; duygu düzenleme ve bunu etkileyen etmenler çerçevesinde incelenmiştir. Araştırmanın örneklemi, 15 resmi anaokulunda eğitim alan 3-5 yaş arası 427 (%49.5) kız ve 436 (%50.5) erkek olmak üzere toplam 863 çocuktan oluşturulmuştur. Araştırmada, çocukların saldırganlık düzeylerine ilişkin etkenler öğretmenlere ve annelere uygulanan ölçeklerle, duygu ifade etme ve duygu düzenleme becerilerine ilişkin ölçeklerle veri toplanmıştır.

Bu çalışmaların analizleri birinci problem cümlesi çerçevesinde incelendiğinde; okul öncesi dönem çocuklarının duygu ifade etme becerilerinden üzüntü ifade etme ve öfke ifade etme becerileriyle ilişkisel saldırganlık düzeyleri arasında anlamlı bir ilişki görülmüştür (Ersan,2017). Okul öncesi dönem çocuklarının üzüntü ifade etme düzeylerinin bu çocuklardaki

ilişkisel saldırganlığı negatif yönde; öfke ifade etme ve başedebilme becerileri ile de pozitif yönde anlamlı bir ilişki olduğu gözlenmiştir. Okul öncesi dönem çocuklarının mutluluk ifade etme, korku ifade etme ve duygu düzenleme beceri düzeylerinin ise çocuklardaki ilişkisel saldırganlık ile arasında anlamlı bir ilişki olmadığı da yapılan çalışmanın sonucunda görülmüştür.

İkinci problem cümlesi çerçevesinde okul öncesi dönemde saldırgan davranışların cinsiyete göre değişkenlik analizleri incelendiğinde; çalışmanın ilişkisel tarama modeline dayandığı görülmektedir. Araştırmada veri toplama araçları olarak; Kişisel Bilgi Formu” ve ”Okul Öncesi Sosyal Davranış Ölçeği Öğretmen Formu”(OÖSDÖ-ÖF) kullanılmıştır (Uysal ve Dinçer, 2013). Okul öncesi dönem çocuklarının fiziksel ve ilişkisel saldırganlık düzeylerinin cinsiyete göre anlamlı şekilde farklılaştığı görülmüştür. Bu Okulöncesi dönem erkek çocukların fiziksel; kızların ise ilişkisel saldırganlık davranışları sergiledikleri, erkeklerin saldırgan davranışları genel olarak daha fazla gösterdiği gözlenmiştir.

Üçüncü problem cümlesi doğrultusunda yapılan çalışmalar incelendiğinde (Gölge,2022; Özcan, Kanmaz ve Tezel Şahin, 2022) teknoloji kullanımı ile saldırgan davranışlar arasındaki ilişki bazı değişkenler açısından analiz edilmesi amaçlandığından nicel araştırma yöntemlerinden ilişkisel tarama modeline dayanmaktadır. Araştırmalarda veri toplama araçları olarak; Demografik Bilgi Formu, Problemler İnternet Kullanımı Ölçeği-Kısa Form (PIKÖ-KF), Sosyal Yetkinlik ve Davranış Değerlendirme-30 Ölçeği (SYDD-30) (Özcan, Kanmaz ve Tezel Şahin, 2022). Kişisel Bilgi Formu, 36-72 Aylık Çocuklara Yönelik Saldırganlık Yönelim Ölçeği, Okul Öncesi Dönem Çocukları Dijital Oyun Bağımlılık Eğilimi Ölçeği (DOBE) ve Çocukların Tercih Ettiği Oyun Türleri Formu (Gölge,2022) kullanılmıştır.

Gölge (2022); Özcan, Kanmaz ve Tezel Şahin (2022)’nin yaptığı araştırma analizleri üçüncü problem cümlesi çerçevesinde incelendiğinde; “Dijital Oyun Bağımlılık Eğilimi” sürekli oynama, yaşantıya katma ve saldırgan davranışlara eğilim alt boyutları cinsiyete göre anlamlı düzeyde farklılık görülmektedir. Erkeklerin dijital oyun bağımlılık eğilimleri kızlara göre anlamlı derecede daha yüksek bulunmuştur. Ayrıca bu çalışmada cinsiyete göre farklılık gösterdiğine ilişkin sonuçlara ulaşıldığı görülmektedir. Erkeklerin başkalarına yönelik fiziksel saldırganlık ve nesnelere/eşyalara yönelik saldırganlık düzeyleri kızlara göre daha fazla olduğu sonucuna ulaşılmıştır. Okul öncesi dönem çocuklarının dijital oyun bağımlılık eğilimi ölçeği genelinin saldırganlık yönelim ölçeği geneli ile %26,9 düzeyinde, başkalarına yönelik fiziksel

saldırganlık ile %32, başkalarına yönelik ilişkisel saldırganlık ile %17, nesnelere/eşyalara yönelik saldırganlık türleriyle ile %25,9 düzeyinde pozitif yönlü anlamlı ilişki bulunmaktadır (Gölge,2022; Özcan, Kanmaz ve Tezel Şahin, 2022). Bu bulgular sonucunda da okulöncesi dönemde erkek çocukların dijital oyun bağımlılığı ve saldırganlık eğilimi daha yüksek olmakla birlikte, dijital oyun bağımlılığı ile saldırgan davranışlar arasında da pozitif yönlü bir ilişki söz konusudur.

Dördüncü problem cümlesi çerçevesinde yapılan çalışmalar incelendiğinde, okul öncesi dönem çocuklarının saldırganlık yönelimleri ile ebeveynlerinin anne baba tutumları arasındaki ilişkiyi incelemek amacıyla ilişkisel tarama modeli kullanılarak hazırlanmıştır. Araştırmalarda veri toplama araçları olarak; Kişisel Bilgi Formu, Ebeveyn Tutumları Ölçeği ve Saldırganlık Yönelim Ölçeği kullanılmıştır (Yıldızbaş ve Şahin Sak, 2020; Çiftci Topaloğlu, 2013; Parsak ve Kuzucu, 2020)

Çalışmaların (Yıldızbaş ve Şahin Sak, 2020; Çiftci Topaloğlu, 2013; Parsak ve Kuzucu, 2020) analizleri dördüncü problem çerçevesinde incelendiğinde; okul öncesi dönem çocuklarının saldırganlık yönelimlerinin ebeveynin yaşı çocuğun saldırganlık yönelimine etki etmemektedir. Okul öncesi dönem çocuklarının saldırgan davranışlara eğilimi anne babalarının eğitim durumu açısından değerlendirildiğinde, ilişkisel saldırganlık, fiziksel saldırganlık ve nesneye yönelik saldırganlık türlerinde anlamlı bir farklılık gösterdiği bulunmuştur. Verilere bakıldığında ebeveynlerin eğitim düzeyi arttıkça çocukta görülen saldırganlık ve türlerine yöneliminin azaldığı görülmektedir. Bu durumun nedeni, ebeveynlerin eğitim düzeyinin artmasıyla çocuğa karşı tutumların önemine yönelik farkındalıklarının artmasının ve çocuklarına daha bilinçli ebeveynlik tutumları göstermelerinin bir sonucu olabilir. Yine analiz sonuçlarına baktığımızda ebeveynlerin anne baba tutum türleri ile çocukların saldırganlık yönelimleri arasında bir ilişki olduğu görülmektedir. Demokratik anne-baba tutumu ile çocuklardaki saldırganlık yönelimi arasında negatif yönlü bir ilişki görülmektedir. Demokratik tutumu benimseyen anne babaların çocuklarıyla etkili ve pozitif iletişimi benimseyerek, çocuğa birey olarak değer vermeleri, buna bağlı olarak da çocukların olumlu davranışlar geliştirmelerinin etkili olduğu söylenebilir. Otoriter durumda da tam tersi bir sonuç görülmektedir. Anne- babanın kuralları koyarak çocukların görüşlerini görmezden geldiği, iletişimin zayıf olduğu ailelerde çocukların olumsuz davranışlar geliştirmeye yöneldiği gözlenmektedir. Bu da bulgularda, otoriter tutum ve saldırganlık yönelimi arasında pozitif ilişki olduğu görülmektedir.

Beşinci problem cümlesi çerçevesinde yapılan çalışmalar incelendiğinde (Kaya, 2020) okulöncesi dönem çocuklarda görülen saldırgan davranışları etkileyen etmenler arasındaki ilişkiyi daha anlaşılabilir hale getirmek için ilişkisel tarama metodu kullanılarak hazırlanmıştır. Araştırmada veri toplama araçları olarak; Kişisel Bilgi Formu, Okul Öncesi Sosyal Davranış Ölçeği-Öğretmen Formu ve Çocuklar İçin Kısa Mizaç Ölçeği kullanılmıştır. Çalışmada elde edilen bulgular; Prior, Sanson ve Oberklaid (1989; aktaran Yağmurlu vd., 2005), 3 ile 8 yaş arasında dört mizaç özelliği olduğu varsayımını öne sürdüğü mizaç özellikleri temele alınarak değerlendirilmiştir. Bunlar; tepkisellik, sebatkârlık, sıcakkanlılık ve ritmiklikdir. Belirli bir uyaran veya olaya tepki vermeye hazır olma durumu, tepkisellik özelliğini tanımlamaktadır. Sebatkârlık ise, dikkati belli bir durum, olay veya etkinlik üzerinde yoğunlaştırabilmeyi tanımlamaktadır. Sıcakkanlı mizaca sahip kişilerin, yeni insan ve ortamlara yaklaşma istekliliği yüksektir. Diğer bir mizaç özelliği olan ritmiklik ise, çocuğun yemek yeme, uyuma gibi günlük rutinlerinin düzenliliğini tanımlamaktadır.

Kaya,(2020) tarafından yapılan çalışmanın analizleri beşinci problem cümlesi çerçevesinde incelendiğinde; Fiziksel ve ilişkisel saldırganlık ile tepkisellik, sebatkârlık ve ritmiklik mizaç özellikleri arasında anlamlı bir ilişki belirlenmiş olup, sıcakkanlılık mizaç ile saldırganlık türleri arasında bir ilişki gözlenmemiştir. Çalışmanın bulgularına göre; fiziksel saldırganlık ile sebatkârlık, mizaç özelliği arasında negatif yönde düşük düzeyde, tepkisel mizaç özelliği ile de pozitif yönde hafif düzeyde anlamlı bir ilişki, ilişkisel saldırganlık boyutunda ise ritmiklik ile ilişkisel saldırganlık arasında negatif yönde düşük düzeyde anlamlı ilişki olduğu görülmektedir.

TARTIŞMA VE SONUÇ

Bu sistematik gözden geçirme çalışması, Türkiye’de yapılan klinik olmayan örneklerde okulöncesi dönem çocuklarında gözlenen saldırgan davranışlara duygu ifade ve düzenleme becerisi, cinsiyet, dijital oyun ve teknoloji kullanımı, anne-baba tutumları ve çocuğun mizacı gibi bazı özelliklerin çocukların fiziksel ve ilişkisel saldırganlıklarına etkisi incelenmiştir. Araştırmaların cinsiyet farklılığının saldırgan davranışlara ilişkin sonuçları, alan yazınlarında da gördüğümüz cinsiyet değişkenine ilişkin bulgularını desteklemektedir. İncelenen araştırmalarda ilişkisel tarama metodu bulguları okulöncesi dönem erkek çocuklarının fiziksel saldırganlığı kızlara göre daha çok kullandığını göstermektedir (Öngören ve Tepeli,2015; Şen, 2009; Uysal ve Dinçer, 2013; Yıldızbaş, 2019; Yırtıcı, 2019). Ersan (2017) çalışmasında fiziksel saldırganlık ile erkek ve kız çocukları arasında anlamlı farklılık belirlemiş olup, ilişkisel

saldırganlık boyutunda kız ve erkek çocukları arasında anlamlı bir bulunmamıştır. Öngören ve Tepeli (2015)'nin okulöncesi dönemdeki çocukların saldırganlık davranışlarını inceledikleri çalışmaya baktığımızda ise erkek çocuklarının fiziksel, kız çocuklarının ilişkisel saldırganlık davranışları gösterme eğiliminde oldukları görülmektedir. Benzer şekilde Uysal ve Dinçer (2013)'in çalışmasında da okul öncesi dönemde erkek çocukların fiziksel saldırganlık davranışlara yönelimlerinin kızlara oranla anlamlı düzeyde farklılaştığını, ilişkisel saldırganlık türünde ise cinsiyete göre herhangi bir farklılaşmanın olmadığını bulmuşlardır. Bu çalışmalara göre, okulöncesi dönem çocuklarının özellikle fiziksel saldırganlık boyutunda cinsiyete göre farklılaşmanın olduğundan bahsedebiliriz. Bu farklılaşma da genetik özelliklerin, ailelerin çocuklarına yansıttıkları toplumsal cinsiyet algıları, annenin aile içinde şiddete maruz kalma durumu ve aile içi kalıplaşmış geleneksel roller gibi etmenlerin etkisi olabilir.

Ele alınan bir diğer etmen olan duygu ifadesi ve başedebilme becerisi ile okulöncesi dönem çocuklarda saldırgan davranışlar arasında özellikle zor duyguların ifade edilebilmesiyle ilgili anlamlı bir ilişki görülmektedir. Özellikle okulöncesi dönem çocuklarının üzüntü, öfke ve korku duygularını ifade etme becerileri ve düzeylerinin fiziksel saldırganlık eğilimleri arasında anlamlı bir ilişki olduğu gözlenmiştir (Ersan,2017). Bu çalışmayı Kayhan ve Aktürk (2015)'in yapmış çalışmanın olduğu okul öncesi dönem çocuklarının duygu düzenleme becerilerindeki zayıflık ile fiziksel saldırganlıkları arasında pozitif yönde bir ilişki olduğu bulgusu desteklemektedir. Bu da gösteriyor ki okullarda okulöncesi dönem çocuklara duygu-okuryazarlığı ve duygulara yönelik becerileri geliştirmeye yönelik çalışmalara ve etkinliklere yer verilmelidir. Ayrıca anne-baba eğitimleriyle de çocukları destekleyebilmeleri adına ailelerin ebeveynlik becerilerinin geliştirilmesi de faydalı olacaktır.

Araştırmanın anne-baba tutumlarıyla ilgili sonuçlarına baktığımızda ise, aile içinde demokratik tutumun benimsendiği ailelerde okulöncesi dönem çocuklarında gözlenen özellikle fiziksel saldırganlık boyutunda negatif yönlü, otoriter tutumuyla yaklaşılan çocuklarda ise yine özellikle fiziksel saldırganlık boyutunda pozitif yönlü anlamlı bir ilişki olduğu görülmektedir (Yıldızbaş ve Şahin Sak,2020). Aynı çalışmanın bulguları aşırı koruyucu ve izin verici aile tutumları ile okulöncesi dönem çocuklarda saldırgan davranışlar arasında anlamlı bir ilişkinin olmadığını göstermektedir. Çalışma sonuçları göstermektedir ki özellikle demokratik tutum gösterilen çocukların ilişkisel, fiziksel, kendine ve nesneye yönelik saldırganlık yönelimleri arasında negatif yönlü bir ilişki vardır. Bulgulardan yola çıkarak anne-babanın etkili iletişim becerilerine

sahip olmasının ve çocuğa birey olarak değer verilmesinin çocuğun olumlu davranış geliştirmesinde oldukça önemli olduğunu görmekteyiz. Bu bilgiler ışında okullarda anne-baba eğitimlerinin ağırlık verilmesinin faydalı olabileceğini söyleyebiliriz.

Okulöncesi dönem çocuklarda saldırgan davranışlar ile teknoloji kullanımı ve dijital oyun kullanımı arasındaki ilişkiyi ele alan çalışmalar, genel saldırganlık ve saldırganlığın alt boyutları arasında pozitif yönlü anlamlı bir ilişki olduğunu göstermektedir. Bu saldırganlık alt boyutlarından özellikle başkasına yönelik fiziksel saldırganlık ile nesneye yönelik saldırgan alt boyutları arasında orta düzeyde pozitif yönlü anlamlı bir ilişki görülmektedir (Gölge,2022). Bulgular, anne-babalara yönelik bilinçli teknoloji kullanımıyla ilgili bilgilendirme çalışmalarının önemini göstermektedir.

Çalışmada son olarak ele alınan bir diğer etmen olan mizaç özellikleri ile okulöncesi dönem çocuklarda saldırgan davranışlar arasında da anlamlı bir ilişki görülmektedir. Çocukların fiziksel ve ilişkisel saldırganlıkları ile fiziksel saldırganlık boyutunda bulguları incelediğimizde, sebatkarlık mizaç özelliği ile negatif yönde düşük, tepkisel mizaç özelliği ile de pozitif yönde hafif düzeyde anlamlı bir ilişki olduğu görülmektedir. İlişkisel saldırganlık boyutunda ise ritmiklik mizaç özelliği ile de negatif yönde düşük düzeyde anlamlı ilişki tespit edilmiştir(Kaya,2020). Bu çalışmayı Uçar(2017)'in çalışmasındaki çocukların fiziksel saldırganlık düzeyi ile sebatkarlık ve ritmiklik mizaç özelliği arasında anlamlı bir ilişkinin olduğu, ilişkisel saldırganlık ile mizaç özellikleri arasında anlamlı ilişki bulunmadığına yönelik bulguları da desteklemektedir. Bu çalışmaların sonucunda diyebiliriz ki okulöncesi dönem çocuklarda saldırgan davranışlara yönelim ile mizaç özellikleri arasında sadece fiziksel saldırganlık alt boyutunda düşük düzeyde negatif yönlü bir ilişki bulunmakta olup, mizaç özelliklerinin saldırgan davranışlar üzerinde büyük bir etkiye sahip değildir.

Çalışmada incelenen araştırmalar göstermektedir ki okulöncesi dönemde çocuklarda saldırgan davranışlara yönelimde organik kökenli etkenlerin dışında çevresel faktörlerde oldukça öneme sahiptir. Bu bağlamda çocuklarda olumlu davranış geliştirme özellikle anne-babanın eğitim, bilgi ve ebeveynlik becerilerini güçlendirmek önemli bir yere sahiptir. Beraberinde Erken çocukluk döneminden itibaren çocuklara duygulara yönelik becerileri geliştirmek ve bilinçli teknoloji kullanımına ilişkin bilgilendirme çalışmalarına yer vermekte faydalı olacaktır.

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MAINTENANCE METHODS USED IN RAIL SYSTEMS

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Abstract

Transportation systems have tended to grow rapidly with developing urbanization and increasing transportation needs and continue to grow. Within the transportation systems, the public transportation structure has enabled the rail system transportation to reach an important point due to reasons such as carrying capacity, clean energy, efficiency, and prevention of sound pollution. In our country, as in many parts of the world, the installation of rail transportation systems appears as unexpected service investments that require high time and cost, are difficult to cover, and are unexpected. These investments made for social service purposes have made it necessary to carry out resource management, monitoring and maintenance operations with good engineering practices, starting from the first moment, in order to reduce the costs of installation and operation to the lowest, risk-free levels. When installing a system, in addition to the costs incurred in procuring and commissioning the product, the costs that the product will incur throughout its life are taken into account. Choosing correct and effective maintenance practices in rail transportation systems and operating employees, materials and processes with the right methods and software supports are the points that increase efficiency. The relationship between efficiency and maintenance is an important issue that needs to be addressed not only in rail transportation systems but also in other sectors. Especially in the field of transportation, it should be evaluated in terms of air transportation, rail systems transportation, ship transportation and road transportation. In terms of efficiency, determining the maintenance types and the affecting maintenance criteria and prioritizing them with the determined methods is an important parameter in choosing the maintenance method to be applied. In this study, the types of maintenance used in rail systems will be examined and the orientation of the applied maintenance methods in terms of maintenance methods in rail transportation systems will be discussed.

Keywords: Rail System, Maintenance, Productivity

Introduction

Transportation systems have tended to grow rapidly with developing urbanization and increasing transportation needs and continue to grow. Within the transportation systems, the public transportation structure has enabled the rail system transportation to reach an important point due to reasons such as carrying capacity, clean energy, efficiency, and prevention of sound pollution. In our country, as in many parts of the world, the installation of rail transportation systems appears as unexpected service investments that require high time and cost, are difficult to cover, and are unexpected. These investments made for social service purposes have made it necessary to carry out resource management, monitoring and maintenance operations with good engineering practices, starting from the first moment, in order to reduce the costs of installation and operation to the lowest, risk-free levels (Özarpa, C., Kinaci, B. F., & Avci, İ, 2022). When installing a system, in addition to the costs incurred in procuring and commissioning the product, the costs that the product will incur throughout its life are taken into account. Choosing correct and effective maintenance practices in rail transportation systems and operating employees, materials and processes with the right methods and software supports are the points that increase efficiency. The relationship between efficiency and maintenance is an important issue that needs to be addressed not only in rail transportation systems but also in other sectors. It is necessary to get support from experts who have worked in this field to determine the most appropriate and sustainable methods by considering the relationship between efficiency and maintenance (Thun, J.H., 2006).

In a study on rail systems, it was revealed that the maintenance practices implemented in the Netherlands in the late 90s, efforts to reduce the cost of maintenance without reducing the amount of maintenance, increased punctuality in trips, and thus, effective practices developed to reduce the cost by not reducing the amount of maintenance gave successful results and increased efficiency. has been placed (Budai, G., Huisman, D. ve Dekker, R., 2004). In other studies on rail transportation systems, smart sub-solutions, management applications and software have begun to be used in order to increase efficiency with technology development. These systems used include RAMS (Reliability, availability, maintenance and security) management application, ERP enterprise resource management software, LCC life cycle cost analysis and Maintenance Prevention applications (Türk Standartları Enstitüsü , 2018), (Kant, B., Odabaş, M.S. , 2019), (International Electrotechnical Commission , 2017).

Maintenance Methods

In fact, safety and punctuality are the most important factors in the use of rail transportation systems. Maintenance practices used to ensure safety and punctuality in rail transportation systems have an important place in reducing and preventing unexpected malfunctions as much as possible. In rail transportation systems, the infrastructure and superstructure as a whole must be evaluated together during the maintenance process and maintenance systems must be implemented. When providing maintenance practices, planning as much as possible with a central network structure has an important place in terms of monitoring and effective operation. Maintenance applications performed centrally with a network structure result in less costly and less disruptive traffic (Budai, G., Huisman, D. ve Dekker, R., 2004), (Kumar, U., Crocker, J., Knezevic, J., El-Haram, M., 2000). Maintenance practices in rail transportation systems are progressing towards becoming systems that require less maintenance, with the developing technology and developments in material science. Additional conveniences such as system management method developments and the implementation of digital maintenance tracking applications make the systems more trackable and efficient. Despite these developments, the maintenance needs of rail systems have not been reset and they continue to be systems that continue to need work.

All systems and subsystems used in rail systems begin to encounter malfunctions from the moment they are put into use and malfunctions continue to occur throughout the life cycle. In Figure 1, the average failure rates of the electrical and electronic systems used during their life cycle, from the moment of installation, are shown graphically.

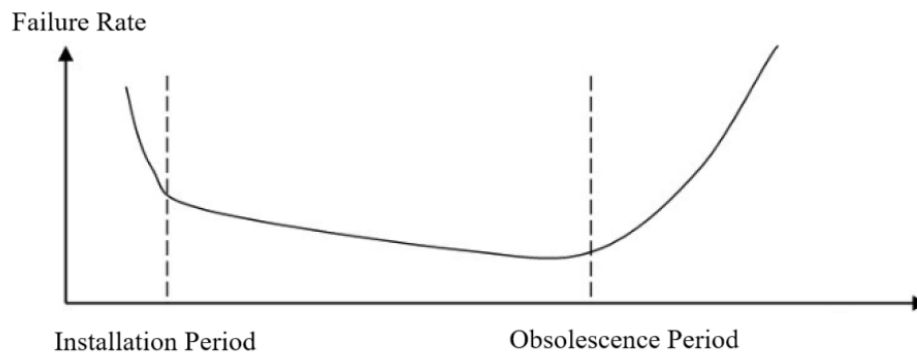


Figure 1. Failure rates over time throughout the life cycle of electrical and electronic systems

In Figure 2, the average failure rates of the mechanical systems used during their life cycle, from the moment of installation, are shown graphically.

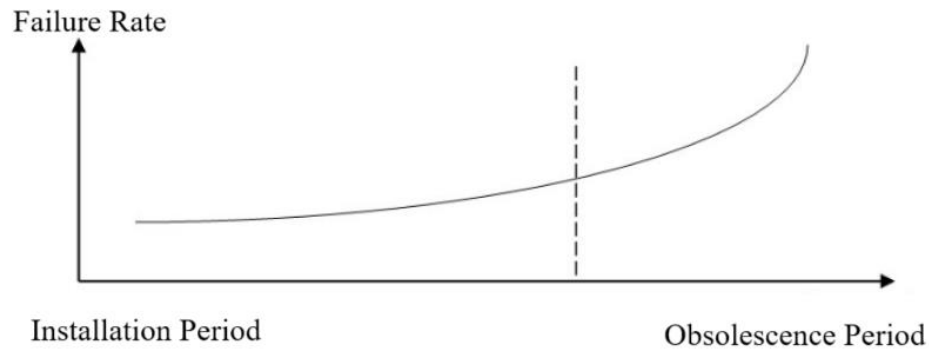


Figure 2. Time-dependent failure rates throughout the life cycle of mechanical systems

Basic maintenance is the maintenance methods that ensure the sustainable management of the system, infrastructure or vehicles in rail transportation systems throughout their lifetime without malfunctions. Existing systems are mostly operated by applying periodic preventive maintenance and corrective maintenance method in case of malfunction or damage. With the impact of developing technology and digitalization, the monitoring method, which is one of the digital maintenance methods, has started to create a maintenance application area, and thus, more cost-effective and efficient applications have been achieved. Complementary maintenance practices applied for the system, infrastructure or vehicles in rail transportation systems are structures that constitute a unique maintenance method or sub-methods of basic maintenance methods. Rail transportation systems require applying many different maintenance layers separately or together. Details about maintenance practices are given below (Thun, J.H., 2006), (Türk Standartları Enstitüsü , 2018), (Alman Standartları Enstitüsü, 2019).

Periodic Preventive Maintenance

It is a type of maintenance in which the basic replacement and repair operations of a system are carried out at certain periods. It is done to prevent the replaced elements from causing malfunction or damage.

Corrective Maintenance

It is a type of maintenance applied to eliminate the damage and restore the system to an operable state in case of a malfunction or any accident that occurs as a result of maintenance practices that are not carried out on time.

Maintenance by Monitoring

It is an innovative maintenance method consisting of various technological and software instruments, also referred to as predictive maintenance application. The personnel to be maintained are monitored with various methods and intervened at the right time to ensure low-cost and trouble-free maintenance.

Opportunity Maintenance

It is the situation where maintenance that is overdue or not yet due, regardless of time, is performed while the system or vehicle is being intervened for another purpose.

Active Maintenance

It is a type of corrective or preventive maintenance performed without requiring maintenance to ensure that a part continues to function.

Healing Maintenance

It is a type of technical operation performed to increase the functionality of a part without changing its original function.

Modification

It is a type of technical operation performed to increase the functionality of a part by changing one or more functions.

Modernization

It is the set of changes and innovations made in order to meet new demands and developments in equipment or parts.

Preventive Maintenance

It is a type of maintenance that is planned in advance to ensure that the functionality of the system or part is sustainable and to prevent malfunctions.

Onsite Maintenance

It is a type of maintenance performed without moving the part from its location to any maintenance center.

Operator Maintenance

It is the type of maintenance activities performed by the operator using the vehicle or device.

Conclusion

In this study, where the maintenance practices used in rail transportation systems are prioritized in the context of transportation efficiency, it has been understood that efficiency is an important issue

due to the problems experienced in energy resources and environmental pollution, and that studies need to be carried out to increase the efficiency levels of existing systems as well as newly established systems. In the research conducted in the literature, it has been determined that there are transportation efficiency studies on rail transportation systems and that there are not enough studies on the maintenance effect specifically on rail transportation systems. In addition, maintenance practices are an important parameter affecting efficiency on rail transportation systems, together with topics such as system procurement criteria, employment of expert personnel, corporate structure, social awareness, use of smart technologies, integration with different systems, innovative orientation, central management, planning and energy technology. It has been determined that . The most important relationship between maintenance methods and efficiency is that they are directly related to the increase in malfunctions that occur in systems over time.

It has been determined that periodic maintenance, monitoring maintenance, corrective maintenance, opportunity maintenance, active maintenance, preventive maintenance, on-site maintenance and operator maintenance methods are generally used in order for rail transportation systems to maintain a comfortable and malfunction-free life.

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CROSSINGS IN RAIL SYSTEMS

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Abstract

Rail transportation systems are among the widely used transportation types due to reasons such as transportation safety and efficient structure. With the developing rail system structure, safe and fast infrastructure systems have gained importance. One of the most important parameters in rail transportation systems is the infrastructure systems used. Infrastructure systems used in regions where rail system lines intersect with highway systems are underpasses, overpasses and grade crossings. Although their use is risky, grade crossings continue to be used because underpasses and overpasses cannot be built at all intersections. Among all these systems, the most used grade crossings have different types of structures. Many studies are carried out in the world and in our country to ensure the safety of grade crossings. Grade crossing awareness days (ILCAD) are held worldwide. Grade crossing safety is a complex structure with many components. The location where the grade crossing is created, its physical interaction with the railway, the warning and warning signs to be used and the perception of all these by the grade crossing users. Besides these main components, many more can be listed. Grouping the components using certain criteria will help safety and maintenance units organize their decision-making processes regarding the safety level of the grade crossing and the measures to be taken. In this study, all infrastructure systems will be examined and information about grade crossings, where accidents and risks are most common, will be detailed.

Keywords: Rail System, Crossing, Underpass, Overpass, Grade Crossing

Introduction

Rail transportation systems need structures that will provide appropriate vehicle movement so that vehicles can travel safely. These structures are basically; It consists of infrastructure and superstructure systems (B.F. Kinaci and C. Özarpa). One of the important parameters of rail transportation systems is infrastructure systems. Grade crossings, which are among the infrastructure systems; It consists of gated barrier grade crossing, automatic barrier system grade crossing and uncontrolled (free) grade crossing types. Grade crossings appear as areas that directly affect the safety of life and property and where serious accidents may occur (Özarpa, C., Kınacı, B. F., & Avcı, İ. , 2022). In this regard, many studies are carried out to ensure the safety of grade crossings both in the world and in our country. Due to the problems that may arise, the use of grade crossings is kept as small as possible, and transportation is attempted to be provided with underpass and overpass structures. Due to the costs and implementation difficulties of underpasses and overpasses, it has become necessary to continue using grade crossings (T.C Devlet Demiryolları İşletmesi Genel Müdürlüğü , Hemzemin Geçitlerin Korunması Bakımı ve Yönetimi İle Geçit Bekçilerinin Görevlerine Ait Yönetmelik. T. C. Resmi Gazete, 22512, 1996), (American Association of State Highway Officials), (Brent D. Ogden, Chelsey Cooper) .

To ensure safety at grade crossings, a complex structure with many components must be created. While evaluating the safety of grade crossings, details such as physical location, interaction of railway and highway, warning and warning signs to be used and level of awareness are examined. When determining the types of grade crossings to be established; Train travel speed ($V < 120$ km/h, 120 km/h $< V < 160$ km/h, $V > 160$ km/h) and travel moment value (multiplying the number of trains passing through the grade crossing daily and the number of road vehicles) are the most important parameters taken into consideration (T.C Devlet Demiryolları İşletmesi Genel Müdürlüğü , Hemzemin Geçitlerin Korunması Bakımı ve Yönetimi İle Geçit Bekçilerinin Görevlerine Ait Yönetmelik. T. C. Resmi Gazete, 22512, 1996), (DB Netze), (Ulaştırma ve Alt Yapı Bakanlığı). Various standards, regulations, application models and reports have been published by different institutions to explain certain basic situations during the implementation of grade crossings (A. Creber).

Rail System Infrastructure Systems

Rail transportation systems need roads that provide appropriate vehicle movement so that vehicles can travel safely. These roads basically consist of infrastructure and superstructure systems. One of the important parameters of rail transportation systems is infrastructure systems. Infrastructure systems include all kinds of work done to ensure the safe navigation of the existing natural ground structure of the rail system vehicle. Infrastructure systems mainly consist of tunnels, bridges, passages and support structures. Figure 1 shows the basic infrastructure and superstructure systems (Ay, İ, 2014).

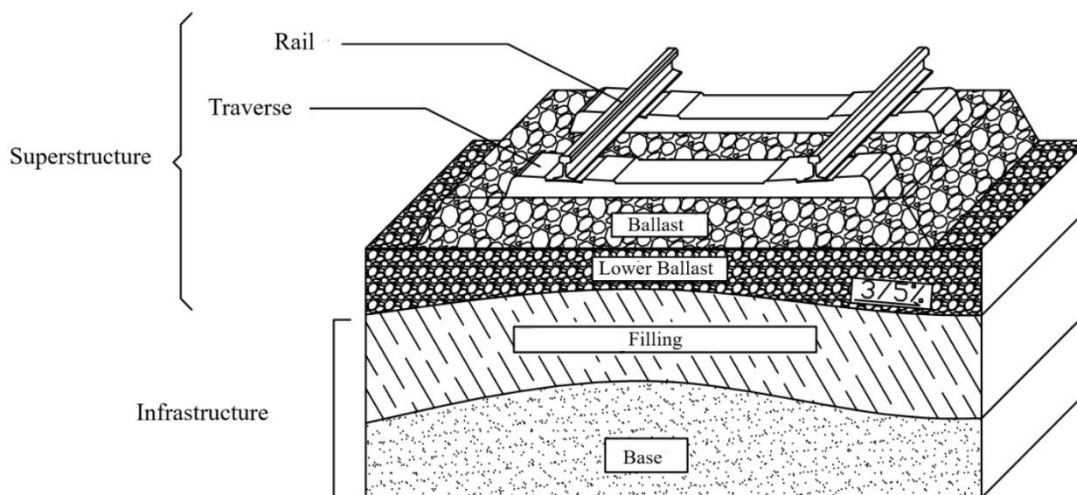


Figure 1. Infrastructure and Superstructure Systems

Grade Crossing

The structures that enable passage from one side to the other at the points where the railway intersects with the highway are called crossings. In railways, transitions are provided by underpasses, overpasses and grade crossing structures. Grade crossing types are basically; It consists of gated barrier grade crossings, automatic barrier system grade crossings and uncontrolled (free) grade crossings. Figure 2 shows 1-lane and 2-lane highway grade crossings intersecting the railway (Transport Canada).

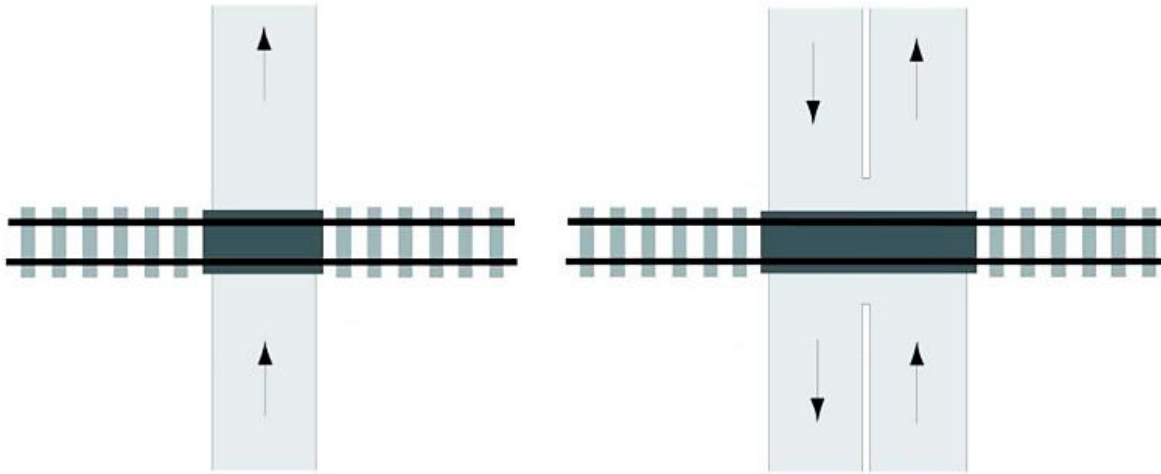


Figure 2. 1-lane and 2-lane Highway Intersecting with Railway

When designing grade crossings, designs are made according to the train speed and travel moment value (the number of trains passing through the grade crossing daily multiplied by the number of road vehicles). Table 1 shows the grade crossing type selection according to train speed and travel moment values (T.C Devlet Demiryolları İşletmesi Genel Müdürlüğü , TCDD Emniyet Yönetim Sistemi El Kitabı (Sürüm No: 1.0). Ankara: TCDD Demiryolu Emniyeti ve Risk Yönetimi Müdürlüğü., 2017).

Table 1. Grade Crossing Selection

Train Speed	Grade Crossing (GC) Moment	GC Type
Train Speed < 120 km/h	Moment < 3.000	Uncontrolled
Train Speed < 120 km/h	3.000 < Moment < 30.000	With Flashing Bell and Automatic Barrier
120 km/h < Train Speed < 160 km/h	Moment < 3.000	With Flashing Bell and Automatic Barrier
120 km/h < Train Speed < 160 km/h	3.000 < Moment < 30.000	With Flashing Bell and Automatic Barrier
Train Speed > 160 km/h	Moment < 3.000	GC Cannot Be Opened
Train Speed < 160 km/h	Moment > 30.000	GC Cannot Be Opened

When designing grade crossings, the section where the crossing is located must be provided with a structure suitable for all railway vehicles and road vehicles. A cross-sectional view of the values

accepted in applications around the world is shown in Figure 3. One of the important details in grade crossing design is the calculation of safe stopping distance.

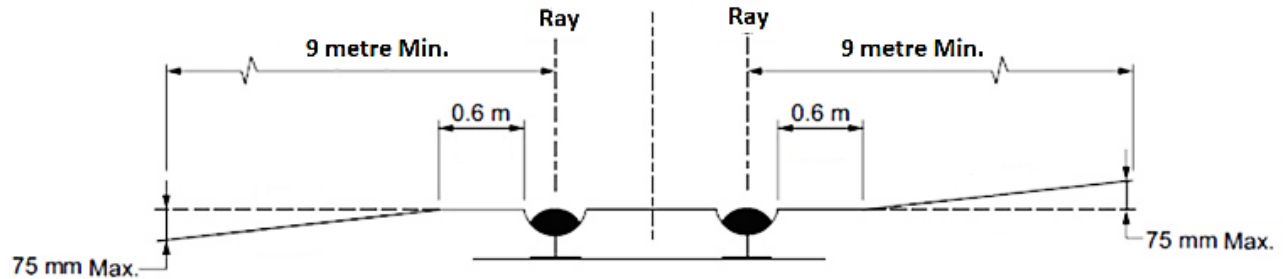


Figure 3. Cross Section View of Grade Crossing

Conclusion

With the developments in rail transportation systems, the number of crossings intersecting with the highway has increased. Grade crossings, which are the most frequently used system among these crossings, have been identified as an area where serious studies are carried out due to accident risks and the effects of these accidents. The geometric designs and risk prevention practices of grade crossings used around the world are specially designed according to the geographical location of the region where the system is used, line capacities, awareness level and technology levels of the systems used. In the study, acceptable geometric design was determined when creating a grade crossing by examining the standards, regulations, application models and reports put forward by many different countries.

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**BAZI SÜBSTİTÜE MWCNT BİLEŞİKLERİNİN FOTOLÜMİNESANS
ÖZELLİKLERİNİN İNCELENMESİ**

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Özet

Karbon nanotüpleri (CNT'ler) lüminesans davranış sergiler. Tek duvarlı karbon nanotüplerin (SWCNT'ler) fotolüminesans (PL) spektrumları birçok keskin emisyon bandı sergiler. Yarı iletken kuantum noktalarının doğal dezavantajlarından yoksundurlar. Çift duvarlı karbon nanotüplerin lüminesansı ile ilgili olarak, bazı araştırmacılar iç kabuktan güçlü bir emisyon rapor ederken, bazıları dış kabuktan zayıfladığını, bazıları ise her ikisini de rapor etmektedir. Bu çalışma kapsamında Suzuki-coupling reaksiyonu ile sentezlenen, karakterize edilen ve hidrojen depolama özellikleri belirlenen aril sübstitüe MWCNT bileşiklerinin fotolüminesans özellikleri incelenmiştir. Eklenen grup üzerindeki halka sayısı ve delokalizasyon arttıkça fotolüminesans şiddetinin arttığı tespit edilmiştir.

Anahtar Kelimeler: Fotolüminesans, MWCNT, karakterizasyon.

**INVESTIGATION OF PHOTOLUMINISENCE PROPERTIES OF SOME
SUBSTITUTED MWCNT COMPOUNDS**

Abstract

Carbon nanotubes (CNTs) exhibit luminescent behavior. Photoluminescence (PL) spectra of single-walled carbon nanotubes (SWCNTs) exhibit many sharp emission bands. They lack the inherent drawbacks of semiconductor quantum dots. Regarding the luminescence of double-walled carbon nanotubes, some researchers report a strong emission from the inner shell, some report a weakening from the outer shell, and some report both. Within the scope of this study, the photoluminescence properties of aryl substituted MWCNT compounds synthesized by Suzuki-coupling reaction, characterized and whose hydrogen storage properties were determined were examined. It was determined that the photoluminescence intensity increased as the number of rings and delocalization on the added group increased.

Keywords: Photoluminescence, MWCNT, characterization.

Giriş

Karbon nanotüpler silindirik fulleren tipi yapılardır. İlk kez 1985 yılında sıcak karbon buharının yoğunlaşması sırasında 60 veya daha fazla karbon atomunun bir araya gelmesiyle oluşan futbol topu şeklindeki moleküller olarak keşfedilmişlerdir. Tek duvarlı karbon nanotüpler (SWCNTs) sp^2 karbondan yapılmış çapları 0.5-1.5 nm olan uzun silindirik yapılardır. Çok duvarlı karbon nanotüpler (MWCNTs) sp^2 karbondan yapılmış uzun silindirik nano yapılardır. Nanotüpler dünya çapında pek çok araştırma grubunun üzerinde yoğun çalışmalar yaptığı bir alandır. Artık yaklaşık son 30 yıldır yapılan araştırmaların sonuçları doğrultusunda geleceğe yönelik uygulamaları çok önemli faydalar vaat etmektedir. Nanotüplerin mevcut uygulamaları sınırlıdır ve yaygın olarak kullanılmamaktadır [1].

Heteroatom içeren bileşikler, benzen halkaları içeren bileşikler, naftalin türevleri ve metal içeren inorganik bileşikler, ışıldayan maddelere örnektir. Bir atom veya molekül ultraviyole ışığın (UV) fotonları tarafından uyarıldığında lüminesans olgusu meydana geldiğinde buna fotolüminesans (PL) adı verilir. Fotolüminesans teknolojisi, malzemelerin yüzeyindeki aktif bölgelerin yapısını ve özelliklerini belirlemek için yaygın olarak kullanılan bir yöntemdir. PL teknolojisi yüzeylerdeki reaksiyonları anlamak için kullanılabilir. PL çalışmaları aynı zamanda emisyon tepe dalga boylarını ve kuantum verimlerini belirlemek için de kullanılabilir. Son olarak, eklemeler ve modifikasyonlardan sonra moleküllerin özelliklerini incelemek için kullanılabilir [2–4].

Lüminesans maddelerde her aşamada görülebilir. Heteroatom içeren bileşikler, benzen halkaları içeren bileşikler, naftalin türevleri ve metal içeren inorganik bileşikler, ışıldayan maddelere örnektir. Lüminesans, madde uyarılmış bir durumdan temel enerji durumuna geçtiğinde meydana gelir. Atomik spektrumlar doğrusal iken moleküller bantlar halindedir [5]. CNT bileşikleri üzerine gerçekleştirilen çalışmalarda eklenen fonksiyonel grupların lüminesans şiddetini artırdığı tespit edilmiştir [2, 6, 7].

Bu çalışmada, Suzuki-coupling reaksiyonu ile sentezlenen ve hidrojen depolama özellikleri rapor edilen aril-süstitüe MWCNT'lerin fotolüminesans özellikleri belirlenmiştir. Halka sayısının artması ve eklenen grubun yer değiştirmesi ile fotolüminesansın arttığı bulunmuştur.

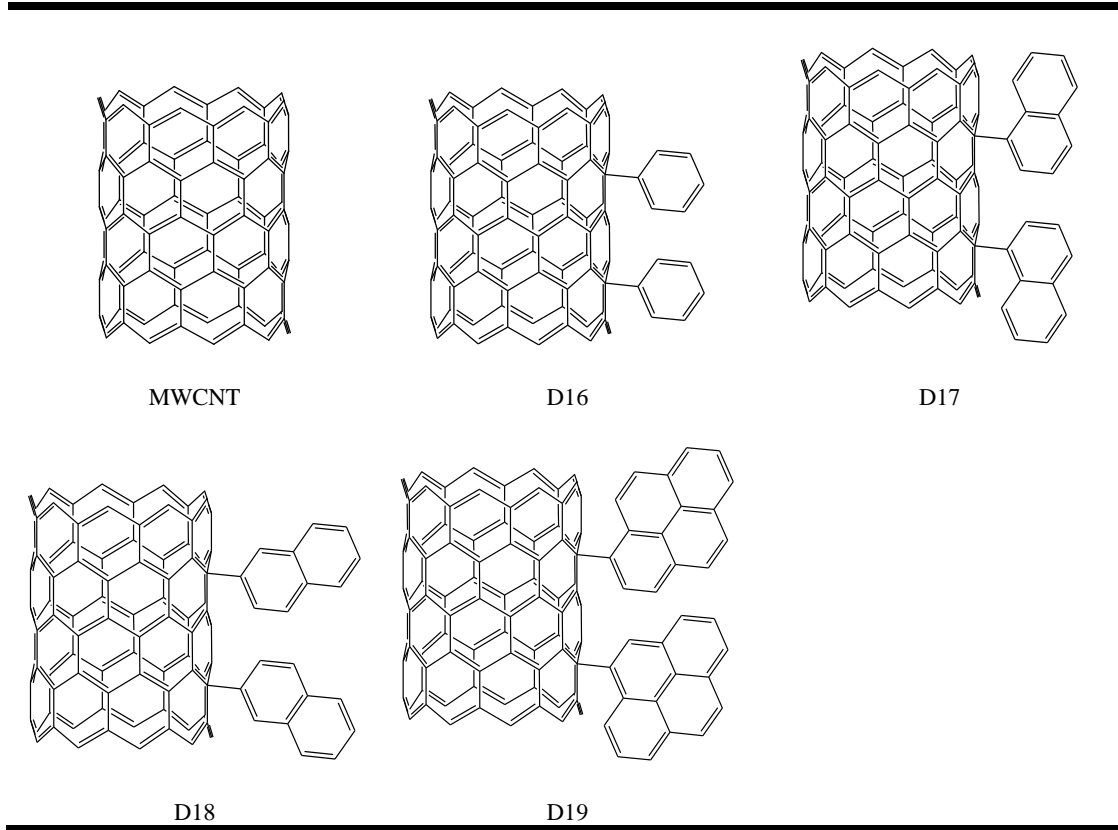
MATERYAL VE METOT

Fotolüminesans Çalışmaları

298 K sıcaklığındaki bir kriyostata (yakın) yerleştirilmiş tozlar (MWCNT, D16, D17, D18, D19), 0.01 ve 1.04 W/cm² arasındaki uyarma yoğunlukları üzerinde fotoluminesans ölçümleri

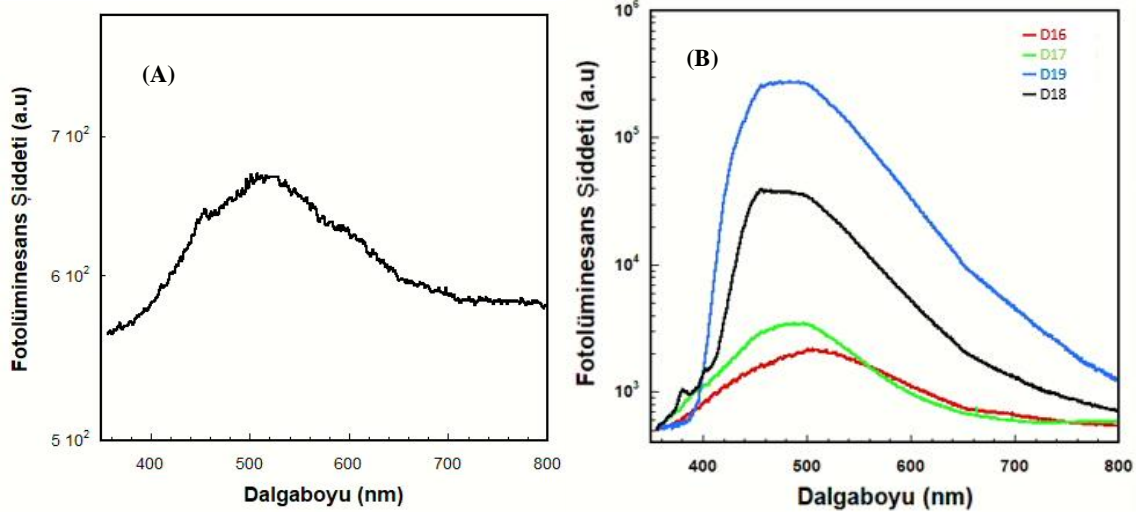
yapılmıştır. Eksitasyon için 349 nm'de frekans üçlü Nd: YLFQ anahtarlamalı puls lazer kullanılmıştır. Lüminesans uygun lenslerle toplanmış ve daha sonra 1200 çizgi/mm ızgara kullanılarak 500 mm'lik bir spektrometre ile dağıtılmış ve ICCD kamera dedektörü tarafından şiddet verileri toplanmıştır (dedektör sıcaklığı -25 °C) [8, 9].

Çizelge 1. Kullanılan aril süstitüe MWCNT'ler [9, 10]



BULGULAR

Bu çalışmada MWCNT, D16 - D19 bileşiklerinin fotolüminesans spektrumları Şekil 2'de verilmiştir.



Şekil 1. Sübstitüsyon içermeyen MWCNT bileşiminin (A) ve D16, D17, D18, D19 bileşiklerinin (B) farklı dalga boylarındaki fotolüminesans ölçümü [9].

TARTIŞMA VE SONUÇ

Bu çalışma kapsamında, ticari olarak satın alınan MWCNT bileşiği ile Suzuki coupling reaksiyonuyla sentezlenen aril sübstitüe MWCNT bileşiklerin optik özelliklerinin tespit edilmesi amacıyla fotolüminesans özellikleri incelenmiştir. İlk olarak 25 °C’de genel bir dalga boyu taraması gerçekleştirilmiş ve maksimum lüminesans tespit edilen dalgaboyları belirlenmiştir.

Şekil 1 A incelendiğinde ticari MWCNT bileşiminin 525 nm dalgaboyunda $5,6 \cdot 10^2$ lüminesans şiddetine sahip olduğu, Şekil 1 B’de ise sırasıyla D16, D17, D18 ve D19 bileşiklerinde ise en yüksek fotolüminesans şiddeti D19 bileşiğine ait (~ 450 nm için $5 \cdot 10^5$ a.u.) olduğu tespit edilmiştir. D19’dan sonra en yüksek fotolüminesans şiddetinin D18 bileşiğine ait olduğu (~ 450 nm için $5 \cdot 10^4$ a.u.), üçüncü en yüksek fotolüminesans şiddetinin D17 bileşiğine ait olduğu (480 nm için $5 \cdot 10^3$ a.u.) ve son olarak en düşük fotolüminesans şiddetinin (500 nm için $1 \cdot 10^3$ a.u.) D16 bileşiğine ait olduğu gözlenmiştir. Bileşiklerin sırasıyla fenil, α -naftil, β -naftil ve 1-pirenil fonksiyonel gruplarını içerdiği düşünüldüğünde aromatik benzen halkasının artmasıyla fotolüminesans şiddetininin yaklaşık 10 kat arttığı tespit edilmiştir.

Bununla beraber ilave edilen benzen halkaları PL değerinin daha kısa dalga boylarına, maviye kaymasına sebep olmuştur. Aynı halka sayısına, fakat farklı bağlanma bölgelerine sahip α -naftil ve β -naftil modifiye MWCNT’lerin fotolüminesans spektrumları incelendiğinde α -naftil bileşiminin diğer konformasyondan daha yüksek fotolüminesansa sahip olduğu tespit edilmiştir.

Spektrumlarda geniş bantların olması geçişlerin daha çok $\pi \rightarrow \pi^*$ geçişleri olduğunu; bileşiklerin konjuge π bağları içermesi sebebiyle $\pi \rightarrow \pi^*$ geçişlerinin gerçekleştiği düşünülmektedir.

Son olarak maksimum PL değerlerine sahip oldukları dalgaboyları karşılaştırıldığında MWCNT > D16 > D17 > D18 > D19 şeklinde olduğu tespit edilmiştir.

TEŞEKKÜR

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**BAZI ORJİNAL METİL SÜBSTİTÜE BENZOTİYOAT BİLEŞİKLERİNİN
YARIŞMALI EKSTRAKSİYONU VE ÇEŞİTLİ SULARDAN METAL GİDERİMİNİN
İNCELENMESİ**

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Özet

Hetereatom içeren bileşikler içerdikleri oksijen, kükürt, azot gibi elektronegatif elementlerden dolayı hidrofilik bir özelliğe sahiptirler. Ayrıca taşıdıkları hidrokarbonlar ile ester, eter, aromatik gruplar gibi fonksiyonel gruplardan kaynaklanan apolar karakterli hidrofobik özellik sergileyen bir esnek yapıya sahiptir. Organik bileşikler içerdikleri bu atomlar ve gruplar sebebiyle, metal iyonları ile olağanüstü seçicilik özellikleri göstermektedir. Bu çalışma kapsamında; seçimli ekstraksiyon ve metal giderimi üzerine çalışmalar gerçekleştirilmiştir. Bu amaçla, metil süstitüe benzotiyoot bileşiklerinin, aynı çözültü içerisinde metal tuzlarını içeren ortamda sergiledikleri metal seçicilikleri yarışmalı ekstraksiyon ile incelenmiştir. Ayrıca mikrodalga sentez yöntemiyle sentezlenen benzotiyoot bileşiklerinin, şebeke, göl ve dere sularından alınan su numuneleri üzerine etkisi yarışmalı sıvı-sıvı iyon çiftleri ekstraksiyonu ile belirlenmiştir. Uygulamanın amacı, sertliğe ve tat-koku-görüntü bozukluklarına yol açabilen bazı metal iyonlarının giderimi araştırılmasıdır. Bağlı bulunan fonksiyonel grupların (değişiminin seçicilik üzerine etkisi incelenmiştir. Gerçekleştirilen çalışmada elde edilen sonuçlar ışığında, su arıtım sistemlerinin iyon değiştirici ya da iyon tutucu reçinelerinde kullanılan bileşiklerin kullanılması olasıdır. Ayrıca, bu bileşiklerin uygulama alanının geliştirilmesi ve geri kazanımlarının artmasıyla endüstride kullanımı olasıdır.

Anahtar kelimeler: Sulardan metal giderimi, yarışmalı metal ekstraksiyonu, metal kompleksleşmesi, içme suyu kalitesi.

**COMPETITIVE EXTRACTION OF SOME ORIGINAL METHYL SUBSTITUTED
BENZOTHIATE COMPOUNDS AND INVESTIGATION OF THEIR METAL
REMOVAL PROPERTIES FROM VARIOUS WATERS**

Abstract

Compounds containing heteroatoms have a hydrophilic property due to the electronegative elements they contain such as oxygen, sulfur and nitrogen. In addition, it has a flexible structure that exhibits non-polar hydrophobic properties resulting from the hydrocarbons it carries and functional groups such as esters, ethers and aromatic groups. Organic compounds show extraordinary selectivity with metal ions due to the atoms and groups they contain. This scope of work; studies on selective extraction and metal removal have been carried out. For this purpose, the metal selectivities of methyl substituted benzothioate compounds in the same solution containing metal salts were examined by competitive extraction. In addition, the effect of benzothioate compounds synthesized by microwave synthesis method on water samples taken from mains and stream waters was determined by competitive liquid-liquid ion pair extraction. The purpose of the application is to investigate the removal of some metal ions that can cause hardness and taste-odor-image disorders. The effect of changing the attached functional groups on selectivity was examined. In the light of the results obtained in the study, it is possible to use compounds used in ion exchange or ion trap resins of water treatment systems. Moreover, it is possible to use these compounds in industry with the development of their application areas and increasing their recovery.

Keywords: Metal removal from water, competitive metal extraction, metal complexation, drinking water quality.

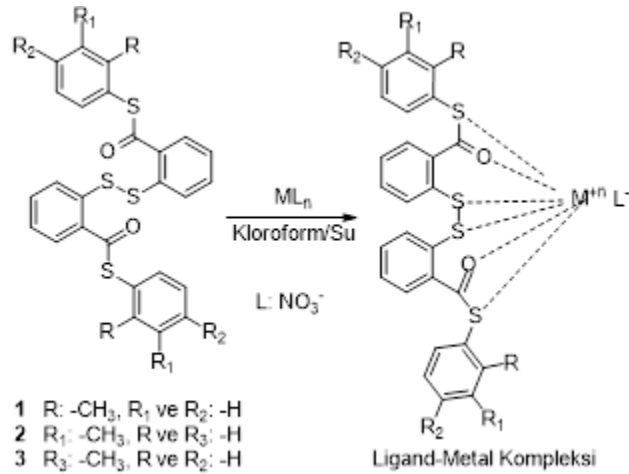
Giriş

Taç eterler içermekte oldukları oksijen, kükürt, azot atomları ve benzen halkaları sebebiyle oldukça ilgi çekicidir [1]. İçerdikleri döner atomlara bağlı olarak okso, azo, tiyo, benzo ve benzo-tiyo, vb. olarak adlandırılmaktadır [2]. Benzo taç eterlerin 1960'lı yıllarda Perderson tarafından sentezinden sonra kükürt içeren üyelerinin sentezleri 1970-1980'li yıllarda gerçekleşmeye başlamıştır [3]. 1972-1973 yıllarında Tanaka ve arkadaşları, 1981'de Buter ve Kellog ile başlayan benzo-tiyo crown eterlerin sentezi 1990'lı yıllarda oldukça artmıştır [4, 5]. Tiyo taç eterler ağır metallere ve değerli metallere karşı taşıdıkları kükürt atomları sebebiyle yüksek ilgi göstermektedir [6]. 2,2'-ditiyosalisilik asit, ilaçların, boyaların, fotokimyasalların ve biyositlerin sentezinde bir ara madde olarak kullanılır [7]. Halkalı bileşiklerin esterifikasyon, amidasyon ve tiyoesterifikasyon reaksiyonları ile sentezi 1970'li yıllara dayanmaktadır. Daha sonraki yıllarda bu bileşiklerin metalurjik özellikleri içerdikleri heteroatomlar, aromatik yapılar ve fonksiyonel gruplar nedeniyle araştırılmıştır [8–15]. Bu çalışmada, tiyoester türevlerinin fonksiyonel gruplarının seçimli metal ekstraksiyonu üzerindeki etkisini araştırmak amacıyla, Zn^{2+} , Mn^{2+} , Cr^{3+} , Fe^{3+} , Co^{2+} , Cu^{2+} iyonları ve sıvı-sıvı iyon çiftleri ekstraksiyonu kullanılmıştır. Ayrıca sıvı-sıvı iyon çiftleri ekstraksiyonuna metal tuzları yerine göl, dere ve şebeke suları uygulanmış ve ppb seviyesinde ekstraksiyonu araştırılmıştır.

MATERYAL VE METOT

Sentez

Şekil 1'de yer alan **1-3** bileşikleri literatüre göre sentezlenmiştir [16].



Şekil 1. 1-3 bileşikleri kompleksleşme şeması

Yöntem

Sıvı-sıvı ekstraksiyonu birbiriyle karışmayan iki sıvının (organik faz ve inorganik faz) yardımıyla inorganik materyellerin organik materyellere taşınmasıdır. Yarışmalı metal ekstraksiyonu ile nispi seçicilik faktörlerinin (S_f) belirlenmesi ve doğal su numunelerinden metal giderimi literatüre göre gerçekleştirilmiştir [9, 17]. Yarışmalı ekstraksiyon için indüktif olarak eşleşmiş plazma – optik emisyon spektroskopisi (ICP-OES) ve yüzey sularından metal giderimi çalışmalarında indüktif olarak eşleşmiş plazma – kütle spektroskopisi (ICP-MS) cihazları kullanılmıştır. Ekstraksiyon denge sabiti (K_{ext}), denge anında organik fazda oluşan kompleksin sulu fazda yer alan metal iyonuna oranı (K_D), ekstraksiyon yüzdesi (%Ext ve $\ln(K_{ext})$) ve ekstraksiyonun serbest Gibbs enerjisi ($-\Delta G_{ext}$) değerleri hesaplanmıştır.

BULGULAR

Yarışmalı ekstraksiyon amacıyla kullanılan 1-3 bileşiklerinin Mn^{2+} , Fe^{3+} , Cr^{3+} , Co^{2+} , Zn^{2+} , Cu^{2+} iyonlarının karışımında elde edilen veriler Çizelge 1’de verilmiştir.

Çizelge 1. 1-3 bileşiklerinin sıvı-sıvı iyon çiftleri ekstraksiyonuyla Mn^{2+} , Fe^{3+} , Cr^{3+} , Co^{2+} , Zn^{2+} , Cu^{2+} iyonlarının karışımından ((kloroform/su (%50), doğal pH ve 25 °C’de) elde edilen ekstraksiyon sabitleri.

Ligand	İyon	K_{ext}	K_D	%Ext	$\ln(K_{ext})$	$(-\Delta G_{ext})$
1	Co^{2+}	1.77E+03	8.18E-02	7.56	7.48E+00	4.43E+03
	Cr^{3+}	3.05E+03	1.35E-01	11.88	8.02E+00	4.75E+03
	Cu^{2+}	8.76E+03	3.31E-01	24.86	9.08E+00	5.38E+03
	Fe^{3+}	3.73E+05	3.50E+00	77.77	1.28E+01	7.60E+03
	Mn^{2+}	6.27E+03	2.67E-01	21.10	8.74E+00	5.18E+03
	Zn^{2+}	6.31E+03	2.41E-01	19.41	8.75E+00	5.18E+03
2	Co^{2+}	1.34E+03	6.30E-02	5.92	7.20E+00	4.26E+03
	Cr^{3+}	3.76E+03	1.62E-01	13.97	8.23E+00	4.87E+03
	Cu^{2+}	8.35E+03	3.18E-01	24.14	9.03E+00	5.35E+03
	Fe^{3+}	3.83E+05	3.54E+00	77.99	1.29E+01	7.61E+03
	Mn^{2+}	5.90E+03	2.54E-01	20.24	8.68E+00	5.14E+03
	Zn^{2+}	3.65E+03	1.53E-01	13.27	8.20E+00	4.86E+03
3	Co^{2+}	8.17E+02	3.93E-02	3.78	6.71E+00	3.97E+03
	Cr^{3+}	2.99E+03	1.32E-01	11.70	8.00E+00	4.74E+03
	Cu^{2+}	8.46E+03	3.22E-01	24.35	9.04E+00	5.35E+03
	Fe^{3+}	3.88E+05	3.57E+00	78.11	1.29E+01	7.62E+03
	Mn^{2+}	5.03E+03	2.20E-01	18.03	8.52E+00	5.05E+03
	Zn^{2+}	3.25E+03	1.38E-01	12.14	8.09E+00	4.79E+03

1-3 bileşiklerinin sıvı-sıvı iyon çiftleri ekstraksiyonuyla Mn^{2+} , Fe^{3+} , Cr^{3+} , Co^{2+} , Zn^{2+} , Cu^{2+} iyonlarının karışımından elde edilen nispi seçicilik faktörleri (S_f) Çizelge 2-4’de verilmiştir.

Çizelge 2. Mn^{2+} , Zn^{2+} , Cr^{3+} , Co^{2+} , Fe^{3+} , Cu^{2+} iyonlarını içeren karışımının, **1** bileşiği ile sıvı-sıvı iyon çiftleri ekstraksiyonunda elde edilen nispi seçimlilik faktörleri (S_f).

	Co^{2+}	Cr^{3+}	Cu^{2+}	Fe^{3+}	Mn^{2+}	Zn^{2+}
Co^{2+}	-	0.61	0.25	0.02	0.31	0.34
Cr^{3+}	1.65	-	0.41	0.04	0.50	0.56
Cu^{2+}	4.05	2.46	-	0.09	1.24	1.37
Fe^{3+}	42.77	25.96	10.57	-	13.08	14.52
Mn^{2+}	3.27	1.98	0.81	0.08	-	1.11
Zn^{2+}	2.95	1.79	0.73	0.07	0.90	-

Çizelge 3. Mn^{2+} , Zn^{2+} , Cr^{3+} , Co^{2+} , Fe^{3+} , Cu^{2+} iyonlarını içeren karışımının, **2** bileşiği ile sıvı-sıvı iyon çiftleri ekstraksiyonunda elde edilen nispi seçimlilik faktörleri (S_f).

	Co^{2+}	Cr^{3+}	Cu^{2+}	Fe^{3+}	Mn^{2+}	Zn^{2+}
Co^{2+}	-	0.39	0.20	0.02	0.25	0.41
Cr^{3+}	2.58	-	0.51	0.05	0.64	1.06
Cu^{2+}	5.05	1.96	-	0.09	1.25	2.08
Fe^{3+}	56.27	21.83	11.13	-	13.97	23.16
Mn^{2+}	4.03	1.56	0.80	0.07	-	1.66
Zn^{2+}	2.43	0.94	0.48	0.04	0.60	-

Çizelge 4. Mn^{2+} , Zn^{2+} , Cr^{3+} , Co^{2+} , Fe^{3+} , Cu^{2+} iyonlarını içeren karışımının, **3** bileşiği ile sıvı-sıvı iyon çiftleri ekstraksiyonunda elde edilen nispi seçimlilik faktörleri (S_f).

	Co^{2+}	Cr^{3+}	Cu^{2+}	Fe^{3+}	Mn^{2+}	Zn^{2+}
Co^{2+}	-	0.30	0.12	0.01	0.18	0.28
Cr^{3+}	3.37	-	0.41	0.04	0.60	0.96
Cu^{2+}	8.19	2.43	-	0.09	1.46	2.33
Fe^{3+}	90.82	26.94	11.09	-	16.22	25.82
Mn^{2+}	5.60	1.66	0.68	0.06	-	1.59
Zn^{2+}	3.52	1.04	0.43	0.04	0.63	-

Çizelge 5’de Iılsu Barajı göl havzası (Su-1), Kezer Çayı (Su-2) ve çeşme suyu (Su-3) numunelerindeki Zn^{2+} , Mn^{2+} , Cr^{3+} , Fe^{3+} , Co^{2+} , Cu^{2+} iyonlarının giderimi için gerçekleştirilen çalışmada elde edilen veriler yer almaktadır.

Çizelge 5. İlisu Barajı havzası (Su-1), Kezer Çayı (Su-2) ve çeşme suyu (Su-3) numunelerindeki Cu^{2+} , Mn^{2+} , Zn^{2+} , Fe^{3+} , Cr^{3+} , Co^{2+} iyonlarının, **1-3** bileşikleriyle ile sıvı-sıvı iyon çiftleri ekstraksiyonu kullanılarak metal giderimi.

Ligand	Kodu	Cr^{3+}	Mn^{2+}	Fe^{3+}	Co^{2+}	Cu^{2+}	Zn^{2+}
1	Su-1 (baş.) (ppb)	0.0	1.6	1022.2	0.7	0.0	1.4
	Su-1 (ext. son.) (ppb)	0.0	1.5	854.8	0.6	0.0	0.0
	% Ekstraksiyon	-	2.9	16.4	17.9	-	99.7
	Su-2 (baş.) (ppb)	121.4	5.4	979.4	0.8	3.1	14.0
	Su-2 (ext. son.) (ppb)	115.9	5.1	671.5	0.6	3.0	13.9
	% Ekstraksiyon	4.5	5.1	31.4	21.0	3.7	0.9
	Su-3 (Baş.) (ppb)	154.1	22.9	1268.2	1.3	3.8	43.6
	Su-3 (ext. son.) (ppb)	147.5	7.6	1098.2	1.2	3.7	36.1
	% Ekstraksiyon	4.2	66.6	13.4	4.7	3.5	17.2
2	Su-1 (baş.) (ppb)	0.0	1.6	1022.2	0.7	0.0	1.4
	Su-1 (ext. son.) (ppb)	0.0	1.2	382.2	0.2	0.0	0.0
	% Ekstraksiyon	-	20.9	62.6	67.0	-	99.5
	Su-2 (baş.) (ppb)	121.4	5.4	979.4	0.8	3.1	14.0
	Su-2 (ext. son.) (ppb)	115.7	5.0	694.6	0.8	3.0	9.5
	% Ekstraksiyon	4.7	5.8	29.1	1.4	3.3	31.9
	Su-3 (Baş.) (ppb)	154.1	22.9	1268.2	1.3	3.8	43.6
	Su-3 (ext. son.) (ppb)	149.8	4.3	1066.2	1.2	3.6	39.8
	% Ekstraksiyon	2.8	81.2	15.9	8.4	5.3	8.8
3	Su-1 (baş.) (ppb)	0.0	1.6	1022.2	0.7	0.0	1.4
	Su-1 (ext. son.) (ppb)	0.0	1.5	848.1	0.5	0.0	1.0
	% Ekstraksiyon	-	4.8	17.0	23.1	-	25.3
	Su-2 (baş.) (ppb)	121.4	5.4	979.4	0.8	3.1	14.0
	Su-2 (ext. son.) (ppb)	118.5	5.1	925.6	0.7	2.9	6.9
	% Ekstraksiyon	2.4	5.3	5.5	15.0	5.2	51.0
	Su-3 (Baş.) (ppb)	154.1	22.9	1268.2	1.3	3.8	43.6
	Su-3 (ext. son.) (ppb)	150.5	10.7	896.9	1.2	3.6	27.6
	% Ekstraksiyon	2.4	53.5	29.3	4.5	4.4	36.8

TARTIŞMA VE SONUÇ

Bu çalışmada, Mn^{2+} , Zn^{2+} , Cr^{3+} , Co^{2+} , Fe^{3+} , Cu^{2+} iyonlarının, sıvı-sıvı ekstraksiyonu ((kloroform/su (%50), doğal pH ve 25 °C'de) ile **1-3** bileşiklerinin yarışmalı ekstraksiyonu ve metal giderimi incelenmiştir.

Çizelge 1'de yer alan yarışmalı ekstraksiyon sonuçları incelendiğinde **1** bileşiğinin K_{ext} , K_D , %Ext, $\ln(K_{\text{ext}})$ ve $(-\Delta G_{\text{ext}})$ değerlerinin büyük olması ekstraksiyonun yüksek olması anlamına gelmektedir. Ekstraksiyonun en güzel göstergesi olan % ekstraksiyon değerleri incelendiğinde **1**, **2** ve **3** bileşiklerinin en fazla Fe^{3+} iyonunu (sırasıyla %77.77, %77.99 ve %78.11) ekstrakte ettiği

tespit edilmiştir. **1**, **2** ve **3** bileşiklerinin Fe^{3+} iyonunu ekstraksiyonu en yakın iyon (Cu^{2+}) göre yaklaşık 3 kattan daha fazladır. Tüm bileşikler en az Co^{2+} tuzunu (% Ext değeri 3.78-7.56 arası) ekstrakte etmiştir. **1** ve **3** bileşiklerinin % ekstraksiyon değerleri sıralaması $Fe^{3+} > Cu^{2+} > Mn^{2+} > Zn^{2+} > Cr^{3+} > Co^{2+}$ şeklindedir. **2** bileşiğinin % ekstraksiyon değerleri sıralaması ise $Fe^{3+} > Cu^{2+} > Mn^{2+} > Zn^{2+} \approx Cr^{3+} > Co^{2+}$ şeklindedir.

Çizelge 2’de yer alan S_f değerleri incelendiğinde **1** bileşiğinin Fe^{3+} iyonunu; Co^{2+} iyonuna göre 42.77 kat, Cr^{3+} iyonuna göre 25.96 kat, Zn^{2+} iyonuna göre 14.52 kat, Mn^{2+} iyonuna göre 13.08 kat ve Cu^{2+} iyonuna göre 10.57 kat daha fazla tercih ettiği gözlenmiştir. Özetle **1** bileşiği Fe^{3+} iyonunu seçimli olarak ekstrakte etmektedir. Çizelge 3’de yer alan S_f değerleri incelendiğinde **2** bileşiğinin Fe^{3+} iyonunu; Co^{2+} iyonuna göre 56.27 kat, Cr^{3+} iyonuna göre 21.83 kat, Zn^{2+} iyonuna göre 23.16 kat, Mn^{2+} iyonuna göre 13.97 kat ve Cu^{2+} iyonuna göre 11.13 kat daha fazla tercih ettiği gözlenmiştir. Özetle **2** bileşiği Fe^{3+} iyonunu seçimli olarak ekstrakte etmektedir. Çizelge 4’de yer alan S_f değerleri incelendiğinde **3** bileşiğinin Fe^{3+} iyonunu; Co^{2+} iyonuna göre 90.82 kat, Cr^{3+} iyonuna göre 26.94 kat, Zn^{2+} iyonuna göre 25.82 kat, Mn^{2+} iyonuna göre 16.22 kat ve Cu^{2+} iyonuna göre 11.09 kat daha fazla tercih ettiği gözlenmiştir. Özetle **3** bileşiği Fe^{3+} iyonunu seçimli olarak ekstrakte etmektedir. Çizelge 2-4’e göre **1-3** ligandları içerisinde en seçici ligand, **3** numaralı ligand olduğu belirlenmiştir.

Kendiliğinden meydana gelen bir olayın olasılığının bir ölçüsü olan pozitif Gibbs serbest enerji değerleri ($-\Delta G_{ext}$), tüm ekstraksiyonların istemli olduğunu göstermektedir.

Ayrıca Kezer Çayı, İlisu Barajı göl havzası ve çeşme suyu örneklerinde de aynı iyonların Zn^{2+} , Cr^{3+} , Mn^{2+} , Co^{2+} , Fe^{3+} , Cu^{2+} iyonlarının, **1-3** bileşikleriyle sıvı-sıvı iyon çiftleri ekstraksiyonu üzerinden metal giderimi araştırılmıştır. Çizelge 5’e göre su örneklerinin ppb düzeyinde Zn^{2+} , Cr^{3+} , Mn^{2+} , Co^{2+} , Fe^{3+} , Cu^{2+} iyonlarını içermesine rağmen **1-3** bileşikleriyle tarafından %1.4 ile %99.7 oranında bu iyonları ekstrakte ettiği tespit edilmiştir.

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Özet

Ticari olarak üç farklı erik türünün yetiştiriciliği öne çıkmakta olup, bu türler içerisinde Japon grubu olarak sınıflanan *Prunus salicina* L., üretim ve tüketim yönüyle en yüksek paya sahiptir. Anavatanı Çin ve çevresi olan bu tür, Japonya’da yayılım göstermiş, ilerleyen süreçte Japon eriği ıslahının öncüsü olarak bilinen Luther Burbank tarafından Amerika’ya getirilmiştir. Bu ekip tarafından 1884 yılında Kaliforniya’da başlatılan ıslah çalışmaları günümüzde en gelişmiş ıslah programları arasında bilinmekte ve o dönem elde edilen çeşitlerden bazıları halen ticari olarak kullanılmaktadır. Bu türde hem tür içi hem de türler arası melezleme ıslahı çalışmaları yoğun olarak devam etmektedir. Melezleme, kendileme ve serbest tozlanma çalışmaları doğrultusunda çok sayıda çeşit geliştirilmiştir. Seleksiyon çalışmaları da varyasyonun önemli bir parçası olarak karşımıza çıkmaktadır. Ayrıca farklı mutajenler ile yeni genotipler geliştirilmiştir. Günümüzde ABD başta olmak üzere, Çin, Güney Afrika, İspanya, İtalya, Brezilya, Türkiye ve Şili’de farklı hedefleri barındıran ıslah programları devam etmektedir. Meyve türlerinde ıslah çalışmalarının, tescile yansımaları uzun zaman aldığından, ıslahçıların hedef parametreleri belirleyip doğru yöntem ile yoluna devam etmesi oldukça önemli hale gelmektedir. Genel olarak Japon eriklerinde ıslah hedefleri; verim, şarkaya dayanıklılık, kendine verimlilik, hasat sonrası uzun süreli muhafazaya uygunluk, erkencilik-geçcılık ve yüksek meyve kalitesi (irilik, sertlik, koyu meyve kabuk rengi, aroma) şeklinde karşımıza çıkmaktadır. Genel hedeflerin dışında, tüketici tercihleri ve ihracat hedef ülkeleri doğrultusunda da ıslah çalışmalarının, farklı meyve et ve kabuk rengi bazında şekillendiği görülmektedir. A.B.D ‘de koyu kabuk rengi, İspanya’da sarı kabuk rengi, koyu kabuk rengi-kırmızı meyve et rengi, Türkiye’de ise kabuk ve et rengi açısından geniş bir varyasyon oluşturulmuştur.

Anahtar Kelimeler: Japon eriği, kalite, kendine verimlilik, dayanıklılık.

RECENT BREEDING TARGETS IN JAPANESE PLUM (*Prunus salicina* L.)

Abstract

Commercial cultivation of three different plum species stands out, and among these species, *Prunus salicina* L., classified as the Japanese group, has the highest share in terms of production and consumption. This species, whose homeland is China and its surroundings, spread in Japan and was later brought to America by Luther Burbank, known as the pioneer of Japanese plum breeding. The breeding studies initiated by this team in California in 1884 are known as among the most advanced breeding programs today, and some of the varieties obtained at that time are still used commercially. Both intraspecific and interspecific hybridization studies in this species continue intensively. Many varieties have been developed through hybridization, self-pollination and open-pollination studies. Selection studies also appear as an important part of variation. Additionally, new genotypes have been developed with different mutagens. Today, breeding programs with different goals continue in the USA, China, South Africa, Spain, Italy, Brazil, Türkiye and Chile. Since breeding efforts in fruit species take a long time to be reflected in the registration, it becomes very important for breeders to determine target parameters and continue with the correct method. In general, breeding targets for Japanese plums are; yield, resistance plum pox virus, self-compatibility, suitability for long-term storage after harvest, early-late maturing and high fruit quality (largeness, hardness, dark fruit skin color, aroma). Apart from general targets, it is seen that breeding studies are shaped on the basis of different fruit flesh and shell colors in line with consumer preferences and export target countries. There is a wide variation in terms of dark skin color in the USA, yellow skin color in Spain, dark skin color-red fruit flesh color, and skin and flesh color in Türkiye.

Keywords: Japanese plum, quality, self-fertility, resistance.

JAPON ERİKLERİ HAKKINDA GENEL BİLGİLER

Japon erikleri (*Prunus salicina* L. $2n=2x=16$)'nin orjin merkezi Çin'dir ve bu nedenle bazı kaynaklarda Çin eriği olarak da geçmektedir (Yoshida, 1987). Anavatanı Çin'de, çok geniş bir coğrafi yayılım gösterdiği ve 1.000'den fazla yerli Japon eriği çeşidinin bulunduğu ve bunlardan 700'den fazlasının Ulusal Erik ve Kayısı Germplazm (NGRPA)'da muhafaza edildiği bildirilmektedir (Zhang, 1990; Wei vd., 2020). Ayrıca 2.000 yıldır bilinen "Zhui Li" çeşidinin halen Çin'de üretimi yapılmakta ve tüketiciler tarafından tercih edilmektedir (Chen vd., 1981). Japon erikleri çoğunlukla taze tüketimde kullanılmaktadır (Okie ve Weinberger 1996; Chen vd., 1981; Bolat vd., 2015; Şahin vd., 2022), ancak yapılan ıslah çalışmaları sonucunda elde edilen SÇKM miktarları yüksek çeşit adaylarının kurutmalık özellikleri ile de ön plana çıktığı ve bu amaçla da kullanılabilirliği düşünülmektedir (Şahin vd., 2022).

Günümüzde daha çok Japon eriği olarak bilinen bu türün, Japonya'ya gelişi üzerine iki farklı görüş bulunmaktadır. Birinci görüş doğal yollarla Kore yarımadası üzerinden Japonya'ya geldiği yönünde iken, diğer bir görüş ise Çinli bir keşiş tarafından ağaçların İmparator'a hediye olarak getirildiği yönündedir (Matsumado, 1977). Amerikalı tarım delegesi Norman J. Colman'ın 1887 yılında yayınladığı raporda, 1870 yılında Hough tarafından ilk Japon eriklerinin Kaliforniya'ya ithal edildiği ve komşusu John Kelsey tarafından üretildiğinden bahsetmektedir (USA Department of Agriculture, 1889). Sonraki yıllarda ise Japon eriği ıslahının öncüsü olarak bilinen Luther Burbank tarafından 1884 yılında Japonya'dan Kaliforniya'ya getirilen Japon eriği çeşitleri ile ABD'de ıslah çalışmaları başlamıştır (Okie ve Weinberger 1996).

JAPON ERİKLERİNDE ISLAH ÇALIŞMALARI

Japon eriği ıslahında geleneksel ıslah yöntemleri yaygın olarak kullanılmakta ve bunlara fonksiyonel genomik, mutasyonlar, in vitro teknikler ve moleküler belirteçler dahil olmak üzere yenilikçi biyoteknolojik yöntemler dahil edilmektedir (Carrasco vd., 2013). Melezleme ıslahı çalışmaları kapsamında türler arası ve tür içi karşılıklı melezleme, serbest tozlanma, ve kendileme uygulamaları yapılmaktadır (Bellini vd., 2008; Ruiz vd., 2019).

Yapılan ıslah programları incelendiğinde, Burbank tarafından Amerika'da başlatılan ıslah programlarının halen aktif olarak devam ettiği ve günümüzde en gelişmiş ıslah programlarının Kaliforniya olduğu görülmektedir (Okie ve Ramming, 1999). Bu programlara ek olarak Çin, Güney Afrika, İspanya, İtalya, Brezilya, Türkiye ve Şili'de farklı ıslah hedeflerine yönelik programlar

devam etmektedir (Hartmann ve Neumüller, 2009; Topp vd., 2012; Liu vd., 2013; Ruiz vd., 2019; Çavdar vd., 2017; Şahin vd., 2022).

Burbank tarafından Amerika'da başlatılan ilk ıslah çalışmaları ile Japon eriği × Japon eriği ve Japon eriği × yerli Amerika erikleri arasında melezleme çalışmaları gerçekleştirmiştir (Howard, 1945; Crow, 2001). Bu program kapsamında tescil edilen çeşitlerden bazıları halen günümüzde kullanılmakta ve ıslah çalışmaları devam etmektedir (Milošević ve Milošević, 2018). En önemli çeşitlerin başında gelen Angeleno ve Black Diamond çeşitleri serbest tozlanma sonucunda elde edilen ve üretimi çok yaygın olan çeşitler olarak karşımıza çıkmaktadır. Kaliforniya'da yaklaşık 200 Japon erik çeşidi ticari üretimde olmasına rağmen, siyan dış kabuk rengine sahip olan Friar, Angeleno ve Black Amber, çeşitleri Kaliforniya'nın toplam Japon eriği üretiminin yaklaşık %40'ını oluşturmaktadır (Okie ve Ramming 1999; Milošević ve Milošević 2018).

İtalya'da 1989 yılında Black Gold × Burmosa arasında yapılan melezlemeler sonucunda, Dofi-Sandra çeşidi tescil edilmiştir ve bu çeşit erkenci ve koyu kabuk rengi ile ön plana çıkmaktadır (Bellini ve Nencetti, 2002). Yine aynı ülkede, 1996 yılında başlatılan ıslah çalışmasında sarı kabuklu, dayanıklı, sertliği yüksek ve yüksek verimli Japon eriklerinin ıslahı amaçlanmıştır. T.C. Sun × Golden Plum, T.C. Sun × Shiro ve T.C. Sun × Byrongold kombinasyonları kullanılmış ve 989 melez birey elde edilmiştir (Bellini vd., 2008).

Çin'de yedi farklı ili kapsayacak şekilde devam eden Japon eriği ıslah programı bulunmaktadır. Ana hedefler, yedi il için adaptasyon yeteneği yüksek, iri meyveli, meyve sertliği yüksek ve yeme kalitesi yüksek çeşitlerin geliştirilmesidir ve dört çeşit adayı ön plana çıkmıştır (Topp vd., 2012). Tayvan'da ise küçük bir ıslah programı bulunmakta ve iri meyve özelliği ve düşük soğuklanma ihtiyacı olan beş çeşit adayı üzerine çalışmalar devam etmektedir (Wen ve Sherman, 2003; Wen ve Liu, 2004).

İspanya'da, CEBAS-CSIC ve IMIDA ortaklığı ile yüksek verimli, şarkaya (Plum pox virus, PPV) dayanıklı, erkenci, kendine verimli ve meyve kalitesi yüksek Japon eriği ıslahı çalışmaları 2011 yılında başlamıştır. Kayısı × Japon eriği gibi türler arası melezlemeleri de içeren 50 farklı kombinasyonda melezleme çalışmaları gerçekleştirilmiş ve 4.500 melez birey elde edilmiştir. Fenotipleme işlemlerine devam edildiği ve ümitvar çeşit adaylarının belirlendiği bildirilmektedir (Ruiz vd., 2019). 2020 yılında ise Myrtea® serisi ile piyasaya güçlü bir giriş yapılmış ve Black Splendor'un serberst tozlanmasıyla Lucia myrtea ve Victoria myrtea çeşitleri tescil edilmiştir

(Guevara vd., 2021; Ruiz vd., 2021). Lucia myrtea kendine verimsizdir ve tozlayıcı olarak kendine verimli olan Victoria myrtea çeşidi önerilmektedir (Guevara vd., 2021).

Türkiye’de bu türde ıslah çalışmaları, 2013 yılında Tarımsal Araştırmalar ve Politikalar Genel Müdürlüğü’ne bağlı Ege Tarımsal Araştırma Enstitüsü’nde Çavdar vd., (2017) tarafından başlatılmıştır. Amaç farklı olgunlaşma zamanları, farklı meyve kabuk ve et renklerine sahip, verimli ve kaliteli çeşitlerin geliştirilmesidir. Kendileme, serbest tozlanma ve melezleme çalışmaları sonucunda elde edilen tohumlar, embriyo kültürü yöntemi ile çimlendirilerek melez bitkiler elde edilmiştir. Toplamda 12 kombinasyondan elde edilen 2.854 melez bireyden yapılan değerlendirmeler sonucunda 36 tanesi seçilerek seleksiyon II parselinde değerlendirmeye alınmak üzere fidanları yetiştirilmiştir (Çavdar vd., 2017; Şahin vd., 2022). Çoğu ıslah programında olduğu gibi bu çalışmada da kendine verimliliğin aktarımı amacıyla Methley ve Black Diamond çeşitleri kombinasyonlarda kullanılmıştır. Bu ıslah programında, Black Diamond, Black Amber ve Angeleno çeşitlerinin serbest tozlanmasından elde edilen 8 çeşit adayının kendine verimlilik durumları arazi koşullarında belirlenmiş ve Black Diamond’un serbest tozlanmasından elde edilen 18-26 nolu çeşit adayının ana ebeveyni gibi Se alleli içerdiği düşünülmekle birlikte kısmen kendine verimli olduğu tespit edilmiştir (Şahin vd., 2023).

JAPON ERİKLERİNDE GÜNCEL ISLAH HEDEFLERİ

Dünya çapında yapılan Japon eriği ıslah çalışmaları ve tarihçesi incelendiğinde, ıslah hedeflerinin çok farklılık göstermediği görülmektedir. Genel ve güncel ıslah hedefleri;

- Yüksek verim,
- Plum pox viruse (şarka) dayanıklılık,
- Kendine verimlilik,
- Hasat sonrası uzun süreli muhafazaya uygunluk,
- Erkencilik-geçcilik
- Yüksek meyve kalitesi (irilik, sertlik, koyu meyve kabuk rengi, aroma)

olarak karşımıza çıkmaktadır. Genel hedeflerin dışında, tüketici tercihleri ve ihracat hedef ülkeleri doğrultusunda da ıslah çalışmalarının, farklı meyve et ve kabuk rengi bazında şekillendiği görülmektedir. A.B.D ‘de koyu kabuk rengi, İspanya’da sarı kabuk rengi, koyu kabuk rengi-kırmızı meyve et rengi, Türkiye’de ise kabuk ve et rengi açısından geniş bir varyasyon oluşturulmuştur.

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TÜRKİYE'DE ARMUT VE AYVA TÜRLERİNDE ATEŞ YANIKLIĞI HASTALIĞI ÜZERİNE YAPILAN ÇALIŞMALAR

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Özet

Türkiye, Dünya ayva üretimine liderlik ederken, armut üretiminde ise dördüncü sırada yer almaktadır. Her iki türün üretimdeki en önemli sorunların başında, ateş yanıklığı hastalığı gelmektedir. Gram negatif yapıya sahip, *Erwinia amylovora* Burril. etmeninin sebep olduğu bakteriyel kökenli bu hastalık, bitkilerin, toprak üst ve alt aksamalarının tamamını infekte edebilen ve tüm bitkinin ölümüne sebep olabilen çok yıkıcı etkilere sahiptir. Ülkemizin farklı bölgelerinde yürütülen çalışmalar ile hastalığın ayva ve armut plantasyonlarındaki yaygınlık oranları belirlenmiş ve çoğu bölgede yüksek oranda epidemiy gösterdiği tespit edilmiştir. Ülkemizde yaklaşık 40 yıllık geçmişi olan bu hastalığa karşı henüz etkin bir mücadele yöntemi bulunmamakta olup, antibiyotiklerin kullanımı çoğu ülke tarafından yasaklanmıştır. Kimyasal mücadele ise rezidü problemlerine sebep olmakta, ayrıca canlı ve ekosistem sağlığı üzerine olumsuz etkiler meydana getirmektedir. Bu bağlamda, başlangıç materyali ön plana çıkmakta olup, dayanıklı çeşit ve anaçların kullanımı ve ıslahı önem arz etmektedir. Her iki türde de gerek seleksiyon gerekse melezleme ıslahı çalışmaları ile toleran çeşit ve anaçların geliştirilmesine yönelik çalışmalar bulunmaktadır. Armutta, melezleme ıslahı sonucunda hastalığa toleran çeşitler geliştirilmiş ve tescil ettirilmiştir. Ayvada ise melezleme ve hastalık testleme çalışmaları devam etmekte ve toleransı yüksek melez bireyler elde edildiği belirtilmektedir. Hastalığın, kalıtım mekanizması oldukça karmaşık olup, tüm detayları ile araştırmacılarımız tarafından aydınlatılmıştır. Erken seleksiyona yönelik moleküler çalışmalar yok denilecek kadar azdır. Ancak hastalığa dayanımda erken seleksiyon kriteri olarak bazı biyokimyasal ve morfolojik özellikler tanımlanmıştır. Bu çalışmada, ülkemizde armut ve ayvada ateş yanıklığı hastalığına dair yürütülen çalışmalar ve güncel durum özetlenmeye çalışılmıştır.

Anahtar Kelimeler: *Erwinia amylovora* L., *Cydonia oblonga*, *Pyrus communis*, dayanıklılık ıslahı, seleksiyon

**STUDIES CONDUCTED ON FIRE BLIGHT DISEASE ON PEAR AND QUINCE
SPECIES IN TURKIYE**

Abstract

Turkey is the world's top producer of quinces and ranks as fourth in pear production. One of the most important problems in the production of both species is fire blight disease. *Erwinia amylovora*, the gram-negative bacteria that causes this disease, may kill a plant entirely by infecting all of its above and below ground parts. Studies carried out in different parts of our country have revealed the disease's prevalence rates in quince and pear plantations, and they have shown that the disease has a high epidemic rate in the majority of those places. Since most nations forbid the use of antibiotics, there is no effective way to battle this disease, which has been present in our nation for around 40 years. Chemical control causes residue problems and also has negative effects on living things and ecosystem health. The importance of scion/rootstock combination at start is highlighted in this situation. So, it is crucial to use and breeding resistant rootstocks and cultivars. In both species, there are several studies on the development of tolerant varieties and rootstocks through both selection and hybridization. In pear, disease-tolerant genotypes have been developed and registered as a result of hybridization breeding. In quince, hybridization and disease testing studies are ongoing and it is stated that hybrids with high tolerance have been obtained. The inheritance mechanism of the disease is quite complex. But our scientists have thoroughly explained it. There are almost no molecular studies on early selection. However, some biochemical and morphological characteristics have been defined as early selection criteria for disease resistance. In this study, we tried to summarize the studies and current situation on fire blight disease on pear and quince in our country.

Keywords: *Erwinia amylovora*, *Cydonia oblonga*, *Pyrus communis*, resistance breeding, selection

AYVA, ARMUT VE ATEŞ YANIKLIĞI HASTALIĞINA İLİŞKİN GENEL BİLGİLER

Yetiştiriciliği, Dünya'nın ılıman iklim bölgelerinde yoğunlaşmış olan ayva ve armut, *Rosales* takımının *Rosaceae* familyası içerisinde yer almakta olup, tropik ve subtropik iklime sahip yörelerin yüksek rakımlı alanlarında dahi ekonomik olarak yetiştirilebilmektedir (Silva vd., 2014). Armut ve ayva meyvelerinin yetiştiricilikte ekolojik avantajlara sahip oluşu, faydalarına ilişkin farkındalığın artması ve son yıllarda muhafaza ve işleme imkanlarının gelişmesi fiyatlara olumlu yansımış olup, dalgalanmaların önüne geçilerek çiftçilerce tercih edilen bir ürün haline geldiği görülmektedir. Nitekim son 20 yılda üretim hızla artarak, 2021 yılında, bu iki türe ait toplam üretim 27 milyon ton düzeylerine ulaşmıştır (FAO, 2021). Ancak, ayva ve armut üretiminin optimum düzeyde seyredebilmesi için, en yıkıcı hastalığı olan ateş yanıklığı ile mücadeleye büyük önem verilmelidir. *Erwinia amylovora*'nın sebep olduğu ateş yanıklığı, bitkinin toprak altı ve toprak üstü aksamının tamamını infekte edebilen ve sistemik hareket ettiğinden tüm bitkinin ölümüne sebep olabilen bir hastalıktır (Vanneste, 2000).

Yaklaşık 250 yıllık geçmişi olan hastalık, ülkemizde ilk kez 1985 yılında Afyon iline bağlı Sultandağı ilçesindeki armut bahçelerinde tespit edilmiştir (Öktem ve Benlioğlu, 1988). 1987 yılı itibarıyla Türkiye'nin bütün yumuşak çekirdekli meyve yetiştirme alanlarında ateş yanıklığı belirtileri görülmüş ve çoğu bölgede ciddi zararlar oluşturarak pek çok bahçenin sökülmesine neden olmuştur (Momol ve Yeğen, 1993; Mirik, 2000; Kıpçak ve Akkopru, 2017; Şahin ve ark., 2019).

HASTALIĞIN TÜRKİYE'YE GİRİŞİ VE YAYILIŞI

Türkiye'de ateş yanıklığının görüldüğü ilk yer Afyon'un Sultandağı ilçesidir. İlçe yakınlarında bulunan göllerin, Mısır ve Kıbrıs'tan gelen göçmen kuşlara, dinlenme ve barınma yeri sağladığı ve hastalığın bu kuşlar vasıtası ile ülkeye girdiği düşünülmektedir (Öktem ve Benlioğlu, 1988). 1987'de ise Isparta ve Burdur'da görülmüştür (Öktem ve Benlioğlu, 1988; Momol vd., 1992). Sonraki yıllarda yapılan survey çalışmalarıyla ateş yanıklığı hastalığının Orta Anadolu Bölgesi'nde yumuşak çekirdekli meyve ağaçlarında %15-60, Ege Bölgesi'nde %23,93, Doğu Akdeniz Bölgesi'nde ise %42,37 oranına varan bulaşıklık oluşturduğu belirlenmiş; hastalık nedeniyle bölgede çok sayıda ağacın yok edildiği bildirilmiştir (Öktem ve Benlioğlu, 1988; Tokgönül ve Çınar, 1991; Demir ve Gündoğdu, 1993). Ege bölgesinde hastalık ilk kez 1986 yılında, Aydın ve

Denizli’de görülmüş, 1986-1991 yılları arasında bölgenin tüm illerinde değişen oranda hastalığın olduğu tespit edilmiştir (Demir ve Gündoğdu, 1992). 1989 yılında Batı Akdeniz’de nisan ve mayıs aylarının yağmurlu geçmesi, hastalığın şiddetli şekilde ortaya çıkmasına neden olmuştur (Momol vd., 1992). Doğu Anadolu Bölgesinde, yumuşak çekirdekli meyvelerde görülen hastalıkların tespitinin belirlendiği çalışmada, en büyük sorunun ateş yanıklığı olduğu bildirilmiştir (Kotan, 2002). Momol ve Yeğen (1993) 1987 yılı itibariyle, ateş yanıklığının Türkiye’de ayva ve armut yetiştirilen her yörede bulunduğunu ve çoğunda ciddi boyutlara ulaştığını belirtmişlerdir. Ege ve Doğu Marmara Bölgesi ayva plantastonlarında yapılan çalışmada, il bazında hastalık yaygınlık oranları %24,30-100 arasında değişim göstermiştir (Şahin ve ark., 2019). Yapılan bu çalışmalar hastalığın ülkemizde ayva ve armut yetiştirilen hemen her bölgede yaygın olduğunu ve ekonomik kayıplara sebep olduğunu göstermektedir.

ÜLKEMİZDE HASTALIKLA MÜCADELE YÖNTEMLERİNDE VE ISLAHDA YAŞANAN GELİŞMELER

Ateş yanıklığı hastalığına karşı kullanılan mücadele yöntemleri 3 grup altında (kültürel, kimyasal ve biyolojik) toplanabilir. Biyolojik mücadelede üst düzey bilgi gereksinimi, etkinliğinin ekolojiye bağlı değişimi ve süreklilik gerektirmesi, etkinliğini azaltmaktadır. Günümüzde ateş yanıklığına karşı önerilebilecek etkin kimyasal mücadele bulunmamaktadır. 1950’lerde antibiyotiklerin keşfi ile hastalığa karşı farklı antibiyotikler denenmiş ve Streptomycin, Terramycin, Kasugamycin gibi antibiyotikler hastalığa karşı etkili bulunmuştur. Ancak antibiyotiklerin insan ve çevre sağlığına olumsuz etkileri, kullanımı halinde dayanıklı tiplerin gelişimi (Loper vd., 1991) ve pahalı oluşu gibi sebeplerle kullanımı yasaktır. Kullanımı yasak olmasına rağmen, *E. amylovora*’nın streptomisine dayanıklı strainlerinin varlığı, ilk olarak 1971 yılında Amerika Birleşik Devletleri’nde kaydedilmiş olup, daha sonra farklı bölgelerde de rapor edilmiştir (Loper vd., 1991). Erzurum, Erzincan, Artvin, Kars ve Iğdır illerinde, yumuşak çekirdekli meyve ağaçlarından izole edilen *E. amylovora*’nın toplam 41 strain’inde streptomisin sülfata karşı duyarlılıkları test edilmiş ve strainlerin %31.7’sinin streptomisine karşı dayanıklı olduğu tespit edilmiştir (Kotan vd., 2009). Antibiyotik kullanımının yasaklanması, hastalığa karşı fungusitlerin kullanımını beraberinde getirmiştir. Fungusitler içinde ön plana çıkan kimyasallar, Fosetil-Al, bakırlı bileşikler, maneb+bakır, mancozeb+bakır gibi kombinasyonlar olmuştur. Bakırlı preparatların hastalığa etkisinin araştırıldığı bir çalışmada, bakır+Maneb karışımının en iyi etkiyi verdiği fakat hiçbirinin

hastalığı engellemede yeterli olmadığı belirtilmiştir (Saygılı ve Üstün, 1996). Bakırın vegetasyon döneminde kullanılması, bitkinin fizyolojisi üzerine olumsuz etki göstermekte ve bitkide genel fitotoksik etkilere sebep olmaktadır (Benlioğlu ve Özakman, 1992).

Kimyasal mücadelede kesin çözümün bulunamamış olması, önerilen kimyasalların pahalı ve insan sağlığına zararlı olmaları, gümrük kontrollerinde kalıntıların çıkması ve organik yetiştiriciliğin her geçen gün daha çok önem kazanıyor olması; hastalığın kontrolünde dayanıklı çeşit, anaç ve ara anaçların kullanımını öne çıkarmaktadır. Tarımsal üretimde pestisitlerin kullanımını azaltan veya yasaklayan yeni tarım politikalarının geliştirilmesi de bitki hastalık ve zararlıları ile mücadele stratejileri içinde, hastalık ve zararlılara dayanıklı çeşit ıslahını oldukça önemli kılmıştır. Tüm bu sebeplerle, ateş yanıklığına dayanıklı çeşit ıslahının üzerinde durulması gerektiğine dikkat çekilmektedir. Ateş yanıklığına dayanıklılığın poligenik olması ve mekanizmasının karmaşık olması sebepleriyle ıslah çalışmalarında genellikle kontrollü melezlemeler kullanılmaktadır (Evrenosoğlu vd., 2019). Bu nedenle, öncelikle ülkemizde mevcut genetik kaynakların duyarlılık düzeyinin belirlenmesi konusunda çalışmalar yapılmıştır. Yapılan çalışmalar, yaygın olarak kültürü yapılan çeşitlerin, hastalığa yüksek düzeyde hassasiyet gösterdiği yönündedir (Tokgönül, 1991; Aysan vd., 1999; Saygılı vd., 2004; Şahin vd., 2019; Mertoğlu vd., 2020; Harmanda vd., 2021). Bu sebeple önce dayanıklı genotiplerin tespitine yönelik seleksiyon çalışmaları yürütülmüş olup, kontrollü melezlemeler ile dayanıklı yeni genotiplerin geliştirilmesi evresine geçilmiştir (Öztürk vd., 2011; Mertoğlu ve Evrenosoglu, 2017; Şahin vd., 2020). Morfolojik markörlerin erken seleksiyon kriteri olarak kullanılması, ateş yanıklığı hastalığı gibi çok genle kontrol edilen hastalıklara karşı ıslah süreçlerinin kısaltılmasında önem taşımaktadır. Ayva türünde yapılan çalışmada yaprak kenar dalgalılığı ile hastalığa dayanıklılık arasında önemli ve pozitif korelasyon görülmüştür ve bu özelliği erken seleksiyon kriteri olarak ıslah çalışmalarında kullanılması ile ıslah süresinin kısaltılması hedeflenmektedir (Şahin, 2023).

HASTALIĞA DAYANIMIN KALITIMI

Armutlarda ateş yanıklığı hastalığının kalıtım deseninin ortaya çıkarılması maksadı ile yürütülen çalışmada, hastalığın kalıtım derecesi, kullanılan ana ebeveyn ile tozlayıcıların damızlık değerleri ve ana ebeveynin sağladığı ortam ile melezlerde ateş yanıklığına dayanımda nasıl etki gösterdiği, hastalığa farklı derecede dayanım gösteren F₁ melez populasyonda araştırılmıştır. Çalışma

sonucunda hastalığın poligenik kalıtım gösterdiği ve kalıtımda birden fazla faktörün etkili olduğu bulunmuştur. Hastalığa dayanım, sonraki generasyonlara her iki ebeveyn tarafından aktarılmaktadır. Fakat ana ebeveynin kalıtıma olan etkisi, baba ebeveyne göre çok daha yüksektir. Hastalığa dayanımı kalıtsal olarak sonraki generasyonlara aktarmada, ana ebeveyn olarak; 'Magness' ve 'Mustafa Bey' çeşitleri öne çıkmıştır. Tozlayıcı çeşitler arasında benzer sonucu; 'Kiefer' ve 'Limon' çeşitleri göstermiştir. Hastalığa dayanımda, ebeveynlerin etkisinin ayrı ayrı önemli olmasına ilave olarak, ebeveynler arası gen interaksiyonunun da, hastalığa dayanım üzerine olan etkiside önemli bulunmuştur. Hastalığın eklemeli olmayan genlerden hesaplanan kalıtım derecesi %23, eklemeli genlerden hesaplanan kalıtım derecesi %32 ve iki durumun toplamını ifade eden geniş anlamlı kalıtım derecesi ise %55 bulunmuştur. Ananın gen etkilerinin babaya göre daha yüksek olması ve analık etkisinin hastalık üzerine %7 oranında etki etmesi, hastalığa dayanımda sitoplazmik gen etkilerinin önemli olduğunu göstermektedir (Evrenosoğlu vd., 2019). Her iki türde de, hastalığa dayanıklı genotiplerin geliştirilmesinde, heterobeltiosis odaklı yaklaşımın daha etkili sonuçlar verdiği sonucuna varılmıştır (Şahin vd., 2020; Mertoğlu vd., 2020).

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MASAL ANLATIMININ İLKOKUL ÖĞRENCİLERİNİN EĞİTİM VE GELİŞİMİ ÜZERİNDEKİ ETKİSİ

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Özet

Masallar, toplumların kültür birikimleri olup nesilden nesle aktararak varlıklarını sürdürürler. Masallar, eğlendirmek ve hoşça vakit geçirmek için kullanılan masalların eğitici yönlerinin olduğu bilinmektedir. Bu açıdan masal, “terbiye ve ahlâka faydalı, yararlı hikâye” şeklinde tanımlanmaktadır. Masallar en acı dersi bile tatlandırarak verdiği için, örnek davranışların insan bilincine aktarılıp yerleştirilmesinde yardımcı olacak eğitim aracı olarak görülmektedir. Özellikle sonu mutlu biten masalların çocukların gelişmesinde, kendilerini keşfetmelerinde, dünyaya umutla bakmalarında, onlara iyi ve doğru değerlerin öğretilmesinde önemi büyüktür. Masal anlatımının öğrencilerin dil becerilerini artırdığını, hayal güçlerini geliştirdiğini ve sosyal becerilerini güçlendirdiği bilinmektedir. Masalların çocuklar, gençler hatta yetişkinlerin eğitimindeki etkileri daha 1400’lü yıllarda keşfedilmiştir. Sonuç olarak, masal anlatımının ilkökul öğrencilerinin eğitim ve gelişimi üzerinde olumlu bir etkisi olduğu görülmektedir. Bu nedenle, öğretmenlerin sınıflarında masal anlatımını kullanarak öğrencilerin bilişsel, duygusal ve sosyal becerilerini desteklemeleri teşvik edilmelidir. Ayrıca velilerin masal anlatımını çocukların günlük eğitim programlarına dahil etmelerini teşvik etmek gerekmektedir.

Anahtar Kelimeler: Hikaye anlatımı, ilkökul öğrencileri, dil gelişimi, hayal gücü, empati.

**THE EFFECT OF STORYTELLING ON THE EDUCATION AND DEVELOPMENT OF
PRIMARY SCHOOL STUDENTS**

Abstract

Fairy tales are cultural treasures of societies, sustaining their existence by being passed down from generation to generation. It is known that while fairy tales are used for entertainment and leisure, they also possess educational aspects. From this perspective, a fairy tale is defined as a "beneficial and instructive story" that contributes to upbringing and morality. Since fairy tales sweeten even the bitterest lessons, they are seen as educational tools that assist in conveying and embedding exemplary behaviors into the human consciousness. Particularly, fairy tales with happy endings play a significant role in the development of children, helping them discover themselves, view the world with hope, and instilling good and correct values. It is acknowledged that storytelling enhances students' language skills, nurtures their imagination, and strengthens their social abilities. The impact of fairy tales on education, for children, youth, and even adults, was discovered as early as the 1400s. In conclusion, it is evident that storytelling has a positive effect on the education and development of primary school students. Therefore, teachers should be encouraged to use storytelling in their classrooms to support students' cognitive, emotional, and social skills. Furthermore, parents should be encouraged to include storytelling in their children's daily educational routines.

Keywords: Storytelling, primary school students, language development, imagination, empathy.

Giriş

Masal, Arapça mesel kelimesinden dilimize geçmiş olan, sözlü edebiyat geleneğinin eski ve önemli bir koludur. Masallar, birçok kültürde geçmişten günümüze aktarılan, genellikle öğretici veya eğlendirici bir amaç taşıyan düz yazı şeklinde ifade edilen halk edebiyatı ürünlerindedir. Masallar genellikle yaşanmamış, yaşanması imkânsız bazı olaylara bağlı olabileceği gibi, yaşanmış ancak sonradan dilden dile anlatılarak olağanüstü hallere bürüne de bilir. Cin, peri, dev gibi olağanüstü kişileri de olan, olağanüstü olaylara yer veren, genellikle bir tekerlemeyle ya da bir varmış, bir yokmuş gibi bir sözle başlayan bir tür halk öyküsüdür. Masalların yazım amacı genellikle okuyucularına öğüt vermektir. Masal, merak duygusunu en çok barındıran edebiyat ürünüdür. Bu edebiyat ürününde olayların nasıl gelişeceği, kahramanları neyin beklediği, masalın nasıl biteceği vb. konular okuyucuda merak uyandırmaktadır. Eğiticilik esastır. Olağanüstü her konu masalda işlenebilir. Genel itibariyle gerçek ya da gerçeğe yakın olan olaylar olağanüstü bir hava katılarak işlenmektedir. Genellikle iyiler hep kazanır kötüler hep kaybeder. İyiler ödüllendirilir, kötüler ise cezalandırılır. Halk içinden birinin kötülere karşı kazandığı zafer durumu başlıca konuyu oluşturur. Okuyucu kitlesi genel itibariyle çocuklardır. Masallar, çocukların iyilik ve kötülük kavramlarının daha kolay kavraması için yardımcı olur. Masallar her zaman iyilerin kazanması ile bitmektedir.

Yazının icadından önce dilden dile, ağızdan ağıza aktarılarak sürdürülmüştür. Fakat sözlü olduğu için zaman içinde değiştirilmiş farklılaştırılmış, değişikliğe uğramış ve kısmen unutulmuştur. Masallar yazının icadından sonra deri, tahta, duvar, tablet, parşömen gibi malzemelere yazılmış, en nihayetinde kağıda yazılıp kitap haline getirilerek masalların kalıcılığı sağlanmıştır. Kitaplaştırılan masalların birer eğitim materyali olarak da kullanılarak çocuk gelişimine katkı sunması hedeflenmiştir.

Masalların çocuklar üzerinde çok farklı alanlarda etkisini görebiliriz. Çocuklar, masallar aracılığıyla fantastik dünyalara yolculuk yaparlar ve bu deneyimlerin çocuk gelişimine bir dizi olumlu etkisi olması hedeflenir. Hayal dünyalarının genişlemesine katkı sağlar, bilişsel ve duygusal becerilerinin gelişimini destekler. Okuma yazmaya olan ilgilerini artırır. Dinleme becerisini geliştirerek dikkat ve konsantrasyonunun gelişmesini sağlar.

Bu bölümde, masalların farklı alanlarda çocuk gelişimi üzerindeki etkilerini inceleyeceğiz.

Dil Gelişimi Üzerindeki Etkileri

Bireyler kendilerini ifade edebilmek, duygu ve düşüncelerini aktarabilmek için temel dil becerilerine ihtiyaç duymaktadır. Bu beceriler ise sırasıyla dinleme, konuşma, okuma ve yazma olarak gelişim gösterir. Öğrenciler, eğitim hayatlarına dinleme ve konuşma becerilerine sahip olarak başlar. Bu dönemde öğrencilerden dinleme ve konuşma becerilerini zamanla geliştirmeleri beklenirken aynı zamanda okuma ve yazma becerileri de kazandırılmaya çalışılır. Dinleme becerisinden sonra kazanılan konuşma becerisi, bireylerin içinde bulunduğu ortamda kazandığı ve hayatı boyunca kullandığı en önemli iletişim aracı olarak karşımıza çıkmaktadır (Keskin, Baştuğ, ve Akyol, 2013). Konuşma, bireylerin kendilerini ifade etmeleri bakımından oldukça önemli olmakla birlikte, okuma-yazma faaliyetlerinin de temelini oluşturmaktadır (Temizyürek, 2007). Masallar, çocuklara dil becerilerini geliştirme fırsatı sunar. Masallar çocuklara yeni kelimeleri, dilbilgisini ve ifade yeteneklerini öğretme potansiyeline sahiptir. Bol bol masal ve hikâye dinleyen çocuklar günlük konuşmalar sırasında duymadıkları yeni kelimelerle tanışma fırsatı bulur. Hikayeler aracılığıyla çocuklar, kelime dağarcıklarını zenginleştirir. cümle yapılarını dilbilgisini anlamalarına yardımcı olur ve hikayenin akışını takip etmelerini sağlar.

Kelime hazineleri geniş olan çocuklar kendilerini çok daha anlaşılır bir şekilde ifade edebilir ve daha rahat iletişim kurabilirler. Ayrıca, çocuklara sık sık hikâye okunması, hikâye anlatma becerilerine de katkıda bulunur. Sözlü anlatı becerileri kelime hazinesinin ötesinde, olayların yer ve zaman bilgisi verilerek anlamlı bir neden sonuç ilişkisi içerisinde anlatılmasını ve dil bilgisi gibi çok daha üst düzeydeki dil becerilerinin gelişmesini sağlar.

Yapılan araştırmalar erken yaştaki sözlü anlatı becerilerinin çocukların ileriki yaşlardaki okuma-yazma gelişimine önemli bir katkısı olduğunu ortaya koymaktadır. Bu nedenle özellikle okulöncesi dönemde çocuklara erken yaşlardan itibaren düzenli olarak masal ve hikâye okunması ve çocuklara da resimlere bakarak masal-hikâye oluşturma fırsatı verilmesi okul çağındaki akademik gelişimlerini destekleyici olacaktır. Tıpkı domino taşlarının birbirine olan etkisi gibi, yetişkinler çocuklara erken yaşlardan itibaren ne kadar sık ve düzenli olarak masal ve hikâye okurlarsa, çocuklar da kitap okumaya o kadar ilgili hale gelebilirler.

Hayal Gücünün Arttırılması ve Yaratıcılığın Teşvik Edilmesi

Yaratıcılık kavramı, Batı dillerinde “Kreativitaet-creativity” karşılığına sahiptir. Latince “creare” kelimesinden gelir. Bu kelime “doğurmak, yaratmak, meydana getirmek” anlamını taşır; devingen, dirik (dinamik) bir süreç olma özelliği sözcüğün anlamında saklıdır (Sevimli, 2015, s. 11). Masallar, çocuklarda hayal gücünü geliştirmenin güçlü bir aracıdır. Çocukların hayal gücü sınırsızdır. Masallar bu hayal güçlerini daha da geliştiren geçmişten günümüze yolculuk yaptıran araçlarıdır. Özellikle okul öncesi ve ilkokul çocukları hayatı gerçek ve hayal arasında yaşarlar. Bu nedenle onların akademik yaşantılarında masalların kullanılması, önem arz etmektedir. Masal ve hikâyelerdeki ayrıntılı betimlemeler ve yoğun renkli görseller, çocukların görsel yönlerinin ve hayal güçlerinin gelişimini destekleyen, hayal dünyalarının ve yaratıcılıklarının kapısını açan bir anahtar gibidir. Çocuk, masalların gerçek olabileceğine inanır. Kendini masal kahramanlarının yerine koyar, olayı yaşar, empatik düşünerek doğruyu bulmaya çalışır. Fantastik dünyalar, büyümlü yaratıklar ve olağanüstü olaylar, çocukların yaratıcılıklarını geliştirir. Bu, problem çözme becerilerini geliştirmelerine ve yaratıcı düşünce süreçlerini kullanmalarına yardımcı olabilir. Walt Disney hayal gücünün önemini "Eğer hayal edebildiğin bir şeyse, yapabilirsin. Onların peşinden gidecek cesaretin varsa, bütün rüyaların gerçek olabilir." sözüyle çok güzel ifade etmektedir.

Çocukluk, gençlik ve olgunluk dönemleriyle karşılaştırıldığı zaman birikimsizliği ve saflığı yansıtmaktadır. İlave olarak çocuklar çok yoğun bir hayal gücüne sahiptir. Saflık ve hayal gücünün ise yaratıcılığı pozitif yönde etkilediği bilinmektedir. Yaşlarının ilerlemesiyle birikim de artmaktadır. Bu birikimler bilhassa yaratıcı düşünme teknikleriyle bağlantılıysa yaratıcılığı pozitif yönde etkileyebilmektedir. Yaratıcılık üzerinde hayal gücünün büyük önemi bulunmaktadır. Çocuklar yoğun hayal gücü sahibi olmalarından dolayı çocukluk dönemlerinde yaratıcılık özellikleri daha çok gerçekleşmektedir (Harmanlı, 2002, s.226).

Hem dinleyeni hem de anlatanı hayal dünyasıyla buluşturan masallar ve hikâyeler, günlük hayatın karmaşasından bir nebze olsun bir kaçış fırsatı yaratırlar. Masalın çocuk üzerindeki etkisi TV dizileri, sinema filmleri vb. aksiyona dayalı popüler yayınların bıraktığı etki ile neredeyse aynıdır. Çünkü her ikisinde de bir kurgu vardır. Masallarda da TV dizilerinde ve hatta sinemalarda bile mutlu son beklenir, bazı dersler çıkarılır, anlamlı mesajlar verilir ya da alınır. Günümüzde gerek yetişkinler gerekse çocuklar tarafından uzun zaman dilimleri ayrılarak izlenen televizyon programları, izleyicilerin hayal kurma gücünü zayıflatırken, masal ve hikâyelerse çocuklara hayal

güçlerini kullanma ve geliştirme fırsatı sunar. Bazı ebeveynler ve öğretmenlerce masal gerçekçi olmaması gerekçesiyle dışlanmaktadır. Bunun nedeni çocuğun hayal dünyası içinde kalması ve gerçek dünyaya uyum sağlayamamasıdır (Pıllancı, 1998; Sezer, 2012: 57).

Günümüzde masalın birçok eğitimci tarafından yararlı olarak görülmesine karşın, bazı ana-baba ve öğretmenler tarafından gerçekçi olmadığı gerekçesiyle dışlanan bir tür olarak da karsımıza çıkmaktadır. Ancak, masalın çocuğu aşırı düş dünyasına sürüklemesinden ve gerçek dünyaya uyum sağlayamamasından korkmak masal türünü bütünüyle dışlamayı gerektirmemektedir. Çocuğa verilecek masalın bilinçli bir şekilde seçilmesi, olası sakıncaları ortadan kaldıracaktır (Dilidüzgün, a.g.e., s. 33.)

Okuma Alışkanlığının Oluşumu

Masallar, çocuk gelişimine bir dizi olumlu etki sağlar. Bunlardan biride okuma yazmaya olan katkısıdır. Masallar, çocuklarda okuma alışkanlığı oluşturmanın önemli bir yoludur. Masalların özellikle çocuklarda okuma ve dinleme eğitimlerini geliştirdiği, kültür aktarımı sağladığı ve iyi örneklerle ruh dünyalarını geliştirerek önlerine çıkabilecek engelleri aşacak kişilikli birer insan olma gibi özellikleri kazandırabileceği belirtilir (Öcal, 2002; Sever, 2008; Arıcı, 2012: 5). Masallardaki kahramanlar, fantastik olay örgüsü çocukların ilgilerini çeker ve merak duygusu uyandırır. Bu merak duygusu ile okumaya devam ederler. Sonrasında ellerine aldıkları her kitabı aynı merak ve heyecanla okumaya başlarlar. Bu sayede çocuklar, masallar aracılığıyla kitap okumanın keyifli bir deneyim olduğunu keşfederler. Bu, merak ve heyecan duygularını ve hayal güçlerini etkileyerek konuya olan ilgilerini artırmaya okuma becerilerini geliştirmelerine ve öğrenmeye olan ilgilerini artırmalarına, yardımcı olur.

Bu konuda; Hem ulusal hem de evrensel değerlerin aktarımında, soyut kavramların algılanmasında, anlama ve anlatma becerilerinin gelişmesinde, olaylara sanatsal bir bakışın gelişmesinde ve çocukların kitaba karşı ilgisini artıran masalların etkisi büyüktür (Kantarcıoğlu, 1991; Duvarcı, 1996; Yavuz, 1997; Karatay, 2007: 465; Arıcı, 2011; Özbay ve Çeçen, 2012: 69) demiştir.

Bu nedenle çocukların akademik yaşantılarında masalların kullanılması, önem arz etmektedir. Ebeveynler ve eğitimciler, çocuklara doğru masalları seçerek, bu olumlu etkileri en üst düzeye çıkarmak için çaba sarf edebilirler.

Yeni nesil çocuklarda mı sıkça rastlanıyor, yeni nesil ebeveyn ve sağlıkçılar mı bu gözle bakıyor ve beklentilerini bu doğrultuda yapılandırıyor büyük bir tartışma konusu, fakat sıklıkla karşılaşılan durumlardan iki tanesi ‘dikkat eksikliği’ ya da ‘öğrenme güçlüğü’. Okuma alışkanlığı, okul çağı öncesinde ciddi bir önleyici hizmet ve sonrasında da iyileştirme aracı olarak işlev gösterir. Okumak ya da küçük yaşlarda dinlemek kendinden menkul sabır, öz denetim mekanizmalarını aktive eder ve geliştirir. Bu iki mekanizmanın, dikkat eksikliğine dair problem yaşanmaması için geliştirilmesi önemlidir, yaşandığında ise destekle yükseltilmesi gereken becerilerdir. Öğrenme güçlüğüne dair ise zihinselleştirme, kavramsallaştırma; yani sözcükler arası ilişki kurma, fikir yürütme, tahminde bulunma, okuduğunu anlama gibi bilişsel işlemlerin geliştirilmesi gerekir. İşte okuma/dinleme tüm bu bilişsel işlemler için bir hazine değerindedir demek yanlış olmayacaktır.

Sosyal Duygusal gelişime katkısı

Duygu bireyin yaşamında, bir canlanma hareketlenme anlamına gelmektedir. Duygular, çocuğun temel gereksinimleri ve bu gereksinimlerin etkisini dışarı yansıtmasıdır. Haz ya da elem olarak yaşanan duyguların yansımaları çocukta sevinç, mutluluk, üzüntü, korku, öfke, kıskançlık, saldırganlık ve ağlama olarak görülür. Günlük hayatımızda hissettiklerimiz ve düşündüklerimizi dışa vurmak ve belirtmek için ya da etkileşimlerimizi düzenlemek için “duygularımız”ı kullanırız. Sosyal ve duygusal gelişim; çocuğun doğuştan gelen mizacının yanısıra kültürel etkileri, çevresindeki model davranışları ve sosyal etkileşim ve yaşantılar gibi fırsatlarla farklı faktörlere bağlı olarak değişiklik gösterebilir. Bu faktörlerden biride masallardır. Masal ve hikâyeler; çocukların, neyin doğru-yanlış, neyin iyi-kötü olduğu üzerinde düşünme, karar verme ve yaşadıkları sorunlar karşısında farklı seçeneklerle problem çözme becerilerini geliştirir. Bunun yanı sıra, masal ve hikâyelerin çocukları rahatlatıcı ve stresle baş etmelerini sağlayıcı etkileri de vardır. Ayrıca, çocuklar korkularıyla baş etmeleri konusunda yardımcı olurlar. Çocuğunuzun korkularına benzer korkuları ele alan hikâye ve masalları onlara anlatarak, çocuğunuzun bu korkularıyla başa çıkmasına yardım edebilir. Çocuğunuza duyguları içeren bir masal veya hikâye okuduğunuzda ya da anlattığımızda, bu çocuğunuzun kendi duygularını tanımasına ve kabullenmesine yardımcı olacaktır. Bunun yanı sıra, çocuğunuz kendi duygularının normal olduğunu, kendisi gibi diğer çocukların da benzer duyguları hissedebildiklerini anlayacaktır. Masallar ve hikâyeler iyilik, zarafet, kötülüğe karşı zafer kazanmak gibi olumlu konuları ele alırken bir taraftan da Pamuk Prenses ve Sindrella’da değinilen kıskançlık, Küçük Deniz Kızı’nda yer

verilen ayrılık ve Aslan Kral'da ele alınan kayıp gibi baş edilmesi zor olan duygu ve durumlarla çocukların tanışmalarına olanak sağlar. Bu kavramlar gerçek hayata dokunan kavramlardır. Masal ve hikâyeler normalde çocuklar-la konuşulması kolay olmayan konu ve duyguları daha güvenli bir ortamda dile getirme olanağı yaratarak çocukların zor durumlarla sağlıklı baş etme becerileri geliştirmelerine yardımcı olur. Aynı zamanda çocuğun bilgi dünyasını genişletir ve böylece duygularını ve düşüncelerini daha iyi ifade etme yetenekleri gelişir.

Resimli masal kitapları çocuğun hayal dünyasına bir pencere açar ve hikâye karakterlerinin de yardımıyla farklı bakış açıları edinmelerine yardımcı olur.

Çocuklar, masalarda duyduğu, dinlediği ve gördüğü hayatlar ile yeni dünyaları keşfeder. Bu masalarda yaşanan üzüntüler, mutluluklar, sevinçler ile yeni duygular öğrenir. Tüm bu duygulara ek olarak çocuk, masalarda tanıdığı karakterlerin verdiği mesajlar, karakteristik özelliklerinin izlemi ve olaylar ile duygusal ve sosyal gelişim sağlar. Kendi kültürünü, farklı kültürleri, gelenekleri, toplumsal davranış şekillerini öğrenir, kültürleri karşılaştırma imkanına da sahip olur. Masallar sonraki dönemlerde yaşadığı topluma ait görenekler, aile ve komşuluk ilişkileri, bireysel farklılıkların toplumdaki yeri ve arkadaşlığın önemi gibi kavramların anlaşılması için de farkındalık yaratır.

Ahlaki ve Kültürel Değerlerin Kazandırılması

Günümüzde gerek toplumumuz gerekse dünyada kişilerarası iletişim ve duygusal bağ giderek azalmaktadır. Bireylerin birbirleriyle iletişim kuramamaları, sevgi ve saygıya dayanan etkileşimin sağlanamaması, sağlıksız bir ortamın ortaya çıkmasına neden olmaktadır. insanların birbirlerine karşı tahammülsüz tutumları da toplumsal bütünlüğe zarar vermektedir. İnsanları bir arada tutan sevgi, saygı, adalet, arkadaşlık, yardımlaşma vb. değerlerin günden güne azalması, toplumda ve evrende barış ortamının bozulmasına zemin hazırlamaktadır

Biliniyor ki değerler soyut kavramlardır ve insanlar da 11-12 yaşlarından itibaren soyut düşünmeye başlarlar. Bu yüzden de soyut kavramları çeşitli semboller kullanmak suretiyle somutlaştıran masallarımız, birtakım değerlerin benimsenmesi ve içselleştirilmesi açısından önem taşımaktadır.

Masal ve hikâyeler çocukların toplumsal değerleri öğrenmelerinde rol oynar. Masallar genellikle bir öğretici mesaj taşır. Karakterler aracılığıyla çocuklara doğru ile yanlışı, iyi ile kötüyü ayırt etmeyi öğretir. Bu şekilde, çocuklar etik değerleri ve toplumsal normları anlamaya başlarlar.

Masallarla büyüyen çocuk sevginin her kapıyı açabileceğini; iyinin, doğrunun er ya da geç kazanacağını; dünyanın adaletle, saygıyla daha da yaşanılabilir bir hale geleceğini öğrenir. Halk masalı da olsa, belli bir yazar tarafından kaleme alınmış masal da olsa, masalların eğitici yönü tartışılmaz. “Ağaç yaşken eğilir” atasözünden hareketle denilebilir ki masallar, bireylere çok küçük yaşlarda toplumsal ve evrensel değerleri aktarma yönünden çok önemli bir görevi üstlenmektedir. Toplum içinde kendisinin de müstakil bir birey olduğunu sezer ve toplumuna karşı bazı sorumlulukları olduğunu farkına varır. Hep beraber inşa edilen dünya barışına çalışarak katkı sağlayabileceğini anlar. Kısacası insanı insan yapan değerler olduğunu, bu değerlere uyulmadığı takdirde insanların ve insanlığın nelerle karşı karşıya kalacağını somut örneklerle görür. Nesilden nesile aktarılan bazı masallar bizi eğlendirirken, insan davranışlarını da etkileyerek toplumun sosyal kurallarının ve değerlerinin de öğretilmesine katkı sağlar. Birçok masal ve hikâyenin içinde adalet, dürüstlük, işbirliği, paylaşma, bireyin kendisine ve başkalarına saygı duyması gibi toplumsal değerler işlenir. Böylece çocuklar da o toplumda önem verilen değerleri masal ve hikâyelerle anlayabilir ve yaşamlarında da uygulayabilirler.

Öğretmenlerin büyük bir çoğunluğu masalların ahlaki değerlerin kazandırılmasıyla birlikte sosyal, kültürel ve kişisel gelişimlerinde etkili olabileceğini düşünmektedirler. Şirin (1998), Demiray (1986) ve Kaya (2000) masalların çıkış gayesinin ahlaki değerlerin kazandırılması olduğunu ifade eder.

SONUÇ

Sonuç olarak, masal anlatımı, öğrencilerinin bilişsel, duygusal ve sosyal gelişimlerine olumlu bir şekilde katkıda bulunabilir. Çocukların toplum içinde belirlenen değerler ve kültürel kuralları öğrenebilir ve hayatlarına uygulayabilirler. Masallar ile çocukların yaratıcılıkları geliştirilerek her alanda üretken bireylerin yetiştirilmesi sağlanabilir. Çocukların kişisel ve akademik başarıları artırılabilir. Bu nedenle, eğitimciler ve ebeveynler, çocuklara düzenli olarak masal anlatarak bu alanlarda gelişimlerini destekleyebilirler.

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TÜRK BOZKIR KÜLTÜRÜNDE DİPLOMASİNİN SEYRİ

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Özet

“Türk Bozkır Kültüründe diplomasının seyri” adlı bu çalışmanın amacı geniş Orta Asya sahasında mühim roller üstlenen bozkır kavimlerinin diğer devletler ile yürüttüğü diplomatik faaliyetleri, diplomasi usul ve tekniklerini bilimsel verilerin ışığı altında incelemek ve ortaya koymaktır. Dünyanın en eski ve köklü uygarlıklarına ev sahipliği yapmış olan Orta Asya sahası sahip olduğu coğrafi şartlar nedeniyle sert iklim koşulları ve zorlu yaşam koşullarının olduğu bir sahaydı. Bozkır kuşağı olarak isimlendirilen bu coğrafyada yaşayan insanlarda önceliğin hayatta kalmak üzerine kurgulandığı bir yaşam biçimi oluşturmuşlardı. Bu nedenden dolayı ki bozkır kültürü kendine ait bir sosyal hayat ve kültür inşa etmiştir. Bu aşamada atın sürati ve demirin gücünü birleştirmeyi başaran bozkır insanı çok geniş sahalara yayılabilmek ve oralarda hâkimiyetini tesis edebilme imkânı elde etmiştir. Bu dinamizmin bir sonucu olarak dünya tarihinde mühim bir yer edinen İskit, Hun, Göktürk gibi devletler bozkır coğrafyası üzerinde siyasi bir teşekkül olarak ortaya çıkmıştır. Zamanla önemli başarılar elde eden bozkırlı kavimler bu suretle başta Çin olmak üzere devletlerarası münasebetlerde aktif rol oynamıştır. Kuruldukları dönemden yıkılışlarına kadar olan süreçte her daim milletler arası siyasetin ve ticaretin bir parçası olmayı başaran bozkır devletlerinin öncelikli maksadı şüphesiz ki devletin devamlılığını sağlamaktır. Bu nedenle başta Çin, Bizans, Sasaniler ile diplomatik faaliyetler yürüten bozkırlı devletler, dış ilişkilerde aktifliği sağlayan tercümanlar, bitegciler ve farklı dillere hâkim elçilik heyetlerini de devlet bünyesine dâhil etmişlerdir. Böylece savaş diplomasisi yanında, ticari faaliyetlerin yürütülmesi noktasında yaşanan sıkıntıların halli, hükümdarların tahta çıkışları, evlilik yolu ile ilişkilerin geliştirilmesi gibi hususlarda diplomasi aktif bir rol üstlenmiştir diyebiliriz.

Anahtar Kelimeler: Diplomasi, Bozkır Kültürü, Elçilik, Çin, Dış Politika,

THE COURSE OF DIPLOMACY IN TURKISH STEPPE CULTURE

Abstract

The aim of this study titled "The course of diplomacy in Turkish Steppe Culture" is to examine and reveal the diplomatic activities, diplomatic procedures and techniques carried out by the steppe tribes, who played important roles in the vast Central Asian region, with other states in the light of scientific data. Central Asia, which hosted the world's oldest and deep-rooted civilizations, was an area with harsh climatic conditions and harsh living conditions due to its geographical conditions. The people living in this geography, called the steppe belt, had created a way of life in which the priority was based on survival. For this reason, the steppe culture built a social life and culture of its own. At this stage, the steppe people, who managed to combine the speed of the horse and the power of iron, had the opportunity to spread to very large areas and establish their dominance there. As a result of this dynamism, states such as the Scythians, Huns and Gokturks, which have an important place in world history, emerged as a political organization on the steppe geography. In this way, the steppe tribes, who achieved important successes over time, played an active role in interstate relations, especially in China. The primary purpose of the steppe states, which always managed to be a part of inter-national politics and trade in the period from their establishment to their collapse, was undoubtedly to ensure the continuity of the state. For this reason, the steppe states, which carried out diplomatic activities primarily with China, Byzantium and Sassanids, included interpreters, bitegci and embassy delegations with a command of different languages within the state structure. Thus, we can say that in addition to war diplomacy, diplomacy played an active role in issues such as the settlement of problems in the conduct of commercial activities, the ascension of rulers to the throne, and the development of relations through marriage.

Keywords: Diplomacy, Steppe Culture, Embassy, China, Foreign Policy,

Giriş

Bozkır; Kaşgari'nin eserinde “tatırlı yer” olarak geçmekte olup, toprağı verimsiz kuru yer manasına gelmektedir (Kaşgarlı Mahmud; 1985, s.494-495). Bu elverişsiz coğrafyada yaşayan bozkır insanının yaşamı ve yaşamsal faaliyetleri de ister zorunlu isterse bir seçimden ibaret olsun bu coğrafi saha ile bütünleşmiş durumdadır. Bu da zorlu yaşam koşullarına direnen ve buna rağmen yaşamını idame ettirmeye çalışan bozkır insanını hürriyetine düşkün, doğaya hükmetmeyi bilen iyi bir savaşçı, asker konumuna getirmiştir (Akcan; 2022, s. 897).

Uçsuz bucaksız bozkır sahasında Türklerin ilk buldukları yer Altay ve Sayan dağlarının çevresi olmuştur. Ancak yapılan araştırmalar Türklerin varlık gösterdiği sahaların yalnızca bu bölgeler ile sınırlı olmadığını ortaya koymuştur. Öyleki Türkler buradan şarka, garba ve cenuba doğru yayılım göstermeye devam etmişlerdir. Milattan önce iki binli yıllara gelindiğinde Türkler Altay dağlarından Yayık Nehrine kadar olan bölgeye bütünüyle serpilmiş durumdaydı. Türklerin garba doğru gerçekleştirdikleri bu yayılımda Orta Asya coğrafyası önemli bir rol üstlenmiştir. Garba doğru ilerleyen Türkler Altay ve Tanrı dağlarının birbirine oldukça yakın olduğu bir noktada Cungarya havzasına girmiş ve zorlu Tarbagatay dağlarını da kolaylıkla geçmeyi başararak Kazak bozkırlarına kadar yayılmışlardır. Böylece Hazardan Cungarya havzasına kadar olan saha Türklerin ikinci anayurdu olmuştur (Koca; 2010, s.17-18).

Türkler yayıldıkları uçsuz bucaksız steplerde zaman içerisinde köklü ve zengin bir medeniyet ortaya koymayı başarmışlardır. Bunun temel sağlayıcıları hiç şüphesiz hayvancılık ve beraberinde gelen yarı göçebeliktir. Bilindiği üzere bozkır sahasının her yerinde iklim koşulları aynı değildi. Bu da geçimini hayvancılıkla sağlayan bozkır insanının hayvanları için gerekli olan otu ve suyu bulabilmesi için mevsimsel bir yer değişikliğini zorunlu kılmıştır (Deer; 1954, s. 161). Yaşanan bu yer değişikliğinde başlıca unsur at idi. Öyleki bir noktadan ötekine hızlı yer değişikliği, hayvan sürülerinin idaresi, gidilecek yaylak ve kışlak alanlarının önceden keşfi gibi sürat gerektiren bütün faaliyetler at sayesinde mümkün olmuştur. (Koca; 2002, s. 15-16). Bunun yanı sıra dayanıklılığı, yüksek manevra yeteneği ve önemli bir savaş aracı olması nedeniyle Türklerin pek çok başarıya imza atmasına da ön ayak olmuştur (Gömeç; 2014, s. 560).

At üzerinde inşa olunan bozkır kültür çevresinde bozkır kavimleri için devletleşmeye giden süreçte at kadar mühim olan bir diğer unsur ise vurucu etkisi oldukça yüksek, silah sanayinin başlıca hammaddesi olan demirdir. Demir kültürünün doğduğu coğrafya olarak kabul edilen Orta Asya sahasında demirciliğin kesin suretle ne zaman başladığı belli değildir. Ancak mevcut kurgan

buluntuları bu coğrafi sahada M.Ö. 2. Bin başlarına denk geldiğini göstermektedir. Bu vesileyle o güne kadar atın hızından yararlanmayı bilen ve çok geniş coğrafyalarda kendi hâkimiyetini kurma imkânı elde eden Türkler demirin vurucu gücünü de kullanmış ve üstünlüklerini ileriye taşımışlardır. Demirin kullanılmaya başlanmasıyla savaşlarda önemi azımsanmayacak ölçüde büyük olan ok uçları, kılıçlar, kamalar, miğfer ve kalkanlar v.s. üretilmiştir (Durmuş; 2014, s. 286). Atın hızı ve demirin vurucu gücüyle ufku genişleyen bozkır Türkleri teşkilatçılık yetenekleri, cesaretleri ve birbirlerine bağlılıkları ile dünya tarihinde mühim roller üstlenen devletler kurmayı başarmışlardır (Rasony; 1993, s.4-5).

Bozkır coğrafyasında ortaya çıkan siyasi teşekküller diplomasinin⁴ başlamasını da sağlamıştır. Aslında diplomasinin varlığı henüz siyasi yapılanmaların kurumsallaşmadığı tarih öncesi döneme dayanmaktadır. Daha o dönemde savaşan kabileler arasındaki anlaşmazlıkların hallinde karşılıklı araçlarla gerçekleştirilen diplomatik faaliyetler devletlerin inkişaf ettiği dönemde daha somut bir kimlik kazanmıştır (Acar; 2006, s. 419-420).

1. Bozkır Diplomasinin Etkin Zümreleri

Tarihsel süreç içerisinde sağlam temelli gücünün zirvesinde siyasi teşekküller kurmayı başaran bozkır kavimleri bu siyasi yapılanmanın doğal bir sonucu olarak aktif bir dış siyaset takip etmiş ve bu amaca hizmet eden memuriyetlere de devlet çatısı altında yer vermişlerdir. Bu bağlamda Kafesoğlu'nun da belirttiği üzere Türklerde devletlerarası siyasi işleri yürütmekle görevli bir dış işleri dairesi mevcuttu. Hunlarda muhtelif dillere hâkim kalabalık heyetler, katipler, tercümanlar ve kuryeler faaliyet halindeydi. Bu yapılanma elbette ki yalnızca Hunlara has değildi. Göktürk ve Uygurlar'da da dış politikanın diğer belirleyici unsurları olan bitegciler, tamgacılar, ılımgalar⁵ devlet meclisinde aktif olarak yer almıştır (Kafesoğlu; 2003, s. 278). Hunlar çağından itibaren varolagelmiş bu zümreler belirli bir düzende sistematik şekilde yürütülen bozkır diplomasinin hem kurumsal bir kimliğe büründürülmesi hem de sistematik işleyişini ortaya koyması bakımından önem arz eder (Berber; 2017, s. 34-35).

Devletlerarası ilişkileri ifade noktasında ilişkilendirilebilecek ilk kavram bozkır diplomasinde mühim bir vazife üstlenen Bitikçi⁶ (kâtip) idi. Bitici, bitgeci, bitigeci, bidgüçi, bitegcin gibi pek çok şekilde ifade edilen kavramın öz Türkçe de bitimek (yazmak) fiilinden geldiği

düşünülmektedir. Bitimek kelimesinin kökeni net olarak bilinmemekle beraber Çince de yazı fırçası manasına gelen bir kelimedenden neşet ettiği de ileri sürülmektedir. (İpşirli; 1992, s. 225). Asıl görevleri hakanın dış güçlerle gerçekleştireceği mektupları anlaşmaları kısacası her türlü yazışmayı kaleme almak olan bitikçilerin devlet kadrosunda mühim bir yer kapladığını söylenebilir (Gültepe; 2002, s. 1578).

Bozkır kavimlerinde diplomasinin kusursuz işleyişini sağlayan bir diğer zümre Tamgacılarıdır. Göktürlere ait kitabelerde mühürdar ve Uygurlarda unvan olarak karşımıza çıkan Tamgacı, Asya Hunlarından itibaren devam ile günümüze gelmiş olup bugün damga olarak bilinmektedir (Donuk; 1988, s. 84). Hakanın damgası yani mührünü taşıyan kişiler olup yarlıg⁷ ve emirlerini yürütmekle görevli olan Tamgacılar (Sümer; 1999, s. 13), aynı zamanda resmi yazışmalarda mührün yanında kendi imzalarını da atması gereken okuryazar ve bilgin bir zümre idi (Ögel; 1988, s.649). İzgi kullanılan tamgaların yalnızca siyasi içerikli metinlerde yer almadığını belirterek bazen ticari yazışmalarda da kullanıldığını öne sürmektedir (İzgi; 1987, s. 58).

Diplomatik faaliyetlerde tercümanlarda oldukça etkindi. Devletlerarası ilişkilerin sağlıklı yürütülmesinde özellikle de birbirlerini anlayabilme noktasında mühim zümrelerden biri de Tercümanlar ve Tercümanlıktı (Tokan; 2011, s. 27). Öz Türkçede Tilmaç, Tolmaç veyahut Tarmaç şeklinde karşımıza çıkan sözcük söylemek manasındaki ti ile dil yerine kullanılan til kelimelerinin birleşiminden oluşmaktadır. G. Nemeth tarafından başta gelen memuriyetler arasında zikredilen ve dış işleri bakanı manası taşıdığı belirtilen Tarmaç (Donuk; 1988, s.47) eski dönemlerden itibaren Türklerin aşına olduğu bir meslek grubuydu. Kafesoğlu'nun da belirttiği gibi Hunlarda muhtelif dillerde konuşabilen ve yazışmaları düzenleyen kalabalık heyetlerin varlığı bunun en güzel örneğidir (Kafesoğlu; 2003, s. 278).

İslamiyet öncesi dönemlerden itibaren devletin çıkarlarını diğer milletlere karşı koruyan ve diplomatik temasları gerçekleştiren elçiler de devletin mühim mercilerindendi. Türkçede halk, ülke, devlet manalarına gelen elçi "ilci" kökünden türemiş bir sözcüktür (Vardan; 2012, s. 30-35). Bunun yanısıra elçiler için Yalabaç, Yalabçı (Tokan; 2011, s. 21) ve hatta Çabış⁸ dendiği de görülmektedir (Donuk; 1988, s. 92).

2. Türk Bozkırında Diplomatik Temaslar

Akrabalık Tesis Etmek Suretiyle Gerçekleştirilen Diplomatik Temaslar

Tarihsel süreç içerisinde bozkır devletlerinin diplomatik temasları göz önüne alınacak olursa izdivaca yönelik temasların bir hayli fazla olduğu görülmektedir. Gerçekleştirilen bu evlilikler çoğu zaman komşu devletlerle yürütülen ilişkileri yoluna sokmayı amaçlamaktaydı ve bazen baskıyla bazen de gönüllü olarak gerçekleştirilmekteydi. Bu sayede taraflar arası oluşabilecek kriz ortamı engellendiği gibi, düşmana karşı birlikte hareket edilebilmekteydi (Koçak; 2022, s. 52). Görünürde masumane amaçlarla gerçekleştirilmiş olan bu evliliklerin altında aslında bambaşka amaçlar bulunmaktaydı. Yapılan bu evliliklerle rakip devlet üzerinde nüfuz sahibi olma, ticari ilişkileri geliştirmek, gücünü karşı tarafa kabul ettirerek boyun eğdirmek gibi sebepler bulunmaktaydı. Bu bağlamda Hunların ekonomik, Göktürklerin komşu kavimler üzerinde nüfuzunu artırma ve Uygurların Orta Asya sahasında konumunu sağlamlaştırma gibi amaçlarla bu izdivaçları gerçekleştirdiğini söyleyebiliriz (Akçay; 2010, s. 3).

Evlilik temelli diplomatik faaliyetlerin ilki Hunlar döneminde vuku bulmuştur. Ağırlıklı olarak Çin ile gelişen ilişkiler döneminde Hun hakanı Motun hâkimiyetini sağlamlaştırmak ve Çin tehlikesini bertaraf edebilmek için Çin'e karşı mücadele etmiştir. Bu mücadelelerden kaynaklı oldukça sarsıntılı bir dönem geçiren Çin ordusu çok ciddi önlem ve tedbirlere rağmen Motun'u alt etmeyi başaramamıştır. M.Ö. 201 yılında Çin ordusuna boyun eğdirmeyi başaran Motun bu sayede bir Çinli prensesle evlenerek Çini vergiye bağlamıştır (Taşağıl; 2013, s. 58). Hem ekonomik kazanımlar hem de nüfuz elde etme noktasında önemli kazanımlar sağlayan evlilik anlaşmaları Motun'un oğlu Ki-ok döneminde de sürdürülmüştür. Çin ile dostane ilişkilerin sürdürüldüğü bu dönemde Çin imparatorunun yeni hakanın tahta çıkışını tebrik etmek maksadıyla saraya bir Çinli prenses gönderdiği ve bu sayede barışın devamlılığını sağladığı görülür (Türkeli; 1990, s. 322).

Hunlardan sonra Çin'in diplomatik temaslarda yönünü döndüğü devlet Göktürkler olmuştur. Bu dönemde Göktürkler kendi içinde siyasi çalkantılar yaşayan Çin için oldukça önemli bir tehditti. Bundan da önemlisi zayıflamış olan Çin imparatorluğu Türkleri boyunduruk altına alacak salahiyyete sahip değildi. Bundan sebep Göktürlere karşı korumacı bir siyaset takip ederek sınır güvenliğini sağlamaya odaklanan Çinliler daha önceden yaptıkları gibi diplomatik temaslara akrabalık tesis etmeyi de ihmal etmemişlerdir (İzgi; 1978, s. 197-98).

Göktürklerde gerçekleştirilen ilk evlilik akdi Bumin Kağan döneminde Batı Wei imparatorunun kağana bir prenses göndermesiyle başlamıştır. Zira güçlerinin zirvesinde olan ve Çin'i yapılan

anlaşmalarla kontrol altında tutmayı başaran Türkler bundan sonra çıkarları doğrultusunda aynı anda pek çok devlet ile temaslarda bulunmuştur. Bu maksatla Batı Wei'ler ile evlilik akdi gerçekleştirerek ezeli düşmanları olan Juan-Juanları bertaraf eden Türkler Akhunlar ile de komşu duruma gelmiş oluyordu (Taşağıl, 2003, s. 19-20). Bundan sonra yönünü batıya dönen Türkler İpek yolu hâkimiyeti için Akhunların ezeli düşmanları olan Sasanilerle ilişki kurmuşlardır. Akhunları bertaraf etme noktasında önemli bir güç olan ve desteğine ihtiyaç duyulan Sasanilerin ittifakına duyulan ihtiyaç İstemi Kağan'ın kızı Fakim'i Sasani hükümdarı Anuşirvan ile evlendirmesi sonucunu da beraberinde getirmiştir (Akbulut; 2002, s. 1333). Böylece evlilik akdi ile Göktürk prensesi Sasani imparatoru ile evlenirken, evlilikten doğan çocuk Sasanilerin varisi olmuş oluyordu (Roux; 2004, s. 98). Bu sayede Göktürkler hedefledikleri gibi büyük ekonomik kazanımlar elde ederek ticaret yolunun büyük kısmına da hâkim olmuşlardır.

Orta Asya bozkırında kurulan önemli Türk devletleri arasında yer alan Uygurlar zamanında da benzer evlilik uygulamalarının diplomatik faaliyetlerle gerçekleştirildiği görülmektedir. Onlarda tıpkı Hunlar, Göktürkler gibi siyasi amaçlarla yapılan evliliklere önem vermişlerdir. 756 yılında Uygur kağanının kızını Çin sarayına gelin olarak göndermesi ve devamında Çin sarayından da bir prensesin kağana gönderilmesi hadisesi mühimdir (Akçay; 2010, s. 75-76).

Ticari Münasebetler Yolu ile Kurulan Diplomatik Temaslar

Kâr elde etme maksadıyla yürütülen her türlü alım satım işlemini kapsayan ticaret diplomatik faaliyetlerde her daim belirleyici bir rol üstlenmiştir. Zira nerede bir diplomatik temas varsa orada mutlaka bir ticari çıkar söz konusudur. Bunu bozkır devletlerinde net şekilde görebiliriz. Bilindiği gibi Çin için uzunca bir dönem Hunlar önemli bir tehdit teşkil etmişlerdir. Çinin kuzey sahasında yaşayan Hunlar için bütün ihtiyaçlarını bu sahadan karşılamak neredeyse imkânsızdı. Bu nedenle Çin sınırlarına yağma ve akınlarda bulunarak bu açığı telafi etmeye çalışmışlardır. Hunlar güçlü bir imparatorluk kurduktan sonra kendilerine bağlı devletler tarafından gönderilen vergi ve haraç ve hediyeler ekonomik açığı kapatma noktasında yarar sağlamaktaydı. Bu anlamda Hun hükümdarı Motun ile Çin arasında gerçekleştirilen anlaşma sunduğu ekonomik ayrıcalıklar yönünden mühimdi. Çünkü bu muahede ile Çin Hunlar için en kıymetli ürün olan ipek başta olmak üzere pek çok yiyecek ve giyecek malzemeyi her yıl düzenli vermeyi garantilemiş oluyordu. Motun'dan sonra da devam eden bu ekonomik yaptırımlar ile ipek ağırlıklı pek çok ürün Hunlara verilmeye devam edilmiştir. Türkler ise bunun karşılığında Çin'e at vermiştir (Onat; 1987, 614-615).

Hun-Çin diplomatik ticaretinin belirleyicilerinden bir diğeri sınır ticaretiydi. İki devlet arasındaki bu ticaret M.Ö. 156-141 de Chün Ch'en kağan dönemine denk gelmektedir. Bu dönemde eskiden yapılmış olan muahede şartlarına ek olarak Hunların Çin sınırlarında herhangi bir engelle karşılaşmadan ticari faaliyetlerini yürütmeleri kararlaştırılmıştır. Hunlar parçalandıktan sonra ticari münasebetler daha aktif hala gelmiştir. Özellikle kuzey Hunları Çin sınırlarında serbestçe ticaret yapmak için pek çok defa istekte bulunmuş elçi göndererek kıymetli hediyeler sunmuş ancak buna rağmen Çin tarafından engellenmişlerdir. Bu durum Hunların Çin sınırlarına akınlarına neden olmuştur. Ancak bu akınların zaman içinde giderek artması Çin'de tedirginlik yaratmış ve Çin hunların sınır ticaretine razı gelmek zorunda kalmıştır .(Onat; 1987, s. 621-622).

Hunlar döneminde başlayan ticari ilişkiler Göktürkler çağında da devam etmiştir. Bilindiği gibi Türklerin en önemli ekonomik faaliyeti kendi besledikleri hayvanlardı. Bu hayvanlar karşılığında Çin'den İpek tedarik edilmekteydi. Ancak zamanla Türklerin gönderdikleri at miktarını arttırması ve karşılığında da aynı oranda ipek talebinde bulunması Çin'in hoşnutsuzluğuna ve iki taraf arasında savaşın meydana gelmesine neden oldu. Göktürklerin üstünlüğü ile neticelenen savaş sonucunda Çin Türklerin talep ettiği yüksek miktardaki ipeği vermeyi kabul etti. Çin'in kendini güvenceye almak için kabul ettiği bu istek Göktürklerin yeni taleplerini de beraberinde getirdi ve Türkler Çin sınırında sabit pazar yeri kurulmasını da Çin'e kabul ettirmiş oldular⁹ (İzgi; 1978, s. 98).

Göktürklerin ticari maksatlı diplomatik temas kurduğu bir diğeri devlet Bizans olmuştur. Akhunlar'ı bertaraf ettikten sonra Sasani tehlikesiyle karşı karşıya kalan ve ekonomik çıkarları zedelenen Göktürkler ticaret akışını yeniden aktif hale getirmek için Bizans ile ortak hareket etmişlerdir. Zira Göktürkler gibi Bizans'ta Sasaniler'in uyguladığı ekonomik ambargodan muzdaripti ve ipek ticaretindeki Sasani üstünlüğünü kırmak istiyordu. Bu maksatla Soğdu elçi Maniakh öncülüğünde bir heyet Bizans'a gönderilmiştir. Neticede iki taraf arasında anlaşma sağlandığı gibi Türkler bu ittifak sayesinde Sasanilerin ekonomik yaptırımlarından kurtulmuştur (Kafesoğlu; 2003, s. 100-101).

Sonuç

Dünya tarihinde iz bırakan medeniyetlerin ve devletlerin zuhur ettiği bir coğrafi saha olan Orta Asya bozkırları coğrafi şartlarına ve zorlu yaşam koşullarına rağmen her daim mühim bir yer edinmiştir. Bunun en önemli nedeni bu coğrafyanın bölgede yaşayan insanlar üzerinde bıraktığı derin etkidir. Bu etki yaşam şekillerinden kültürlerine hatta devlet kurma biçimlerine kadar yaşamlarının her alanına yansımıştır. Zamanla bu coğrafyayla bütünleşen bozkırlılar bu sayede gücü kolay kolay yok edilemeyen devletler kurmayı başarmışlardır. Bu devletleşme diplomasiyi de beraberinde getirmiştir. Bu surette milletler arası ilişkilerde de aktif rol alan bozkır Türkleri başta Çin olmak üzere pek çok devletle siyasi sosyal ve ticari maksatlı anlaşmalar gerçekleştirmişlerdir. Gerçekleştirilen bu diplomatik temaslarda yer alan en önemli nokta elçi, tercüman, kâtip, tamgacı gibi zümrelerin varlığı olmuştur. Bu zümreler gücü zirveye ulaşan Türklerin oldukça sistematik bir diplomatik yapılanmaya sahip olduğunu ortaya koymuştur. Bu sistemli yapı içerisinde gerçekleştirilen diplomatik temaslar sayesinde çok nüfuzlu devletlerle akrabalık tesis edilebilmiş ve önemli ekonomik kazançlar elde edilmiştir.

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HAYVANCILIK İŞLETMELERİNDE SÜRÜ PROJEKSİYONUNUN ÖNEMİ

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Özet:

Çiftlik hayvanlarında sürü projeksiyonu veya sürü akım planı, mevcut sürün yapısını ileriki yıllar da nasıl olması gerektiğinin planlanmasıdır. Bunun için; sürünün döl verimi ile ilgili bazı ölçütlerin bilinmesi ve bu ölçütler doğrultusunda planlamanın yapılması gerekmektedir. Bunun için de kullanılması gereken ölçütler; gebelik oranı, ikizlik oranı, kısırlık oranı, yaşama gücü, sürü yenileme oranı, ayıklama oranı, sürüden çıkarma oranı gibi ölçütler ile işletmelerin sürdürmüş oldukları politikaların yani işletme kapasitelerinin artırılması, azaltılması veya sabit kalması gibi hususların bilinmesi gerekmektedir. Sürü yönetimindeki başarının sağlanabilmesi için hayvan davranışlarının esasını bilmek ve bunu doğru barındırma ilkeleri ile desteklenmesi gerekmektedir. Sonuç olarak, ürün kalitesinin artırmanın temelini; hayvan refahının artırılması, işletme kayıtlarının düzenli olarak tutulması ve modern yazılım destekli sürü yönetim uygulamalarının kullanımı oluşturmaktadır.

Anahtar Kelimeler: Sürü projeksiyonu, Döl verim ölçütleri, Çiftlik hayvanları, İşletme politikası

THE IMPORTANCE OF HERD PROJECTION IN LIVESTOCK

Abstract

Herd projection or herd flow plan in farm animals is the planning of how the current herd structure should be in the future years. For this purpose, it is necessary to know some criteria related to the fertility of the herd and to make planning in line with these criteria. The criteria that should be used for this purpose are pregnancy rate, twinning rate, sterility rate, survival rate, herd renewal rate, culling rate, removal rate and the policies that the enterprises have maintained, i.e. increasing, decreasing or keeping the enterprise capacities constant. In order to ensure success in herd management, it is necessary to know the basis of animal behavior and to support this with the right housing principles. As a result, the basis of increasing product quality is to increase animal welfare, to keep business records regularly and to use modern software-supported herd management applications.

Keywords: Herd projection, Fertility criteria, Livestock, Management policy

Giriş

Çiftlik hayvanlarından oluşturula sürülerde, hayvan mevcudiyetini, hayvan sayılarındaki değişimleri ve üretimi tahmin edebilmek için kullanılan verilere sürü projeksiyonu adı verilmektedir (Göncü, 2017).

Sürü yönetiminde amaç; hayvan refahının dikkate alındığı ve sürüyü bir iş insanı yaklaşımıyla yönetmektir. Böylece hayvan sayısına bağlı kalmaksızın, verilerin toplanması, değerlendirilmesi, işletmeye uygun kararlar alınması ve uygulanması sağlanmasıdır (Öz ve Bilgen, 2002).

Dünya nüfusunun sürekli artma eğiliminde olması, insanların hayvansal ürünlere olan talebini artırmaktadır. Hayvancılık işletmelerinin etkili kullanabilmek için hem sürdürülebilir hem de karlı bir şekilde yapılması gerektirmektedir. Bunun için, hayvancılık işletmelerinde rutin olarak yapılan günlük haftalık, aylık veya yıllık işler mevcuttur. Sürdürülebilir bir üretim için ancak hayvancılık işletmelerindeki tüm bu işlerin ne zaman ve nasıl yapılacağına önceden bilinerek hazırlıklı olunması ile mümkün olacaktır. Bu durum da ancak işletme kaynaklarının en etkili şekilde kullanımı ile mümkün olacaktır. Çünkü bu kaynaklar sınırlı olmasından dolayı, bunların etkin kullanımı ancak yönetim becerisi ile gerçekleşebilmektedir. Bundan dolayı, hayvancılık işletmelerinde üretim maliyetlerini en düşük seviyede tutmak koşuluyla işletmelerdeki karlılık değerlendirilmesinde çoğunlukla girdi, çıktı ve fiyat ile ilişkileri esas alınmaktadır. Fakat işletmedeki üretim sürecinde meydana gelen kayıplar, karlılığı etkilediği görülmektedir. İşletmelerdeki karlılığın artırılmasında kullanılan bilgi ve teknolojik uygulamaların üretim kayıplarının azalmasında etkili olduğu görülmektedir (Göncü ve Koluman, 2023). Başarının elde edilebilmesi için hayvancılık işletmelerinde de farklı iş kollarında olduğu gibi üç temel yöntemin uygulanması gerekmektedir. Bunlar sırasıyla; planlama, uygulama, takip etme ve değerlendirmedir. Hayvancılık işletmelerinde uygulanan sürü yönetimi prosedürleri; uygulama, takip, tespit, müdahale, değerlendirme ve yönetim olmak üzere altı aşamadan gerçekleşmektedir (Drazen, 2000).

Sürü yönetiminde ulaşılması istenen en önemli hedef kârlılıktır. Bunun için tüm kaynakların doğru kullanılması gereklidir. Yapılması gereken ilk iş, sürüdeki mevcut sorunları saptamak, daha sonra gelir-gider tablosunu gözden geçirerek uygun çözümler üretmek ve bunları uygulamaya koymaktır (Uygur, 2004). Sürü yönetimi uygulamalarının aşamaları sırasıyla; İşletmede yapılması gereken işlemlerin belirlenmesi, İşletmelerde belirlenen kararların alınması ve

uygulanması, işletmedeki uygulamalar sonucundaki gelişmeler takip edilir ve geleceğe yönelik planlamalar hazırlanır (Öz ve Bilgen, 2002).

Bu derleme ile, çiftlik hayvanlarından oluşan sürülerdeki yönetimin başarısını ortaya koymak için özellikle döl verim kriterlerinin detaylı bir şekilde incelenmesi ve çözüm yolunun geliştirilmesi amaçlanmıştır.

Hayvancılık İşletmelerinde Sürü Projeksiyonu

Sürü Yönetimi hayvanların yaşamlarını sürdürüp maksimum verim alabilmek için hayvan refahının da göz önünde tutulduğu en uygun bakım ve besleme koşullarını sağlamak, hayvan hastalıklarının ve hayvancılık işletmelerinde idareye bağlı kayıpların önüne geçmek olarak tanımlanmaktadır. Sürü yönetiminin amacı ise hayvanların en uygun koşulları da dikkate alarak sürüyü bir iş adamı yaklaşımıyla yönetmektir (Taşkın ve ark., 2015).

Sürü oluşturulurken hayvan sayısının fazla olması değil hayvan başına verimin yüksek olması amaçlanmalıdır. Çünkü hayvancılık işletmelerinde üretim üzerine çok farklı ve hassas faktörlerin etkisi söz konusudur. Sürekli değişen piyasalar gidi maliyetlerinde dalgalanmalar oluşturması ve sonuç olarak da üretim maliyetlerinin yükselmesine sebep olmaktadır. Bu durum karşısında işletmeler girdi maliyetlerini en aza düşürmek için büyük çaba harcamaktadırlar. İşletmelerin asıl hedefleri üretim sonucunda kar edebilmektir. Ancak biyolojik üretim sürecinde oluşan gelirin, üretimin farklı aşamalarında oluşan kayıplar göz ardı edildiğinde, karlı bir üretimin olması mümkün değildir. Üretim sırasında oluşan kayıplar, gelirlerin önemli bir kısmını götürebilmektedir. Sürü yönetim sistemindeki hata ve eksikliklerden oluşan kayıpları tespit edilmediği sürece, kayıpların etkisini artırarak devam edecektir. Sürü yönetim başarısı, üretim sürecinde oluşan kayıpları en aza indirmeye bağlıdır (Hoskin, 1983; Göncü ve Koluman 2023).

Sürü Projeksiyonunun Aşamaları

Hayvancılık işletmelerinde sürü yönetimi, doğum ile başlayıp hayvanın farklı yaş ve fizyolojik dönemlerinde yapılması gereken işlerin tümünü kapsamaktadır (Göncü ve Koluman, 2023). Sürüde yapılması gereken aşamalar sırasıyla;

Sürünün kayıtlarını tutularak verilerin toplanması,

Toplanan verilerin değerlendirilmesi,

Değerlendirme sonucunda işletmeye yönelik kararların alınması,

Kararların uygulamaya geçirilmesi, şeklinde sıralayabiliriz.

Sürü Kayıtlarının Tutulması

Hayvan yetiştiriciliği yapan işletmelerin ilk yapması gereken düzenli olarak kayıt tutmasıdır. Çiftliklerde düzenli olarak verim kontrolü takibi yapılarak gerekli olan kayıtlar zamanında planlanıp tutulmalıdır. Kayıtların temel olarak hayvanların var olan potansiyellerini ortaya koymalı ve teknik olarak da ıslah çalışmalarına imkân sağlaması gerekmektedir (Çelikyürek ve Aygün, 2014). Hem ekonomik değeri hem de verimleri yüksek olan hayvanları yetiştirebilmek ancak tutulan kayıtlara ait bilgilere sahip olunması ile sağlana bilir. Yalnızca süt verim kayıtlarının tutulması ile o hayvana ait birçok verinin (Yem tüketimi, laktasyon süt miktarı, laktasyon süresi, kuruya çıkarılma vs.) tutulmasını sağlayacak ve işletmenin ihtiyaçları belirlenerek hedefler oluşturulacaktır. Böylelikle yetiştirici hangi hayvanın iyi, hangisinin karlı olduğunu belirleyerek kolaylıkla seçim yapabilecektir. Bunun içinde belirli aralıklarla kayıt tutmak aynı zamanda işletme içi gelişmeyi, büyümeyi, benzer işletmelerdeki konumunu değerlendirme fırsatı verirken, kayıt tutmanın temelinde, hayvanların tanınması ve tanımlanması sağlayacaktır. Bunun kolaylıkla gerçekleştirilmesi için de doğumla birlikte hayvanların küpe numaralarının doğumdan sonra 24 saat içerisinde takılması gerekmektedir (Kaymakçı ve Taşkın, 2005).

Toplanan verilerin değerlendirilmesi

Verinin toplanması sonucunda istatistik yöntemleri kullanarak anlamlı ve yararlı bilgiler haline getirilmesi işlemi olarak tanımlanabilir. İşletmelerin büyüme, küçülme, pazarlama stratejileri belirleme gibi kritik kararlarının alınmasında veri analizlerinden yararlanılmaktadır. Veri analizi, doğru verilerle ve yöntemlerle yapıldığında, işletmelerin stratejik ve kritik kararlarında yapılabilecek birçok hatanın önüne geçilmesini sağlayabilmektedir. Toplanan verilerin değerlendirilmesi yapıldıktan sonra alınan kararların uygulanması yapılmalıdır (Karaca ve ark., 2012).

Değerlendirme sonucunda işletmeye yönelik kararların alınması

Karar alma, birçok seçenek arasından seçim yaparak gelecekte kullanılmak üzere karar verme süreci olarak tanımlanır (Daly ve ark., 2017). Karar verme sürecinde ve kararın uygulanması sırasında dikkat edilmesi gereken hususlar söz konusudur. Bunlar; kararın etkilerinin tüm kapsamını dikkatli bir şekilde değerlendirmek, karar uygulanırken hangi önlemleri almamız gerektiğinin belirlenmesi, kararın etkilerinin farklı şekilde göz önünde bulundurulması gerektiğinde, farklı açılardan değerlendirilmesi gerektiği, alınan kararın kısa ve uzun vadedeki sonuçlarının ortaya çıkması için gereken denetimleri ve kontrollerin yapılması, kararın

uygulanması sırasında karşılaşılabilecek sorunlarla ilgili önceden tahmin edilmesi gerektiği gibi hususlara dikkat edilmesi gerekmektedir (Sağır, 2006).

Sürü projeksiyonunda Planlama

Planlama istenen bir amaca ulaşabilmek için ihtiyaç duyulan faaliyetlerle ilgili düşünme süreci olarak tanımlanır ve akıllı davranışın temel bir özelliğidir. Planlamada sadece istenen sonuç değil, aynı zamanda bu sonuca ulaşmak bilmek için gerekli olan adımları görselleştirerek bir mantık ve hayal gücünün kullanılmasını da kapsar (Göncü ve Koluman, 2023). Sürü projeksiyonunun en temel işlevi planlama yapmaktır. Bunu için planlanması gereken konu hakkında önceden kararlar alarak onun nasıl ve ne zamanda yapılacağına belirlenmeye çalışılmalıdır (Anonim, 2023).

Planlama Fonksiyonları

Planlama yaparken izlenmesi gereken prosedürler aşağıda bildirilmiştir (Göncü ve Koluman, 2023). Buna göre;

İşletmedeki mevcut durumun analizi yapmak,

İşletmenin hedeflerinin belirlenmesi,

İşletmenin stratejik planlamasının belirlenmesi,

İşletmenin sahip olduğu kaynakların yönetimi ve faaliyetlerinin uygulanması şeklindedir.

İşletmedeki Mevcut Durumun Analizi Yapmak

Mevcut durum analizi, işletmede gözlem yapılması, işletmenin mevcutta sahip olduğu dokümanların, tuttuğu kayıtların incelenmesi, ilgili kişilere sorular sorulması, iş yapım yerlerinde inceleme ve gözlem yapılması, veri analizi yapılması şeklinde yürütülür (Çoban ve Karakaya, 2010). Mevcut durum analizlerinde amaç işletmenin ne durumda olduğunu ortaya konulmasıdır. Mevcut durum analizi işletmeyi oluşturan tüm birimlerinin genel olarak işleyişlerinin detaylandırılması ve geleceğe yönelik hedeflerin belirlenmesi için oldukça önemlidir. İşletmelerin yeniliklere uyum sağlayabilmesi, gelir-gider dengesini görebilmesi, işletme içi ve dışı tüm çevresel faktörlerin etkileri detaylandırılarak değerlendirilmesidir. Mevcut durum analizi yaparken dikkat edilmesi gerekenler hususlar aşağıda bildirilmiştir. Bunlar;

- Elde edilen tüm verilerin eksiksiz ve doğru olması ve bu verileri değerlendiren kişilerin konuya vakıf olması gerekir.
- Mevcut durum analizinin sonuç raporu dikkatle değerlendirilmeli ve gerekli uygulamalar yapılmalıdır.

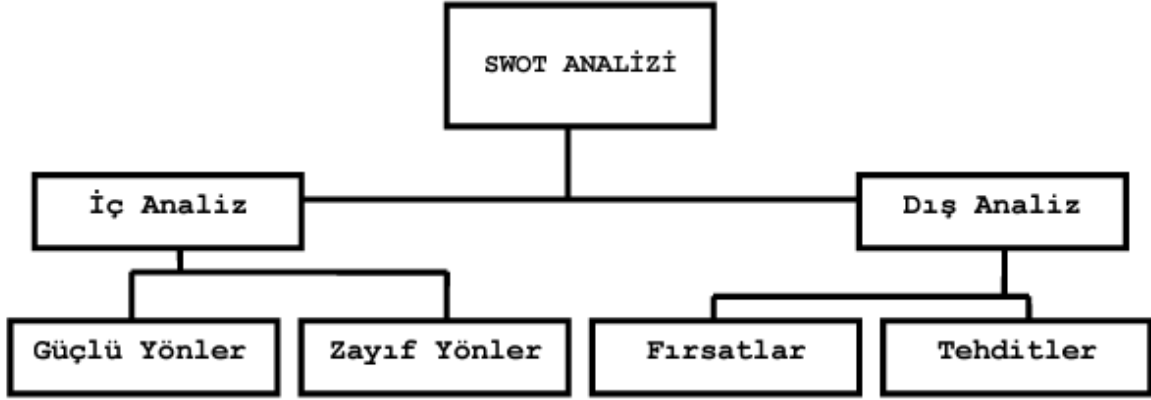
- Mevcut durum analizi sadece olumsuzluk durumunda değil de belli aralıklarla yapılarak değerlendirme sonuçları özenle incelenmelidir.
- Mevcut durum analizinin kısa vadede değil, orta veya uzun vadede işletmeye fayda sağlayacağı unutulmamalıdır.

İşletmelerin stratejilerinin tespitinde en önemli konu amaç ve hedeflerin belirlenmesidir. Bu konuda yol gösteren ve gerçekçi amaçların oluşturulmasındaki temel ilkeler aşağıdaki bildirilmiştir (Thompson, 1999).

- Hedeflenen amaç açık ve seçik olması gerekir.
- Gerçekçi olmalıdır.
- Esnek olmalıdır.
- Ölçülebilir olmalıdır.
- Kısa ve uzun vadede ulaşıla bilinecek amaçları birbirinden ayırmalıdır.
- Uygulayıcılar tarafından benimsenmelidir.
- Motive edici olmalıdır.
- Uyumlu olmalıdır.

Strateji, amaç, hedef, misyon, politika, program, yöntem, plan, vizyon ve taktik içermelidir.

Durum analizi yapılırken kullanılacak başlıca yöntem SWOT analizi olmalıdır. SWOT analizi, işletmenin çevresi ile etkileşimini sistematik olarak inceleyen bir yöntemdir. Bu kapsamda işletmelerin içsel olarak; güçlü ve zayıf yönleri ile dışsal faktörlerden kaynaklanan fırsatlar ve tehditleri belirlemesine yardımcı olmaktadır. Bu yaklaşım ile, işletmelerde planlama yaparken güçlü ve zayıf yönleri ile karşı karşıya olduğu fırsat ve tehditleri analiz etmeyi ve geleceğe dönük stratejiler geliştirmeyi ifade eder (Anonim,2018). SWOT analizinde yöntem kapsamlı bir şekilde belirtilmesi gerekir.



Garfik.1. SWOT Analiz Gerçekleştirme Aşamaları

İşletme stratejileri belirlenirken mutlaka aşağıdaki sorulara cevap verilmesi gereklidir.

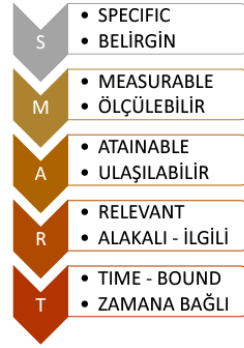
- Neredeyiz?
- Nereye gitmek istiyoruz?
- Gitmek istediğimiz yere nasıl ulaşabiliriz?
- Başarımızı nasıl takip eder ve değerlendirebiliriz?

İşletmenin hedeflerinin belirlenmesi

Hedefler ve planlama bize varmak istediğimiz yolu görünür hale getirmeye yarayan bir olgudur. Hedefimizin ne olduğunu görmek bir haritaya bakıyor gibi ilerlememizi ve nasıl adım atmamız gerektiği hakkında bilgi verir. Doğru bir hedefleme ve planlama başarının önemli unsurlarındandır.

Bir işletmenin hedef belirlemeden ölçeklenmesi ve büyümesi pek mümkün değildir. Tespit edilen hedefler uygulanan veya planlanan stratejilerle uyumlu olmaz ise, işi büyütmek ve başarıya ulaşmak kolay değildir. Peki, stratejilere uygun hedefler nasıl belirlenir? Bir hedefin belirlenebilmesi için ancak uygun stratejiler oluşturulmalıdır. Stratejinize uygun hedef belirlemenin dört yolu vardır. Bunlar; Stratejinize uygun hedefler seçmek, seçilen stratejilerin analizlerini yapmak, gerçekçi hedeflere yoğunlaşmak ve iletişimi canlı tutmaktır. Hedef belirlerken, SMART; Specific, Measurable, Atainable, Relevant, Time Bound (Belirgin, Ölçülebilir, Ulaşılabilir, İlgili, Zamana Bağlı) şeklinde olmalıdır.

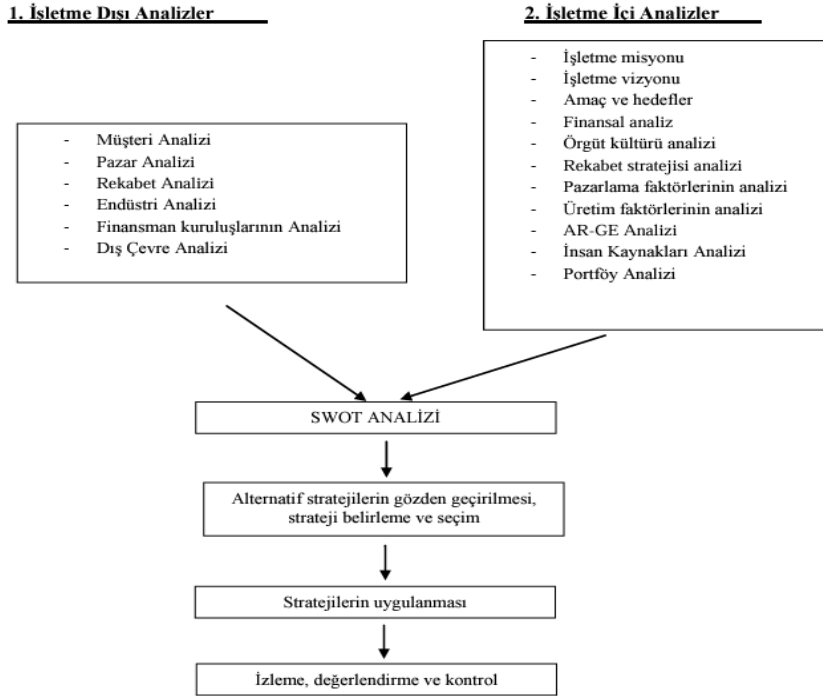
Hedef Belirleme S-M-A-R-T



Grafik. 2. Hedef Belirleme

İşletmenin Stratejik Planlamasının Belirlenmesi

Stratejik planlama, daha önceden belirlenmiş olan ana amacın gerçekleştirilmesi için ortaya konulan planlamayı ifade etmektedir. İşletmede ana stratejik planı yapmadan önce SWOT analizi yaparak işletmenin zayıf ve güçlü yanlarını, tehditlerini ile fırsatlarını belirleyerek bunları aynı zamanda değerlendirilmesini sağlayacaktır (Ergenekon, 1990).



Grafik 3. Stratejik Planlama Süreci

Yapılan çalışmalarda stratejik planlama sürecinde işletme dışı analizler, işletme içi analizler, swot analizi, strateji belirleme ve seçim, uygulama, izleme, değerlendirme ve kontrol süreçleri olmak üzere birçok analiz yapılmaktadır (Kevser, 2007). Grafik 3' de stratejik planlama sürecine ait aşamalar bildirilmiştir.

İşletmenin sahip olduğu kaynakların yönetimi ve faaliyetlerinin uygulanması

Diğer işletmeler ile rekabet edebilmek için ellerindeki kaynakları verimli olarak yönetmesidir. Bu nedenle işletmelerin sahip oldukları sermaye, iş gücü, tesis ve teçhizat gibi kaynakların en etkin biçimde kullanılmasıdır. Kaynak yönetim planının aşamaları; işletmenin iş gücü ve fiziksel kaynaklarının belirlenmesi ve işletmenin sahip olduğu fiziksel kaynaklarının nasıl tasarlanacağına belirlenmesi olarak tanımlanabilir. Alınan kararlar daha sonra uygulamaya aktarılması yapılmalıdır. Kararın değerlendirilmesinde en önemli aşama olup uygulama ile alınan kararların uygulanabilir olup olmadığına karar verilir (Çalışkan,2010).

Sonuç

Dünya nüfusunun sürekli olarak artışı özellikle hayvansal ürünlere olan talebi artırmaktadır. Bu talebin karşılanması ise ancak hayvansal üretimin artırılması ile karşılanabilir. Hayvancılık işletmelerinde üretimi artırmak ise ancak başarılı bir çiftlik yönetimi ile mümkün olacaktır. Başarılı bir sürü projeksiyonu hazırlamak için; hayvanların biyolojik özelliklerini, sürüde uygulanacak strateji ve türlere ait ilgili teknik parametreler kullanılması gerekmektedir. Sürü projeksiyonu yapılmamış bir işletmenin geleceğiyle ilgili gerçekçi bir değerlendirme yapmak ve isabet oranı yüksek tahminlerde bulunmak mümkün olmaz. Hazırlanan sürü projeksiyonuyla başarıya ulaşabilmek için planlama, fizibilite çalışması ve değerlendirmelerin gerçekçi olması gereklidir. Sürü projeksiyonu yapılmış bir işletmede, işletme sahibi veya işletme yöneticilerinin planlamadan kaynaklanan sapmaları kolaylıkla fark ederek, hataya neden olan uygulamaları belirleyip sorunları gidermesi daha kolay olacaktır.

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KOYUN YÜNÜNÜN ORGANİK GÜBRE OLARAK SÜRDÜRÜLEBİLİR TARIMDA KULLANIMI

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Özet

Biyolojik olarak parçalanabilen, sürdürülebilir ve çevre dostu bir malzeme olan yünün, özellikle dünya iklimiyle ilgili artan endişeler ışığında, tekstil endüstrisi dışında da birçok kullanım alanı vardır. Tarihsel olarak etkili bir ısı ve ses yalıtkanı olarak kullanılan koyun yünü, tarım sektöründe kompost veya malç olarak bir karışım halinde kullanıldığında birçok fayda sunmaktadır. Yavaş salınan azot ve diğer eser elementlerin kaynağı olarak, yabancı ot ve haşere kontrolünde, nem tutmada ve sıcaklık düzenlemesinde önemli roller üstlenebilen koyun yününün kısmen koyun gübresi veya aynı zamanda gübre görevi gören diğer bitkisel maddelerle kaplanma avantajları bulunmaktadır. Yaklaşık %10 ile 12 oranında yüksek bir azot içeriği olan koyun yünleri keratin açısından da zengin olup potasyum, fosfor ve kükürt (azot kullanımının iyileştirilmesine yol açar) içermektedir. Ayrıca koyun yünü kendi ağırlığının birçok katı suyu emerek bir sünger vazifesi görmesi ile suyu yavaşça toprağa/bitkiye (kuru dönemlerde) bırakabilmektedir. Aynı zamanda bazı zararlı saldırılarını azalttığı tespit edilen koyun yünlerinin yabancı ot gelişimini de ortadan kaldırdığı görülmektedir. Koyun yünü kompostları, verimli besin profilleri ve yüksek su tutma kapasiteleri ile turba bazlı formülasyonlara benzeyen yumuşak ve ufalanan bir dokuya sahiptir. Günümüzde koyun yünü ile ilgili optimum kompostlama stratejileri ve karışım formülasyonlarının belirlenmesinin yanı sıra, koyun yünü ile ilgili çalışma süreçlerinin nasıl büyütüleceğine dair daha fazla araştırmaya ihtiyaç duyulmaktadır. Bu derlemede koyun yününün tarım sektöründe kullanımı ile ilgili genel bir değerlendirmeye ve konu ile ilgili bazı akademik çalışmalara yer verilmiştir.

Anahtar kelimeler: Yün, Organik Tarım, Sürdürülebilir Tarım

USE OF SHEEP WOOL AS ORGANIC FERTILIZER IN SUSTAINABLE AGRICULTURE

Abstract

Wool is a sustainable, biodegradable, and environmentally benign fiber with a wide range of applications outside the textile industry, particularly in light of growing worries about global climate change. Historically used as an effective heat and sound insulator, sheep wool offers many benefits when used in a mixture as compost or mulch in the agricultural sector. Sheep wool, which can play important roles in weed and pest control, moisture retention and temperature regulation as a source of slow-release nitrogen and other trace elements, has the advantage of being partially covered with sheep manure or other plant matter that also acts as fertilizer. Sheep wool, which has a high nitrogen content of approximately 10 to 12%, is also rich in keratin and contains potassium, phosphorus and sulfur (leading to improved nitrogen utilization). In addition, sheep wool can absorb water many times its own weight and act as a sponge, slowly releasing the water to the soil/plant (during dry periods). Sheep wool composts have a soft and crumbly texture similar to peat-based formulations, with efficient nutrient profiles and high-water retention capacities. Today, more research is needed on how to scale up sheep wool-related working processes, as well as determining optimum composting strategies and mixture formulations for sheep wool. In this review, a general evaluation of the use of sheep wool in the agricultural sector and some academic studies on the subject are included.

Keywords: Wool, Organic Agriculture, Sustainable Agriculture

Giriş

Bitkisel üretimde yüksek verimin sağlanması ve verimliliğin sürdürülebilmesi için gübreleme faaliyetleri oldukça önemlidir. Kimyasal gübreler ve tarım ilaçları ile birlikte, bitkiler kontrollü bir şekilde beslenebilmekte ve zararlılara karşı korunabilmektedir. Ancak bu kimyasal uygulamalar zamanla topraktaki mikroorganizmalar üzerinde olumsuz etkilere neden olmaktadır. İnorganik gübrenin sürekli kullanılmasıyla toprak zamanla daha çorak hale gelmekte, mikroorganizma faaliyetleri tamamen durmakta ve toprağın havalanması bozulmaktadır (Karaca ve ark., 2023). Atık veya yan ürünlerin bitkiler için besin kaynağı olarak kullanılmasının uzun bir geçmişi vardır. Bununla birlikte, henüz kullanılmamış ve mahsuller için besin kaynağı olarak potansiyel değere sahip olabilecek, yaygın olarak bulunabilen bazı atık ürünler bulunmaktadır (Ordiales ve ark., 2016). Bu ürünler için örnekler arasında ham yünün temizlenmesi işlemi sırasında oluşan koyun yünü atığı yer almaktadır (Kroening ve ark., 2004).

Koyun yünü değerli bir doğal elyaftır ve tekstil amaçlı hammadde olarak uzun bir geçmişe sahiptir. Uluslararası ticareti yapılan ilk mallar arasında yer almakta olup birçok ülkenin tarım ekonomisi için halen önemli konumdadır (Henry, 2012). Sentetik elyafların yükselişe geçtiği geçtiğimiz yüzyılın ortalarından bu yana, yün tekstil sektöründe giderek önemini yitirmiş ve artık tekstil pazarında marjinal bir elyaf haline gelmiştir. Pazarlanmayan büyük miktarlardaki ham yün, koyun yetiştiricileri için bir gelir kaynağı olmaktan çıkıp, en iyi ihtimalle yakılacak veya çöpe atılacak sorunlu bir atığa dönüşmüştür. Doğal kaynakların sürdürülebilir kullanımına olan ilginin artmasıyla birlikte yün, yeterince önemsenmeyen, yeterince kullanılmayan, daha iyi değerlendirilmeye değer bir yenilenebilir kaynak olarak yeniden değerlendirilmektedir. Son zamanlarda, giyim dışı uygulamalarda yün atıklarının değerlendirilmesine yönelik çözümlerin bulunması konusunda yoğun araştırmalar yapılmıştır. Yün atıklarına değer katmak için iki ana yön geliştirilmiştir. Bunlardan birincisi doğal elyaf özelliklerinden yararlanılan uygulamalardır. İkincisi ise elyaflardan kimyasal çözüldürme veya enzimatik biyodönüşüm yoluyla ekstrakte edilen keratin biyopolimerinin kullanıldığı uygulamalardır. Doğal durumdaki yün elyafları en çok yeşil bina yalıtımı, polimer elyaf kompozitler veya su kirliliği arıtımında kullanılan emici malzemeler gibi teknik uygulamalarda kullanılmaktadır. Keratin ve türevleri, rejeneratif tıp için protein bazlı biyomateryallerin üretiminde esas olarak değerlendirilmektedir. Biyodönüşüm, yün atıklarını organik tarıma yönelik gübreler veya proteolitik enzimler gibi yüksek değerli ürünlere dönüştürme konusunda önemli bir potansiyele sahiptir (Rajabinejad ve ark., 2019). Organik

gübreler bol miktarda organik azot (N) içermekte ancak kritik dönemlerde bitkilerin ihtiyacını karşılayacak kadar hızlı mineralize olamamaktadır (Pang ve Letey, 2000). Biyodönüşüm, yün atıklarının organik tarıma yönelik gübre gibi yüksek değerli ürünlere dönüştürülmesinde önemli bir potansiyele sahiptir (Sharma ve ark., 2019). Mineral gübrelerden hızlı salınımına karşılaştırıldığında yün atıklarından azotun yavaş salınımı, su kaynaklarının azot bileşikleriyle kirlenmesinden korunması nedeniyle çevre açısından olumludur (Petek ve Logar, 2021). Yün lifleri nemi çok etkili bir şekilde emer ve tutar ve bu özellik, pestisitler gibi kirletici maddelerin akışını azaltabileceği ve su tasarrufunu artırabileceği topraklara uygulandığında oldukça faydalıdır. Yün lifleri hafiftir ve ağırlık ekmeden daha fazla miktarda nemi emebilmektedir (Nustorova ve ark., 2006). Koyun yünü, bitki büyümesi için gerekli olan önemli besin maddeleri açısından zengin bir kaynaktır (McNeil ve ark., 2007). Yüksek miktarlarda N, S ve C içerir. Koyun yünü hidrolizata, topraktaki toplam N, C ve P içeriğini artırarak büyüme koşullarını iyileştirmektedir (Govi ve ark., 1998). Diğer malç malzemeleri gibi, yün de azot kaynağı görevi görerek yabancı ot büyümesini bastırmakta ve diğer malç malzemelerine göre bozulmaya karşı daha fazla dayanıklılık göstermektedir (daha uzun ömürlüdür) (Sharma ve ark., 2019). Diğer taraftan yün, doğal bir kovucu görevi görmektedir. Hargreaves (2017) yünün salyangozları uzaklaştırmak için kullanılabileceğini bildirmiştir. Kompostlama aynı zamanda parazitleri ve patojenleri de ortadan kaldırır ve potansiyel kirletici maddeleri bir dereceye kadar azaltır (Cogger, 2005).

Koyun yünü biyolojik olarak parçalanabilen bir elyaftır. Azot ve kükürt açısından zengin bir gübre olarak toprağa geri dönmesinden elde edilen önemli faydalarla kolayca geri dönüştürülür. Yün atıkları, makas atıkları, halı bertarafı, tekstil endüstrileri, yün yıkama çamuru ve işlenemeyen çok kaba yünlerin yanı sıra birçok biçimde üretilmektedir. Yün atıkları, ilgili literatürle birlikte mevcut değerlendirmeye dahil edilmiş ve yün atıklarının toprak iyileştirici olarak uygulamalarının potansiyel faydaları üzerinde durulmuştur. Son yıllarda çevreye yönelik kamuoyunun artan endişesi ve atık depolama sahalarının maliyetleriyle birlikte, kaçınılmaz yün atığı için alternatif kullanımları aramak son derece acildir (Sharma ve ark., 2019). Koyun yünü tekstil endüstrisi için keratin açısından zengin bir yan üründür. Keratin'in kompleks yapısından dolayı bu atıklar bozunmaya karşı oldukça dirençlidir ve ciddi bir çevre sorunu teşkil etmektedir. Atık yün genellikle çevre dostu olmayan fiziko-kimyasal işlemlerle hazırlanan farklı hidrolizatlara dönüştürülmekte ve bu da bazı amino asitlerin tahrip olmasına ve enerji kaybına neden olmaktadır. Mikrobiyal veya enzimatik ön arıtma ve kompostlama gibi biyoteknolojik yaklaşımların kullanılması, çevresel

etkiyi önemli ölçüde azaltabilir ve biyogaz üretimi için gübre substratları ve yüksek katma değerli ürünler (peptitler, amino asitler ve keratinolitik enzimler) gibi faydalı ürünler üretebilir (Petek ve Logar, 2021). Atık koyun yünü gibi keratin açısından zengin malzemeler, zengin bir mineral element bileşimine sahiptir ancak doğal ayrışma konusunda zorluklar sergilemektedir. Sonuç olarak, bu atık malzemelerin çoğu yakılmakta ya da düzenli depolama alanlarına atılmaktadır. Bu da ciddi çevresel kaygılara yol açmaktadır. Ancak bu atıklar etkili gübre ve toprak düzenleyici olarak kullanılma potansiyeline sahiptir. Tarımsal üretimde doğrudan kullanılabilirdiği gibi çeşitli işlemlere tabi tutularak da kullanılabilirler (Akca ve ark., 2023).

Yün atığı, çiftçilere ek gelir sağlayan, atık yünün en iyi şekilde kullanılması için koyunlara bağımlı olan üreticilere olanak sağlayan toprak iyileştirmeleri için en iyi seçeneklerden biridir. Yün atığı, toprak düzenleyici olarak kullanılmadan önce, büyük ölçüde C:N oranlarının düşürülmesi ve mevcut bitki besin maddelerinin sağlanması da dahil olmak üzere bitki büyümesi için uygun substrat niteliklerini sağlamak amacıyla kompostlamayı gerektirmektedir (Sharma ve ark., 2019). Atık yünün işlenmesine yönelik kimyasal ve fiziksel yöntemler, çok fazla enerji ve kimyasal tüketir ve büyük çevresel etkiye sahiptir. Bu nedenle bunların biyoteknolojik yaklaşımlarla değiştirilmesi gerekmektedir. Mikrobiyal veya enzimatik ön işlemlerle hazırlanan kompostlanmış atık yün veya hidrolizatlar, gübre olarak ve ayrıca biyogaz üretimi için substrat olarak saha deneylerinde umut verici sonuçlar göstermektedir. Atık yün uygulamalarına (yün peptonu, amino asitler, keratinolitik enzimlerin üretimi) yönelik bazı yenilikçi fikirler zaten tanımlanmış durumdadır, ancak daha fazla araştırma, atık yünden yüksek katma değerli ürünlerin geliştirilmesine yönelik daha fazla olasılığı ortaya çıkarabilir (Petek ve Logar, 2021).

Yün endüstrisi, bir milyardan üzerinde koyundan oluşan küresel bir sürüden yılda yaklaşık 1.160 milyon kilogram temiz yün üretmektedir. Her bir koyun, 10 metre kumaş veya yaklaşık altı kazak (kazak) üretmeye yetecek kadar verim sağlamaktadır. Dünya üzerinde toplamda her yıl kişi başına yaklaşık bir kazak üretmeye yetecek kadar yün miktarı oluşmaktadır (Anonim, 2023). Avrupa'da tarım sektörü yılda 200.000 tondan fazla kaba yün üretmektedir. İtalya'da tam olarak 18.000-20.000 ton üretim yapılmaktadır (Zoccola ve ark. 2015). Bu yün, kalite standartlarını karşılamadığından giyim endüstrisi için uygun olmayan bir hayvansal yan üründür ve Avrupa Komisyonu'na göre özel atık olarak sınıflandırıldığından (Bhavsar ve ark. 2016) sıklıkla çöp sahalarına atılmaktadır. Bununla birlikte, çeşitli çalışmalar farklı türdeki yün atıklarının veya yün

kalıntılarının toprak özellikleri ve verimliliği üzerindeki yararlı etkilerini açıkça göstermektedir (Abdallah ve ark., 2019a).

KOYUN YÜNÜNÜN İÇERİĞİ

Her bir ton ham yün, yaklaşık 640 kg yün lifi, 150 kg lanolin (temizlenmemişse), 40 kg kumaş (ter ve dışkıdan gelen potasyum tuzları gibi çözünebilir kirletici maddeler), 150 kg mineral kalıntısı (toprak) ve potansiyel olarak böcek ilacı içeren 20 kg bitkisel madde içerir (Bhavsar ve ark. 2016). Yün, alfa-keratin peptid bağları ve yüksek düzeyde çapraz bağlı disülfid bağları ağı sayesinde stabildir. Yağlı ham yün, bol miktarda karbon (%50 C), azot (%16-17) ve kükürt içeren protein 'keratin'den oluşmaktadır (S 3-4%) (Von Bergen ve ark., 1963). Sert keratin olarak da bilinen alfa keratin, çapraz bağlanan protein zincirleri arasında S-S bağları oluşturmak için daha yüksek sistein içeriğine (%14'e kadar) sahiptir ve bu da pepsin, trypsin veya papain gibi yaygın proteolitik enzimlere direnç gösterme yeteneğine katkıda bulunur (Onifade ve ark. 2012). Ayrıca yündeki spiral bobinin hidrofobik grupları biyolojik parçalanmayı zorlaştırmaktadır (Kornilowicz-Kowalska ve Bohacz, 2011).

Yün, benzersiz özellikleri kimyasal bileşimine ve morfolojik özelliklerine dayanan doğal bir protein malzemesidir. Yün, bir koyun ırkından diğerine değişen inceliğe, yani lif çapına göre sınıflandırılır. Yün lifinin histolojik yapısı kütikül, korteks ve hücre zarı kompleksinden oluşur. Medula adı verilen iç kanal ise sadece kaba ve orta dereceli liflerde bulunur. Kütikül veya dış katman, dış fiziksel ve kimyasal hasara karşı bariyer rolü oynar. Lif yüzeyine pürüzlülük ve dayanıklılık kazandıran üst üste binen pullardan veya kütikül hücrelerinden oluşur. Kütikül yüzeyi, protein substratına kovalent olarak bağlanan yağ asitlerinin varlığından dolayı hidrofobiktir. Korteks hidrofilik olduğundan lif, hidrofilik bir çekirdeği saran hidrofobik bir dış yüzeye sahip bir çekirdek-kabuk yapısına sahiptir (Popescu ve Höcker, 2007). Bu, yün yüzeyinin neden doğası gereği su ve kir itici olduğunu, ancak elyafın bir bütün olarak yüksek miktarlarda su buharını emebildiğini açıklamaktadır. Geleneksel bir tekstil elyafı olarak yün, yüksek ısı yalıtım yeteneği, higroskopiklik, düşük yanıcılık, düşük yoğunluk, keçeleşme, mekanik mukavemet ve dayanıklılık gibi özellikleri nedeniyle değerlidir. Bu özellikler, teknik tekstillerin temsil ettiği teknik uygulamalarda kullanılabilir. Yün lifinin ana kimyasal bileşeni olan keratin, biyopolimerler ve biyo bazlı malzemeler için genel ilgi alanında rolünü oynayabilen bir proteindir (Rajabinejad ve ark., 2019).

KOYUN YÜNÜNÜN GÜBRE OLARAK DEĞERLENDİRİLMESİ

Yün hidrolizatının gübre, yün kompostu olarak uygulanması veya ham yünün gübre olarak kullanılması çeşitli araştırmalarda yer almıştır. Hidrolize yün, bitkiler için gübre kaynağı olarak (Nustorova ve ark., 2006) veya ağır metaller için bağlayıcı madde olarak (Evangelou ve ark., 2008) denenmiştir. Zheljzkov ve ark. (2005, 2008), kompostlaştırılmamış yünün bitki besin kaynağı olarak kullanılabilirliğini, dolayısıyla çiftçilere yetiştirdikleri ürünler için alternatif bir besin kaynağı sunabileceğini ve bu materyali atık alanlarından uzaklaştırabileceğini bildirmiştir. Azot açısından zengin bir kaynak olan yün, kompostlama için hammadde olarak da kullanılmıştır (Das ve ark., 1997; Plat ve ark., 1984; Verville, 1996) Kompostlanmış yün de nohut ve buğday gibi mahsul bitkileri için azot kaynağı olarak değerlendirilmiştir (Tiwari ve ark., 1989a, Tiwari ve ark., 1989b). Zheljzkov (2005) serada fesleğen, dikenli elma ve nane için ve tarlada bahçe adaçayı için gübre olarak yün ve kıl atıklarının kullanıldığı 14 haftalık sera ve 4 yıllık tarla çalışması tasarlamıştır. Sonuçlar yün ve kılların hem sera hem de tarla üretimi için yüksek değerli ürünler elde edilmesi adına iyi besin kaynakları olduğunu göstermektedir. Yün atıklarının toprağa bir kere eklenmesi adaçayı otu verimini önemli ölçüde arttırmıştır (işlenmemiş alanda 1295 kg/ha ile karşılaştırıldığında 3141 kg/ha), ancak yün atığı ile işlem görmüş saksılardaki uçucu yağ içeriği işlenmemiş alanlara göre daha düşük olmuştur. Bununla birlikte, uygulaması yapılan parsellerdeki genel uçucu yağ verimi, daha fazla ot verimi nedeniyle daha yüksek çıkmıştır. Saha çalışmaları, koyun yününün gübre olarak uygulanmasının, atık yün yönetiminin oldukça başarılı bir yolu olduğunu ve aynı zamanda yakınlarda yeterli miktarda ekilebilir arazi olması durumunda, aynı zamanda en ucuz yöntem olduğunu doğrulamaktadır. Nustorova ve ark. (2006) yün hidrolizatını hazırlamak için otoklavda alkalın hidroliz olan termokimyasal yöntemi kullanmıştır (atık yün 0,15 M KOH, 0,05 M NaOH ile karıştırılmış ve 120 °C'de 20 dakika ısıtılmıştır). Konsantre edilmiş, kurutulmuş ve öğütülmüş süpernatant toprağa farklı miktarlarda eklenmiştir. Çalışmada son ürün yalnızca %25 kısmen bozunmuş keratin ve %75-80 suda çözünebilir materyaller (amino asitler, peptitler, lipitler, karbonhidratlar, tuzlar, boyalar, potasyum iyonları) içermiştir. İlave edilen hidrolizat, çavdar otu büyümesi üzerinde faydalı etkiler göstermiştir. 160 gün sonra, en yüksek hidrolizat konsantrasyonuyla gübrelenen çavdar çimi, uzunluk olarak kontrole göre iki katından daha yüksek çıkmıştır. Sonuç olarak hidrolizat miktarının artmasıyla çimlenme yüzdesinde ve toprak mikroorganizmalarının (organik maddenin birincil ayrıştırıcıları) sayısında artış gözlemlenmiştir.

Atık yünün işlenmesi olanaklarından biri olan kompostlama; organik madde dönüşümü ve patojenlerin ve yabancı otların yok edilmesinden oluşan, çevre dostu ve temelde nispeten ucuz bir aerobik prosestir. Kompostlama, ham yünle gübrelemeden daha uygun olan etkili sanitasyondan kaynaklanmaktadır ve aynı zamanda organik atıkların stabilizasyonu ve organik gübre üretimi nedeniyle döngüsel tarımın büyük bir teşvikçisidir (Cáceres ve ark., 2018). Özellikle koyunların esas olarak et için yetiştirildiği bölgelerde düşük kaliteli veya dışkıyla kirlenmiş yün işlemenin bir seçeneği olarak kompostlama ayçiçeği ve mısır bitkileri üzerinde Teksas'ta test edilmiştir (Abdaah ve ark., 2019a). Bu çalışmanın amacı, yüksek kaliteli bir kompost üretmek için yün atıklarının diğer biyokütle ile uygun karışımının belirlenmesidir. Çalışmada atık yün, farklı ek karbon kaynakları (talaş ve kurutulmuş çim kırpıntıları) ve azot (at ahır atığı, yiyecek atığı ve su sümbülü) içeren 4 farklı karışım halinde kompostlanmıştır. Sonuçlar atık yünden elde edilen kompostun tarıma uygun olduğunu göstermiştir. En iyi hammadde bileşimi %25 (h/h) atık yün, %25 (h/h) at ahır atığı ve %50 (h/h) kurutulmuş çim kırpıntısı olarak belirlenmiştir. Bhavsar ve ark. (2016) atık yünün aşırı ısıtılmış su hidrolizini test etmiştir. İşlemde atık yün, 170 °C sıcaklıkta ve 7,0 bar basınçta doymuş buharla 60 dakika süreyle işlenmiştir. Çimlenme testi için seyreltilmiş hidrolizat kullanılmıştır. Tüm örneklerde çimlenme yüzdesinin %100 civarında olması yün hidrolizatının fitotoksik etki oluşturmadığını göstermektedir. 1 g/L konsantrasyonuna seyreltilen hidrolizat, kontrole kıyasla daha yüksek bir tohum çimlenme indeksi ve daha yüksek ortalama kök uzunluğu sonuçlarını vermiştir.

Güncel bir çalışmada atık koyun yünü ve alkali hidrolizatının şeker pancarı sürgün ve köklerinin büyümesi, besin konsantrasyonları ve şeker kalite parametreleri üzerindeki etkilerinin araştırılması amaçlanmıştır. Sürgün ve kök örnekleri, kök gelişimi aşamasından hasada kadar iki hafta aralıklarla toplanmıştır. Şeker pancarı köklerinin yaprak mineral element konsantrasyonları ve şeker kalite parametrelerindeki zamansal değişimleri belirlenmiştir. Atık koyun yünü uygulaması, şeker pancarının sürgün ve kök verimini önemli ölçüde artırmıştır. Kontrol ile karşılaştırıldığında dördüncü örneklemede yapraklardaki azot, kalsiyum ve magnezyum konsantrasyonları artmıştır. Ancak uygulamalar, özellikle hasat dönemine doğru yapraklardaki demir konsantrasyonunun yanı sıra köklerdeki şeker içeriği ve beyaz şeker içeriğinde de önemli bir azalmaya neden olmuştur. Diğer taraftan yapraklarda sürgün ve kök gelişimi ile azot, kalsiyum ve magnezyum oranlarındaki belirgin artış, bu atıkların şeker pancarı üretiminde gübre ekonomisi sağlayacağını göstermiştir (Akca ve ark., 2023). Koyun yününden üretilen gübrenin killi tın tekstürlü toprağın bazı

biyokimyasal özelliklerine etkisinin belirlenmesi amacıyla yürütülen bir başka güncel çalışmada koyun yünü gübresi (KWM) toprağa 0, 0,5, 1,0, 1,5, 2,0, 2,5, 3,0, 4,0 ve 5,0 t da⁻¹ oranlarında eklenmiştir. Araştırma sonuçlarına göre toprakların pH, tuzluluk, organik madde içeriği, potasyum (K), sodyum (Na), demir (Fe), manganez (Mn), çinko (Zn) ve bor (B) konsantrasyonları artmıştır. Diğer elementlerin (fosfor (P), kalsiyum (Ca), magnezyum (Mg), bakır (Cu) içerikleri değişmemiştir. Ayrıca artan dozlarda uygulanan koyun yünü gübresinin toprağın bazı biyolojik özelliklerine olumlu etkisi istatistiksel olarak anlamlı çıkmıştır. Çalışma sonucunda koyun yünü gübresi dozu arttıkça toprağın havalanması ve su tutma kapasitesinin de arttığı bildirilmiştir (Karaca ve ark., 2023). Dağ koyunlarından elde edilen kaba yünün ekonomik değeri düşüktür ve koyun yetiştiriciliğinin zahmetli bir yan ürünü olarak değerlendirilir. Bundan yararlanmanın yollarını bulmak için yürütülen bir çalışmada koyunların kırılması sırasında daha kaliteli yünlerden ayrılan atıklar, kışlık buğday ekiminde gübre olarak kullanılmıştır. Yapılan ön testlerde yıkanmamış yünün aşırı miktarda ağır metal ve çevreye zararlı kirleticiler içermediği ve gübre olarak güvenle kullanılabileceği belirtilmiştir. Aynı çalışmada ham yün daha kısa parçalar halinde kesilip toprağa karıştırılarak iki mevsim kışlık buğday büyümesine etkisi araştırılmıştır. Eş zamanlı olarak yünün biyolojik parçalanmasının ilerleyişi ve topraktaki azot içeriği analiz edilmiştir. Azot bileşiklerinin yavaşça toprağa salındığı ve topraktaki azot içeriğinin yünün biyolojik parçalanmasının ilerlemesiyle sıkı bir şekilde ilişkili olduğu belirtilmiştir. Serbest bırakılan azot, buğday büyümesini çeşitli aşamalarda olumlu yönde etkilemiş, bu da daha yüksek kardeşlenme derecesi, daha yoğun yaprak rengi, daha yüksek saplar ve son olarak daha yüksek verim ile kendini göstermiştir. Çalışma sonucunda dağ koyunu yününün, organik tarımda azot açısından zengin organik gübre olarak başarıyla kullanılabileceği bildirilmiştir. Ayrıca bu durumun tekstil işlemeye uygun olmayan kaba yünlerin sıfır atık stratejisine göre değerlendirilmesine olanak sağladığı sonucuna varılmıştır (Broda ve ark., 2023)

SONUÇ

Koyun yünü bitkiler için gübre olarak değerlendirilebilir. Yapılan araştırmalar organik gübre üretimi açısından koyun yününün etkili bir azot kaynağı olarak kullanım olasılığına sahip olduğunu göstermektedir. Yün üretiminin ekonomik, sosyal ve çevresel sürdürülebilirliğini artırmak için, atık yünün toprak düzenlemelerinde ve peyzaj düzenlemelerinde kompost haline getirilmesi, üreticilere ek gelir sağlayabilir ve koyun yetiştiricisi topluluklara yaşam döngüsünün her bölümünün değeri açısından gurur kaynağı olma potansiyeline sahiptir.

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Özet

Hidrofilik ve kristal özelliklere sahip, sert yapıya sahip doğrusal bir amino polisakkarit olan kitosan, yaygın olarak kullanılan ve kitinin deasetilasyonunun doğal ve güvenli bir ürünüdür. 1980'lerin sonlarında kitosanın endüstriyel miktarlarda bulunması tarımda test edilmesini sağlamıştır. Amino gruplarının varlığı ile kitosan diğer bileşiklerle kompleks oluşturabilmekte ve bitkilerin damar sistemine girerek metabolik-fizyolojik yolların aktivasyonuna yol açabilmektedir. Bu polimerik bileşik diğer doğal polimerlerle bağlanarak gübre ve besin elementleriyle kombinasyon halinde bir yandan bitkinin besin ihtiyacını karşılarken, diğer yandan toprak dokusunun iyileştirilmesine de yardımcı olmaktadır. Kabuklu hayvanların (yengeç, ıstakoz, karides, istiridye vb.) dış iskeletinden, böceklerin kütiküllerinden, mantarların hücre duvarlarından ve bazı alglerden elde edilen kitosanın onlarca yıldır biyotik özellikler ve özellikle de anti-mikrobiyal özellikler sergilediği bilinmektedir. Bu çalışmada kitosan ile ilgili genel bilgiler ve tarla bitkilerinde kitosan uygulamaları ile yapılan çalışmalar araştırılmıştır.

Anahtar Kelimeler: Kitosan, Kitin, Tarla bitkileri, Organik gübre

USE OF CHITOSAN AS A BIOSTIMULANT

Abstract

Chitosan, a linear amino polysaccharide with a rigid structure with hydrophilic and crystalline properties, is a widely used, natural and safe product of chitin deacetylation. Testing of chitosan in agriculture was made possible in the late 1980s when it became available in industrial quantities. With the presence of amino groups, chitosan can form complexes with other compounds and enter the vascular system of plants, leading to the activation of metabolic-physiological pathways. This polymeric compound binds with other natural polymers and, in combination with fertilizers and nutrients, meets the nutritional needs of the plant and helps improve the soil texture. It has been known for decades that chitosan, obtained from the exoskeleton of crustaceans (crabs, lobsters, shrimps, oysters, etc.), cuticles of insects, cell walls of fungi and some algae, exhibits biotic properties and especially anti-microbial properties. In this study, general information about chitosan and studies on chitosan applications in field crops were investigated.

Keywords: Chitosan, Chitin, Field crops, Organic fertilizer

Giriş

FAO'ya göre, dünya nüfusu artmaya devam ettikçe genel gıda talebi 2030 yılına kadar en az %60 artacaktır. Bugün itibariyle 800 milyondan fazla insan yetersiz beslenmektedir. Et ve süt ürünleri gibi yüksek kaynaklı gıdalara olan talebin daha da hızlı ve yaklaşık olarak %70 oranında artacağı öngörülmektedir (Heyes, 2023). Büyüyen bir küresel nüfusu, öngörülen sosyo-ekonomik statüyle beslemek, ek kalori ve özellikle daha fazla protein kaynakları gerektirmektedir (Messina, 2022). Araştırmacılar, dünya nüfusunun ve mevcut büyüme oranının artması ile birlikte önemli ölçüde biyolojik çeşitlilik kaybı ve gıda tükenmesi problemlerinin oluşacağını bildirmektedir. Ayrıca bitki hastalıkları da biyolojik çeşitlilik kaybına ve besin tükenmesine yol açan faktörlerdendir (Saberri Riseh ve ark., 2004a; Saberri Riseh ve ark., 2004b).

Gelişmekte olan büyük ülkelerde maddi yönden artan zenginlik ve enerji üretimi için tarımsal kaynakların çeşitlendirilmesi, tarımsal kaynaklara olan talebi büyük ölçüde artırmaktadır (Lagzian ve ark., 2013). Kuraklık ve şiddetli iklim değişikliği tarımsal üretimi ve verimliliği tehdit eden temel sorunların başında gelmektedir. Yüksek sıcaklıklar ve karbondioksit seviyelerinin toprak nemi, su bulunabilirliği ve besin seviyeleri diğer kritik performans koşulları üzerinde büyük etkisi bulunmaktadır (Baradar ve ark., 2015). Kimyasal gübrelemenin bitki, toprak ve çevreye olan olumsuz etkileri her geçen gün daha çok kendini göstermektedir. Bu sebeplerden dolayı araştırmacılar ve üreticilerin organik gübreleme yöntemlerine yönelimleri gün geçtikçe daha çok artmaktadır. Organik gübreleme, çevreye istenmeyen bir etki oluşturmadan bitkilerin besin gereksinimlerini karşılamak için çok önemli bir yöntemdir (Amanullah ve ark., 2007; Menon ve ark., 2010; Adeoye ve ark., 2011). Ayrıca, özellikle yeni ıslah edilen toprakların fiziksel ve kimyasal koşullarını iyileştirmek için önemli miktarlarda organik madde uygulanması gerekmekte ve bu amaçla organik gübre kullanımına önem verilmelidir (Bilalis ve ark., 2005; Mohmoud ve Salem, 2005). Organik gübreler, kimyasal gübrelerin yerine güvenli, ucuz ve çevre dostu bir alternatif olarak kullanılabilir (Ahmed ve Elzaawely, 2010).

Organik gübrelemeler birçok farklı şekilde yapılmaktadır. Bunlardan bir tanesinde kitosan uygulamasıdır. Kitosan, kitinin deaktilyasyonundan elde edilen doğal bir polimer olup, gıda işleme sırasında ortaya çıkan kabuklu deniz hayvanı atıklarından kolaylıkla elde edilebilmektedir (El-Tanahy ve ark., 2012). Kitosan, hidrofilik ve kristal özellikte, sert yapıya sahip doğrusal bir amino polisakarittir (Zargar ve ark., 2015). Doğada yaygın olarak biyopolimer olarak bulunan kitosan,

polisakkaritler içerisinde oldukça önemli bir yere sahiptir. Erişilebilir doğal polimer olan kitosan, bitkiler için hem gübre hem de kaplama görevi görerek besinlerin raf ömrünü uzatabilmektedir. Kitosan, biyoyoumluluğu ve biyolojik olarak parçalanabilirliği ile bitkinin savunma mekanizmasını güçlendirmede, büyüme uyarıcı, antimikrobiyal ajan ve toprak yumuşatıcı olarak potansiyel ve yüksek verimli bir faktör olarak görev yapmaktadır. Ayrıca kitosan, su verimliliğini artırmakta, besin maddelerinin taşınması ve ağır metallerin uzaklaştırılması için bir taşıyıcı görevi görmektedir (Pandey ve Verma, 2018; Pal ve ark., 2021; Jakhar ve ark., 2022). Kitosan, hücresel DNA ile etkileşime girerek bitkide birçok biyokimyasal-fizyolojik-moleküler reaksiyon oluşturabilmekte ve bitkinin dış etkenlere karşı savunma mekanizmasını harekete geçirebilmektedir (Riseh ve ark., 2023).

Yengeç, ıstakoz, karides, istiridye gibi kabuklu deniz ürünleri, deniz kabuklularının işleme atıkları ve karides işleme endüstrilerinden elde edilen kalamar kabuğu atıkları kitosan üretimi için ana kitin kaynaklarıdır (Nag ve ark., 2022; Kou ve ark., 2021). Genel olarak deniz kabuklularının kabuğu, protein ve kalsiyum karbonat ile birlikte yaklaşık %15-40 oranında kitin (kuru ağırlık) içermektedir (Iber ve ark., 2022; Suryawanshi ve ark., 2020; Çelikçi ve ark., 2020). Deniz kabuklularının kabuk atıkları ağırlıkça %30-50 kalsiyum karbonat ve %20-30 kitinden oluşmaktadır (Kh ve ark., 2019). Genel olarak değerlendirildiğinde, deniz kabuklularının dış iskeletleri ve kabukları %60-75 oranında kitin içermektedir (Zou ve ark., 2021). Kitosan bitkiler için karbon (%47,9-54,4), oksijen (%30,19-42,3), azot (%5,8-7,6) ve fosfor (%3,4-6,1) açısından bol miktarda besin kaynağı görevi görmektedir (Prajapati ve ark., 2022). Kitosan, amino grupları ve diğer bileşiklerle kompleks oluşturabilmektedir. Bu polimerik bileşik diğer doğal polimerlerle bağlanarak gübre ve besin elementleriyle kombinasyon halinde bir yandan bitkinin besin ihtiyacını karşılarken diğer yandan toprak dokusunun iyileştirilmesine yardımcı olmaktadır. Yeni nesil gübre olarak kitosan nanomateryalleri, besin maddelerinin bitkilere yavaş, kontrollü ve hedefli bir şekilde iletilmesi yoluyla bitki bağışıklık sistemini güçlendiriciler olarak işlev görmektedir (Riseh ve ark., 2023).



Şekil 1. Kitin ve kitosanın ana kaynakları (Riseh ve ark., 2023).

Kitosan toprağa uygulandığında topraktaki *Bacillus*, *Pseudomonas fluorescens*, *Actinomyces*, *Mycorrhiza* ve *Rhizobacteria* gibi faydalı olan mikroorganizmaların aktivitesini tetikleyerek, rizosferdeki zararlı bitki patojenlerine karşı mikrobiyal dengeyi değiştirmektedir. Ayrıca kitosan, toprak kaynaklı patojenlere karşı bitkide savunma yanıtlarını artırmaktadır (Bell ve ark., 1998; Murphy ve ark., 2000). Kitosan çeşitli uygulamalar ile tarımsal araştırmacılara yardımcı olabilir ve çeşitli alanlara entegrasyonu ile ideal ve etkili bir seçenek haline gelmiştir (Riseh ve ark., 2023).

KİTOSAN İLE İGİLİ YAPILAN ÇALIŞMALAR

Kitosan kaplı kompoze gübre (CCCF) bünyesinde çok önemli antibakteriyel özellikler barındırmaktadır (Meng ve Wang, 2009). Amborab'e ve ark., (2008) CCCF uygulamasının redoks ve adsorpsiyon yoluyla kök sızıntılarını azaltabildiğini bildirmiştir. Asuming-Brempong ve ark., (2008) ise CCCF uygulamasının katalaz aktivitesini arttırdığını, toprak patojenlerini inhibe ettiğini, bitki stresini, hastalık direncini ve toprağın mikrobiyal çeşitliliğini iyileştirdiğini bildirmişlerdir. Ek olarak CCCF uygulaması aynı zamanda sürekli ekim yapılan tarlalarda besin maddelerinin biyoyararlanımını ve bazı faydalı bakterilerin (*Proteobakteriler*, *Bacteroides*, *Planctomyces*) popülasyonunu arttırdığını, toprağın ekolojisini de iyileştirebildiğini bildirmişlerdir (Ma ve diğerleri, 2013).

Qaisi ve ark., (2022), çemen bitkisine uyguladıkları kitosan ve biyoçar uygulamalarının bitkide tohum verimi, bitki bakla sayısı, tohum kapsül sayısı, bitki boyu, bakla uzunluğu, bitki başına dal sayısı ve bitki başına yaprak sayısına etkilerini araştırmışlardır. Çalışma sonucunda uygulamaların bitkiye olumlu yönde etki ettiği sonucuna varmışlardır. Zayed ve ark., (2017), tuz stresi koşullarında yetiştirilen fasulye bitkisinde kitosan nanopartiküllerinin çimlenme ve fide büyüme parametreleri üzerine etkilerini araştırdıkları çalışmada kitosan uygulamasının bitkilerde çimlenme ve fide büyümesini olumlu yönde ettiğini bildirmişlerdir. Kitosan nanopartikülleri, bitki büyüme hormonları için bir taşıyıcı sistem olarak kullanılabilir. Giberellik asit ile birlikte uygulanan kitosan nanopartikülleri fasulye bitkisinde yaprak alanını genişleterek klorofil seviyesini önemli ölçüde artırmıştır (Pereira ve ark., 2017). Kitosan ile nemlendirilmiş yer fıstığı tohumlarında ise çimlenme oranında, ATP sentezinde, lipaz aktivitesinde, giberellik asit ve IAA seviyelerinde artış olduğu bildirilmiştir (Zhou ve ark., 2002).

Costales-Menéndez ve ark., (2018), aşılınmış soya fasulyesinde kitosan uygulamasının toprağa ve yaprağa uygulamalarının bitkide nodül sayısı ve kuru nodül ağırlığı, çiçek sayısı, bitki boyu, yaprak alanı ve bitkilerdeki nitrojen konsantrasyonu zerine etkilerini incelemişlerdir. Çalışmada her iki uygulama yönteminin (toprağa ve yaprağa uygulama) bitkide bu özelliklere fayda sağladığı ve bitki verimini arttırdığı bildirilmiştir. Bir başka çalışmada ise arpa bitkisinde su stresi altında DAP gübresi ile kitosan uygulamasının verim ve verim öğeleri üzerine olan etkileri araştırılmıştır. Araştırma sonucunda elde edilen verilere göre tanede en yüksek protein (%12,6) ve nişasta (%62,3) oranı 100 kg/ha DAP gübre uygulaması ile birlikte 10 g/l kitosan uygulamasından elde edilmiştir. Aynı çalışmada en yüksek tane verimi, başak sayısı ve başakta tane sayısı 10 g/l kitosan ile yapraktan yapılan uygulama ile elde edilmiştir (Al-Tawaha ve ark., 2020).

Biyoaktif metabolitlerin üretimi için kabuklu hayvan kabuğunun mikrobiyal ayrışması ve gübreleme potansiyelinin araştırıldığı bir diğer çalışmada ise nohut ve bezelye bitkisinde karides ve yengeç kabuğu tozu kullanılmıştır. Elde edilen sonuçlara göre fermente hidrolizat edilmiş kabuklu hayvan kabuklarının (Kitosan) bitkilerin kök ve gövde uzunluklarını, klorofili, hücresel RNA'yı, protein içeriğini ve toplam nitrojen, magnezyum, kalsiyum, fosfor ve potasyum gibi toprağın fiziko-kimyasal parametrelerini önemli ölçüde iyileştirdiği ortaya çıkmıştır (Pal ve ark., 2020). Ayrıca kitosan uygulamasının toprakta serbest yaşayan Rhizobium ve fosfat çözen bakterilerin çoğalmasını arttırdığı ve PGPR ile uygulanmasının bitkinin morfo-fizyolojik

özelliklerini, toprağın fiziko-kimyasal özelliklerini ve mikrobiyal özelliklerini önemli ölçüde etkilediği sonucuna varılmıştır.

SONUÇ

Tarım arařtırmacıları geleneksel olan kimyasal gübrelemenin çevre üzerindeki zararlı etkilerini azaltmanın yollarını arařtırmaktadır. Tarım uygulamalarında kitosanın gübre olarak kullanılma, bitki büyümesini destekleme, toprak sağılığını iyileřtirme ve hastalıklara karşı direnci artırma potansiyeli nedeniyle giderek daha fazla ilgi çekmektedir. Biyo-bozunurluęa ve çevreyle uyumluluęa sahip kitosan bazlı yeni nesil gübreler, besin olarak kullanılan bitkilerin verimliliğini arttırmaya ve çevre kirliliğini azaltmaya yardımcı olabilmektedir. Kitosan, benzersiz bir biyopolimer olarak, gıda üretimi ve korunmasının yanı sıra sürdürülebilir tarım uygulamalarının geliştirilmesinde umut verici bir geleceęe sahiptir. Arařtırmacıların kitosan uygulamasının çeřitli bitkilerde kullanımı hakkında daha detaylı çalışmalar yaparak bilime katkıda bulunmaları gerekmektedir.

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PLANT GROWTH PROMOTING BACTERIA AS BIO-INSECTICIDES IN SUSTAINABLE AGRICULTURE

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Abstract

Plant Growth-Promoting Bacteria (PGPB) are a promising tool in sustainable agriculture, serving as biofertilizers and biocontrol agents. They promote plant growth through various mechanisms, such as the production of plant hormones, nitrogen fixation, and the solubilization of inorganic phosphate. Additionally, they can act as biocontrol agents against plant diseases and pests, reducing the need for chemical pesticides. Research suggests that the use of microbial consortia, rather than single strains, may enhance the effectiveness of PGPB as bio-insecticides and biofertilizers in agricultural practices. This approach aligns with the growing interest in biological-based organic fertilizers as an alternative to agrochemicals in sustainable agriculture. This review aims to inside the current status of PGPB-based bio-insecticides, challenges and prospects.

Keywords: Beneficial bacteria, plant disease, eco-friend, plant pathogen, sustainable agriculture

Introduction

Plant growth promoting bacteria (PGPB) are beneficial microorganisms that can colonize the roots and rhizosphere of plants (Ramakrishna et al., 2019). These bacteria can enhance plant growth and development by various mechanisms, such as nitrogen fixation, phosphate solubilization, production of growth hormones, and biocontrol of pathogens (Glick, 2020). Moreover, PGPB might be used as a plant-protection bio-material to various biotic and abiotic stress factors due to different superior mechanisms including ACC deaminase activity, siderophore and indole acetic acid (IAA) production, secreting hydrolytic enzymes, ammonia and hydrogen cyanide (Kumar et al., 2020; Abdelaal et al., 2022; Gupta et al., 2022; Orozco-Mosqueda et al., 2020; Triantafyllou et al., 2023). In recent years, there has been a growing interest in harnessing the power of PGPB for sustainable agriculture, particularly in the development of bio-insecticides. So, bacterial bio-pesticides, fungal bio-pesticides, viral bio-pesticides, predator bio-pesticides and other bio-pesticides represent 74%, 10%, 5%, 8% and 3% of the market, respectively (Thakore, 2006). This review aims to insight into versatile and sustainable properties of bio-insecticides derived from PGPB and prospects.

How PGPB Can Be Used as Bio-Insecticides

Bio-insecticides are a safer and more environmentally friendly alternative to chemical insecticides (Siegwart et al., 2015). They are derived from natural sources, such as plants, animals, and microorganisms. PGPBs have shown great potential as bio-insecticides due to their ability to produce antimicrobial compounds and induce systemic resistance in plants (Ruiu, 2020). These bacteria can effectively control a wide range of pests, including insects, nematodes, and mites, without causing harm to non-target organisms or the environment (Jamal and Ahmad, 2022).

PGPB-based bio-insecticides work by colonizing the plant roots and stimulating the plant's defense mechanisms. They produce secondary metabolites that are toxic to pests or interfere with their life cycle. Additionally, PGPB enhances the plant's nutrient uptake and overall health, making it more resilient to pest attacks (Singh et al., 2017; Tariq et al., 2022). This sustainable approach not only protects the crops but also promotes the overall health and productivity of the plants.

Advantages of Using PGPB as Bio-Insecticides in Sustainable Agriculture

The use of PGPB as a bio-insecticide offers several advantages in sustainable agriculture. Firstly, these bio-insecticides are non-toxic to humans, animals, and beneficial insects, ensuring the preservation of biodiversity (Ahirwar et al., 2019). Unlike chemical insecticides, PGPBs do not

leave harmful residues in the environment or contaminate water sources. Secondly, PGPB-based bio-insecticides are highly specific in their action, targeting only the pests they are intended to control (Siegwart et al., 2015). This reduces the risk of developing pest resistance, which is a common problem with chemical insecticides. By using PGPB, farmers can effectively manage pest populations while minimizing the need for repeated applications. Additionally, PGPB promotes overall plant health and growth, leading to increased crop yields. These bacteria enhance nutrient uptake, improve soil structure, and protect plants from various diseases (Kisvarga et al., 2023). By improving the plant's resilience, PGPB-based bio-insecticides contribute to the long-term sustainability of agricultural systems.

The Role of PGPB in Biological Control of Pests

Biological control is a sustainable and environmentally friendly approach to pest management. PGPB plays a crucial role in biological control by directly antagonizing pests or indirectly inducing plant defenses against them. These bacteria produce antimicrobial compounds, such as antibiotics and enzymes, that can kill or inhibit the growth of pests (Boro et al., 2022).

Furthermore, PGPB can trigger systemic acquired resistance (SAR) in plants. SAR is a defense mechanism that allows plants to respond rapidly and effectively to pathogen attacks (Choudhary et al., 2007). When PGPB colonizes the roots, they activate the plant's immune system, making it more resistant to pest infestations. This systemic protection lasts for an extended period, providing long-term pest control. The ability of PGPB to modulate the plant's immune response and produce bioactive compounds makes them valuable allies in the biological control of pests (Brock et al., 2013; Mishra et al., 2023). By harnessing the power of these bacteria, farmers can reduce their reliance on chemical insecticides and promote a more sustainable approach to pest management.

Types of PGPB Commonly Used in Bio-Insecticides

Several types of PGPB have been widely used in the development of bio-insecticides. One of the most commonly used groups is the rhizobacteria, which include genera such as *Bacillus*, *Paenibacillus*, *Brevibacillus*, *Pseudomonas*, *Burkholderia*, *Serratia*, and *Streptomyces* (Grady et al., 2016; Anderson and Kim, 2018; Ghazanchyan et al., 2018; Pagani et al., 2023). These bacteria have various mechanisms against pests including antibiotic and antimicrobial compounds or effective enzymes that damage pests. General antibiotic and antimicrobial compounds that are secreted by PGPB strains against pests are hydrogen cyanide, amphisin, oomycin A, 2,4-diacetylphloroglucinol (DAPG), phenazine, pyoluteorin, polymyxin, pyrrolnitrin, tropolone,

tensin, oligomycin A, cyclic lipopeptides, zwittermicin A and kanosamine. In addition, effective enzymes secreted by PGPB to pests are ACC-deaminase, chitinases, beta-glucanases and proteases (Ruiu, 2020).

Another group of PGPB commonly used in bio-insecticides is the entomopathogenic bacteria. These bacteria are pathogenic to insects and can kill them directly through the production of toxins or by causing infections. Examples of entomopathogenic bacteria include *Bacillus thuringiensis*, *Photorhabdus luminescens*, *Brevibacillus laterosporus*, *Chromobacterium subtsugae* and *Yersinia entomophaga* (Ruiu et al., 2013). Additionally, some PGPBs belong to the group of mycorrhizal fungi. These fungi form a symbiotic relationship with plant roots, enhancing nutrient uptake and promoting plant growth. They can also indirectly affect pest populations by improving plant resistance (Ipsilantis et al., 2012; Kumar 2018).

Methods of PGPB Applications as Bio-Insecticides

There are several methods for applying PGPB as bio-insecticides in agricultural systems (Reed and Glick, 2013; Kordatzaki et al., 2022). One common approach is seed treatment, where the PGPB is applied directly to the seeds before planting. This allows the bacteria to colonize the developing roots and establish a beneficial relationship with the plants from the early stages of growth and this method was described as bio-priming (Ceritoğlu et al., 2021; Chakraborti et al., 2022; Erman et al., 2022). Another method is foliar spray, where the PGPB is applied as a suspension to the leaves of the plants. This method is particularly effective for controlling pests that feed on the above-ground parts of the plants, such as aphids and caterpillars. Foliar spray ensures direct contact between the bacteria and the pests, maximizing their biocontrol potential (Preininger et al., 2018; Santos et al., 2021). In some cases, PGPB can also be applied through soil drenching or irrigation. This method allows the bacteria to reach the plant roots and establish a beneficial relationship with the plants. Soil drenching is particularly effective for controlling soil-borne pests, such as nematodes and root-feeding insects (Triantafyllou et al., 2023).

Challenges and Limitations of Using PGPB as Bio-Insecticides

While PGPB-based bio-insecticides offer many advantages, there are also challenges and limitations to their use. One challenge is the variability in efficacy among different strains of PGPB. Not all strains have the same ability to control pests or promote plant growth. Therefore, it is important to select and optimize the strains for specific agricultural systems and target pests. Another challenge is the compatibility of PGPB with other agricultural inputs, such as chemical

fertilizers and pesticides. Some pesticides may have negative effects on the survival and activity of PGPB, limiting their effectiveness as bio-insecticides. It is crucial to consider the interactions between PGPB and other inputs to ensure their compatibility and maximize their biocontrol potential. Furthermore, the formulation and delivery of PGPB-based bio-insecticides can be challenging. The bacteria need to be delivered to the target site in a viable and effective form. The formulation should protect the bacteria from environmental stresses, such as temperature and UV radiation, and ensure their survival and colonization on the plant roots. Additionally, the cost of production and application of PGPB bio-insecticides can be a limiting factor for their widespread adoption. The development and commercialization of these bio-insecticides require significant investment in research, production facilities, and field trials. However, as the demand for sustainable agricultural practices grows, the cost-effectiveness of PGPB-based bio-insecticides is expected to improve.

CONCLUSION

Harnessing the power of PGPB as bio-insecticides offers a sustainable approach to pest management in agriculture. PGPB-based bio-insecticides provide effective control of pests while promoting plant growth and overall health. These bio-insecticides are non-toxic, specific in their action, and do not leave harmful residues in the environment. The successful implementation of PGPB bio-insecticides in agriculture has been demonstrated through various case studies. These bio-insecticides have shown promising results in controlling pests, improving plant resistance, and increasing crop yields. By adopting PGPB-based bio-insecticides, farmers can reduce their reliance on chemical insecticides, protect the environment, and promote sustainable agricultural practices. While there are challenges and limitations to the use of PGPB as bio-insecticides, ongoing research is addressing these issues. The identification of novel PGPB strains, development of innovative formulations, and understanding of their mechanisms of action are contributing to the improvement and practicality of PGPB-based bio-insecticides. In conclusion, embracing sustainable agriculture with PGPB bio-insecticides is a step towards a greener and more environmentally friendly future. By harnessing the power of beneficial bacteria, we can protect our crops, preserve biodiversity, and promote the long-term sustainability of agricultural systems.

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**YENİ FİTOHORMON STRİGOLAKTONLAR VE ASMADA (*Vitis vinifera* L.)
KÖK MİMARİSİNİ DÜZENLEMEDEKİ ROLLERİ**

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Özet

Önemli bitki büyüme düzenleyicileri olan fitohormonlar, kök büyüme ve gelişme süreci üzerinde oldukça etkilidir. Küçük bir terpenoid sınıfı olan strigolaktonlar (SL'ler), bitkilerde her yerde bulunan yeni bir fitohormon olarak kabul edilmiştir. Günümüzde SL'lerin biyosentezi, sinyal iletim mekanizması ve fizyolojik etkilerinin çözülmesi bakımından büyük ilerlemeler kaydedilmiştir. SL'ler sürgün dallanmasını, gövde kalınlaşmasını, yaprak yaşlanmasını, adventif kök oluşumunu, primer ve lateral kök gelişimini, kök tüylerinin uzamasını, bitki toprak mikroorganizmaları arasındaki simbiyotik ilişkiyi teşvik ederler. Son yıllarda, SL aracılı kök gelişiminde oksin, sitokin ve etilen arasındaki hormonal etkileşim, beslenme durumu ve arbusküler mikorizal funguslarla (AMF) simbiyotik ilişkiler gibi çok çeşitli faktörlerin rol oynadığı ortaya çıkmıştır. SL'lerin sentetik bir analogu olan GR24, en yüksek aktiviteye sahip olup en yaygın kullanılanıdır. Kökler bitkilerin en önemli vejetatif organlarından olup, topraktan su ve besin maddelerinin almasının yanında amino asitleri, hormonları ve diğer bileşikler de sentezlerler. Kök büyümesi ve gelişmesi, su ve besin maddelerinin emilim verimliliğini büyük ölçüde belirlediği için ürün kalitesini doğrudan etkiler. Bu çalışmada SL'lerin asma bitkisi özelinde kök mimarisini düzenlemedeki rolleri literatür ışığında derlenmiştir. Yapılan çalışmaların sonucunda ise SL'lerin diğer içsel hormonların içeriğini de etkileyerek asma kök mimarisini önemli ölçüde değiştirdiği söylenebilir.

Anahtar kelimeler: *Vitis vinifera* L., fitohormon, strigolaktonlar, GR24, kök sistemi ve gelişimi

**NEW PHYTOHORMONE STRIGOLACTONES AND THEIR ROLE IN
REGULATION OF ROOT ARCHITECTURE IN GRAPEVINE (*Vitis vinifera* L.)**

Abstract

Phytohormones, which are important regulators of plant growth, have a significant effect on the process of root growth and development. Strigolactones (SLs), a small class of terpenoids, are considered a new phytohormone widely present in plants. In recent times, significant progress has been made in understanding the biosynthesis, signal transduction mechanism, and physiological effects of SLs. SLs promote shoot branching, stem thickening, leaf aging, adventitious root formation, primary and lateral root development, root hair elongation, and the symbiotic relationship among plant soil microorganisms. In recent years, various factors such as the hormonal interaction between auxin, cytokinin, and ethylene in SL-mediated root development, nutritional status, and symbiotic relationships with arbuscular mycorrhizal fungi (AMF) have been identified. GR24, a synthetic analog of SLs, is the most widely used and exhibits the highest activity. Roots are crucial vegetative organs of plants, responsible for absorbing water and nutrients from the soil, as well as synthesizing amino acids, hormones, and other compounds. Since root growth and development significantly determine the efficiency of water and nutrient absorption, they directly influence product quality. This study reviews the roles of SLs in regulating root architecture by focusing on grapevines in light of the literature. The results of these studies suggest that SLs significantly alter grapevine root architecture by affecting the content of other internal hormones.

Keywords: *Vitis vinifera* L., phytohormone, strigolactones, GR24, root system and development

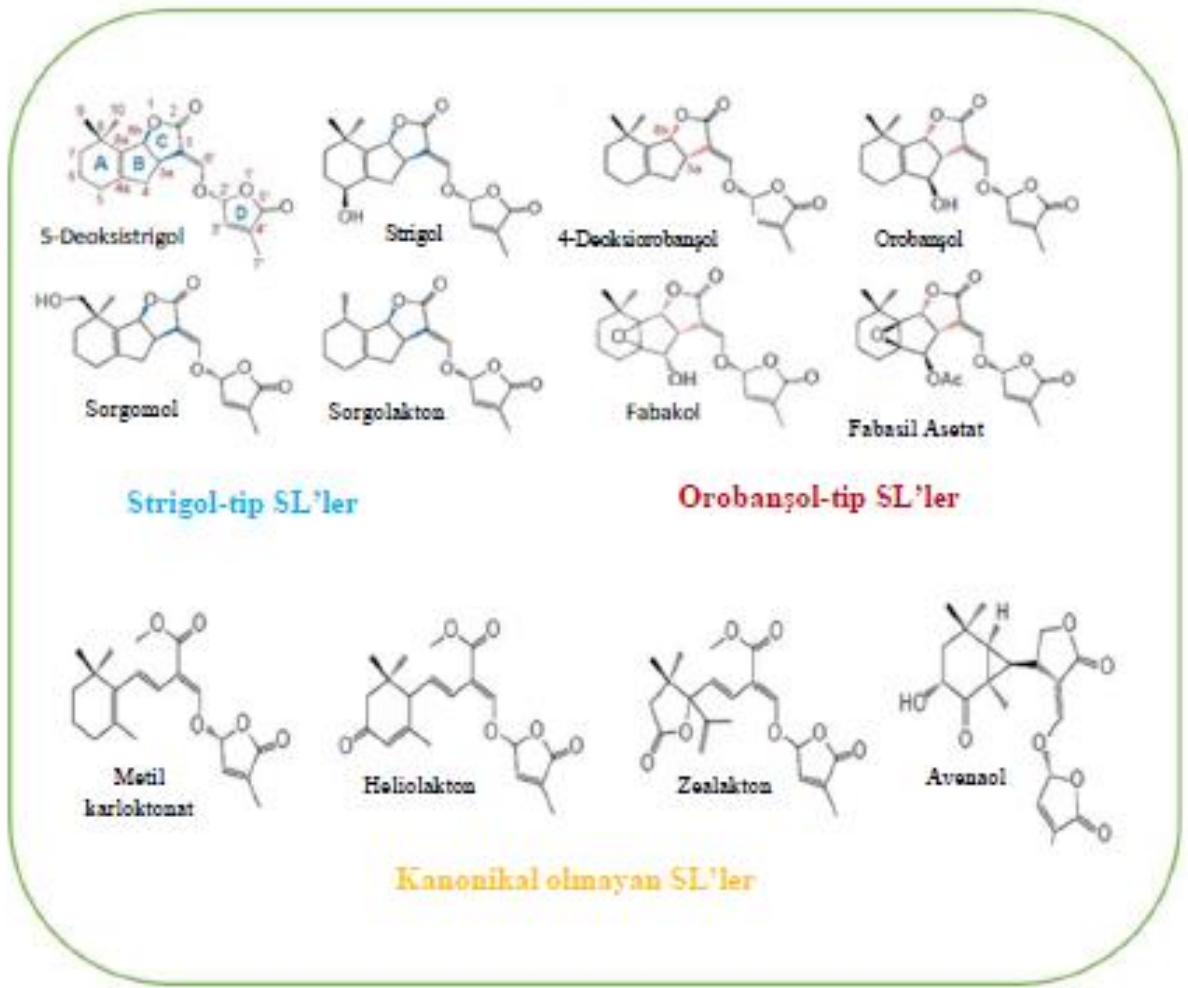
Giriş

Bitki hormonları veya fitohormonlar, bitkilerdeki hücrel ve fizyolojik süreçleri düzenleyen ve düşük konsantrasyonları ile etkili olan organik bileşiklerdir. Bu bileşikler, bitkilerin büyümesini, gelişmesini ve çevresel streslere tepki vermesini düzenleyen anahtar moleküllerdir. Klasik fitohormonlar; oksinler, sitokinler, gibberellinler, absisik asit ve etilendir. Ayrıca brassinosteroidler, poliaminler, salisilik asit, hücreden hücreye sinyalleşmede rol oynayan peptitler ve strigolaktonlar da etki mekanizmaları nedeniyle yeni tip fitohormonlar olarak kabul edilir (Kang, 2017).

Strigolaktonlar (SL'ler), başlangıçta *Striga* (cadı otu) ve *Orobanch* (canavar otu) parazit türlerinin tohumlarının çimlenmesini sağlayarak parazitin konakçı bitkiye bağlanmasına neden olan bileşikler olarak tanımlanmıştır (Cook vd., 1966). İlk SL türevi olan Strigol'un kimyasal yapısı 1972 yılında belirlenebilmiş (Cook vd., 1972), yapısının anlaşılması ise 1985 yılına kadar sürmüştür (Brooks ve ark., 1985). İsim babası Larry Butler olup, cadı otunun cins ismi *Strigo* ve kimyasal yapısındaki lakton kelimeleri bir araya getirilmiştir (Butler, 1995).

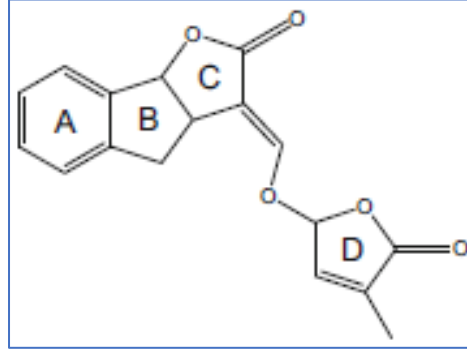
SL sinyallerinin bitkilerde uzun mesafelerde hareket etmesi, bitki büyüme ve gelişme mimarisini kontrol etmesi ve strese yanıt vermede bitki için hayati öneme sahip olması nedeniyle 2008 yılında yeni sınıf fitohormonlar olarak tanımlanmıştır (Gomez-Roldan ve ark., 2008; Umehara ve ark., 2008). Üzerinde yoğun araştırmalar yapılan SL'lerin, sürgün dallanmasını, yaprak yaşlanmasını, gövde kalınlaşmasını, primer ve lateral kök gelişimini, kök tüylerinin uzamasını, adventif kök oluşumunu ve bitki toprak mikroorganizmaları arasındaki simbiyotik ilişkiyi teşvik ettikleri bildirilmiştir (Umehara ve ark., 2008; García Garrido vd., 2009; Umehara, 2011; Smith, 2014; Al Babili ve Bouwmeester, 2015; Ueda ve Kusaba, 2015; Kopta vd., 2017; Waters vd., 2017).

Doğal strigolaktonların genel yapısı A, B, C ve D olarak etiketlenmiş dört bağlantılı halkadan oluşur (Şekil 1). C-D halkaları, SL aktivitesi ve bitkideki bununla ilişkili etkiler için en kritik halkalardır. Bu iki halka bir enol-eter köprüsü aracılığıyla birbirine bağlanmıştır (Ćavar vd., 2015). A – B halkalarının doğal SL'ler arasında daha çeşitli olduğu bilinmektedir. Bu varyasyonlar farklı yan grupların A-B halkalarına bağlanmasıyla meydana gelir (Mangnus vd., 1992; Matusova 2005; Xie vd., 2010). Orobansol, orobansil asetat, metoksiorobansol, 7-hidroksi-orobansol, sorgomol, sorgolakton, strigol, strigil asetat ve metoksistrigolün hepsinin aynı öncü molekül olan 5-deoksistrigolden üretildiğine inanılmaktadır (Şekil 1).



Şekil 1. SL'lerin yapıları ve sınıflandırılması (Arıkan, 2022).

Doğal SL'ler, sentezinin zor ve uzun zaman almasının yanı sıra ekonomik olmaması nedeniyle de tarımsal uygulamalarda tercih edilmemektedir. Sentetik SL'ler ise doğal olanlara göre daha basit yapıları olup, biyoaktivitelerini korumaları tercih nedenidir (Vurro vd., 2016). SL'in sentetik analogu olan GR24 (Şekil 2) adını ilk kez sentezleyen araştırmacının (Gerry Roseberry) baş harflerinden almaktadır (Cardinale vd., 2018).

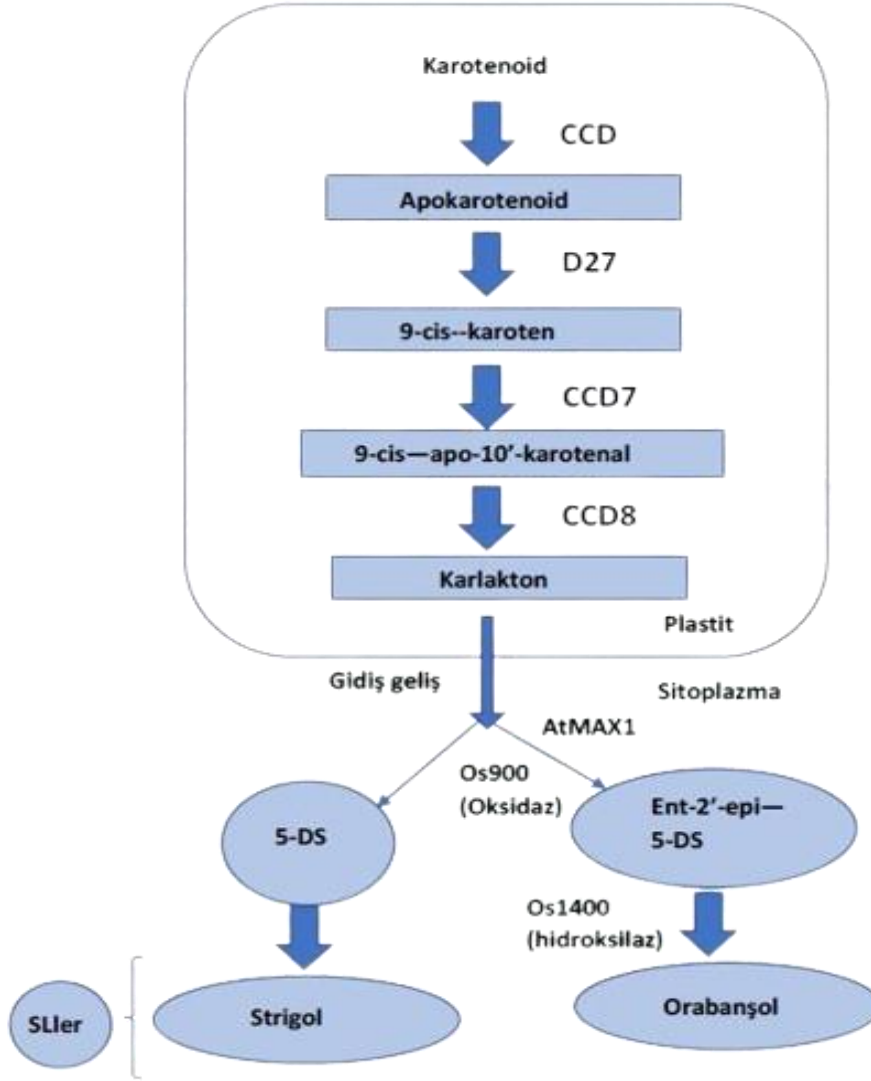


Şekil 2. SL'in sentetik analogu olan GR24

GR24, stereoizomerlerin (hem 5-deoksistrigol hem de 4-deoksiorobanchol tiplerini bulundurur) bir karışımı olarak multigram ölçeğinde üretilmiştir (Vurro vd., 2016). Bu iki stereoizomerin enantiyomerleri ($GR24^{DS}$ ile $GR24^{ent-5DS}$ veya $GR24^{4DO}$ ile $GR24^{ent-4DO}$) eşit miktarda karıştırılıp rasemik GR24 (rac-GR24) elde edilmektedir (Arakan ve Karaman, 2021).

Strigolakton Biyosentezi

SL biyosentetik yolundaki tüm adımlar tam olarak açıklanmamış olsa da (Ruyter-Spira vd., 2013), ana adımların anlaşılmasında büyük ilerleme kaydedilmiştir. SL biyosentezleri (Şekil 3), plastid ve sitosolde olmak üzere iki ayrı bölümde gerçekleşir. Öncü madde olan karlaktonun üretimi plastidlerde gerçekleşirken, karotenoidden karlaktona kadar geçen sentez basamaklarında karotenoid cleavage dioksigenaz (CCD, CCD7, CCD8) ve D27 enzimleri görev alır. Karlaktonun sitoplazmada parçalanması sonunda SL oluşumu gerçekleşir (Banerjee ve Roychoudhury, 2018).



Şekil 3. SL'lerin biosentetik yolu: Strigol ve Orobanşolun oluşumu (Arıkan, 2022).

Strigolakton Taşınımı

Bitkiler içindeki SL hareketine ilişkin veriler biraz çelişkilidir. PLEIOTROPIC DRUG RESISTANCE1 (PDR1), SL dağıtımında önemli bir bileşen ve bir SL taşıyıcısı olarak adlandırılmıştır (Kretzschmar vd., 2012; Sasse vd., 2015). SL'ler ister aktif olarak hücreden hücreye taşınınsın ister transpirasyon akışıyla taşınınsın, hedeflerine ulaştıklarında hedef dokular tarafından algılanmaları gerekir. Bu algılama ve sinyal iletim süreci halen tam olarak aydınlatılma aşamasındadır (Claassens ve Hills, 2018).

Strigolaktonların Kök Mimarisini Düzenlemedeki Roller

Kökler bitkilerin en önemli vejetatif organlarından birisidir. Bitkilerin topraktan su ve besin maddelerini alması ve aynı zamanda amino asitleri, hormonları ve diğer bileşikleri

sentezlemesi önemlidir. Kökün büyümesi ve gelişmesi, büyük ölçüde suyun ve besin maddelerinin emilim verimliliğini belirler ve bu da fotosentetik ürünleri ve meyve kalitesini doğrudan etkiler (Xu vd. 2021). Son yıllarda, SL aracılı kök gelişiminde oksin, sitokin ve etilen arasındaki hormonal etkileşim, beslenme durumu ve arbusküler mikorizal funguslarla (AMF) simbiyotik ilişkiler gibi çok çeşitli faktörlerin rol oynadığı ortaya çıkmıştır (Claassens ve Hills, 2018). SL'nin kök sistemleri üzerindeki etkileri farklı türler arasında iyi bir şekilde belgelenmiştir ve primer kökler, lateral kökler, kök tüyleri ve adventif kökler dahil olmak üzere, kök mimarisinin tüm ana kısımlarını etkilemektedir (Kapulnik vd., 2011a; Ruyter-Spira vd., 2011; Koltai, 2011; Rasmussen vd., 2012b).

Primer Kökler

Yapılan çalışmalar, SL'lerin genel olarak primer kök uzamasının pozitif düzenleyicileri olduğunu, ancak bunun türler arasında değiştiğini ve büyük ölçüde büyüme koşullarına bağlı olduğunu göstermektedir (Claassens ve Hills, 2018).

Lateral Kökler

Primer kök büyümesi üzerindeki nispeten ince etkilerinin aksine, SL'lerin lateral kök gelişimi üzerinde çok daha belirgin etkisi vardır. Bu etki, büyük ölçüde toprağın fosfor (P) durumuna bağlıdır (Claassens ve Hills, 2018).

Adventif Kökler ve Taç Kökler

Adventif kökler, kök olmayan herhangi bir bitki dokusundan gelişir. Bunlar, pirinç bitkilerindeki taç köklerde olduğu gibi normal bitki gelişimi sırasında yaralanma ya da besin eksikliği gibi çeşitli stres koşullarına yanıt olarak oluşabilir. Hem *Arabidopsis*'te hem de bezelyede, SL-eksik ve SL- duyarsız mutantlar, yabani tipteki bitkilere göre daha yüksek adventif köklenme oranlarına sahiptir (Rasmussen vd. 2012a, b). Bununla birlikte, SL'nin kök dışı dokulardan kök başlangıcı üzerindeki etkileri güçlü bir şekilde türe özgüdür. SL'ler *Arabidopsis* ve bezelyede adventif köklenmenin negatif düzenleyicileridir, ancak pirinçte taç kök büyümesinin pozitif düzenleyicileridir.

Kök Tüyleri

Arabidopsis ve domateslerde rac-GR24, kök tüylerinin uzamasını teşvik eder (Koltai vd., 2010; Kapulnik vd., 2011a). SL'ler aynı zamanda, kök tüylerinin uzamasının pozitif düzenleyicileri olarak da görünmektedir.

SL'lerin bu dört kök gelişimi mimarisi üzerindeki etkilerine ilişkin daha fazla araştırma yapılmasına ihtiyaç duyulmaktadır. Kök büyümesi ve gelişiminin, SL'lerin rolü olduğu birçok bileşen arasındaki karmaşık etkileşimin nihai sonuçları olduğu da aynı derecede açıktır. Bu

durum, bitkilerin farklı beslenme durumlarında, SL uygulamalarına verdikleri farklı tepkilerden de anlaşılmaktadır. Ayrıca, diğer fitohormonlar kök gelişiminin düzenlenmesinde kritik rol oynar. Bu nedenle SL etkilerini, besin durumu ve diğer fitohormonlarla karşılıklı etkileşim ile değerlendirmek önemlidir (Claassens ve Hills, 2018).

Besin Durumu ve Strigolaktonların Kök Gelişimindeki Rolü

Kök gelişimi, bitkinin topraktan makro ve mikro besinleri absorbe etme yeteneği ile doğrudan bağlantılıdır. Kök tüyleri bu besin kazanımında önemli rol oynamaktadır (Gilroy ve Jones 2000). Fosfat (P), demir (Fe) ve azot (N) eksikliği, kök tüylerinin oluşumunu ve uzamasını tetikleyebilir (López-Bucio vd., 2003; Muller ve Schmidt 2004). P seviyelerinin, primer ve lateral köklerin mimarisini etkilediği ve bitkinin adaptif büyüme süreçlerinde rol oynadığı gösterilmiştir (Hell ve Hillebrand 2001; López-Bucio 2002; Osmont vd., 2007). Toprağın alüminyum (Al), kalsiyum (Ca), kükürt (S), azot (N) ve demir (Fe) içeriklerinin tümü, primer ve lateral kök başlangıcı üzerinde belirgin bir etkiye sahiptir (López-Bucio vd., 2003; Osmont vd., 2007).

SL'lerin kök mimarisini etkilediği bilindiğinden, bu durum SL'yi beslenme açısından kısıtlayıcı koşullar altında bu yönleri düzenlemede kilit bir role yerleştirebilir. SL, kök tüylerinin uzamasını artırabilir ve bu da besin alımını kolaylaştırabilir (Kapulnik vd., 2011a). Benzer şekilde SL, P sınırlaması altında lateral kök oluşumunu artırır ve bu durum, optimal olmayan büyüme koşulları altında hayatta kalmanın önemli bir yolu olabilir (Al-Ghazi vd., 2003; Osmont vd., 2007). Topraktaki P ve N, optimal konsantrasyonun altında olduğunda SL sentezi ve sızıntı artar (Kohlen vd., 2011). Artan besin alımına erişim sağlamak için arbusküler mikorizal funguslar (AMF) ile simbiyotik ilişkilerden yararlanılabilir.

Arbusküler Mikorizal Funguslar (AMF)

Karada yaşayan bitkilerin çoğu, kök sistemlerinin erişimini artırmak için arbusküler mikorizal funguslar (AMF) ile simbiyotik bir ilişki kurar; bu, simbiyozun eski bir şeklidir (Remy vd. 1994; Smith ve Read 2008). Buna uygun olarak, besin stresi koşulları altında, artan besin alımı için bitki kök sistemlerini güçlendirmedeki rolleri göz önüne alındığında, SL'ler aynı zamanda AMF'nin konakçı köklerini tanımlaması için bitkiden türetilmiş sinyal molekülleri olarak da hareket eder (Bouwmeester vd., 2007; Smith ve Read 2008).

AMF sporları konakçılarından bağımsız olarak çimlenebilir, ancak çimlenen sporlar sınırlı büyüme ve hif gelişimi gösterir. Kapsamlı dallanma, yalnızca konakçı kök sistemlerinin yakın çevresinde meydana gelir (Buee vd., 2000; Nagahashi ve Douds, 2000). Bitki köklerinden

yayılan SL'ler, spor çimlenmesi, hif yapısı, mitoz, solunum reaksiyonu ve gen ifadesindeki çeşitli değişiklikleri içeren çeşitli etkileri tetikler (Tisserant vd., 2012; Genre vd., 2013).

Simbiyotik faz sırasında, AMF bitki kök epidermal hücrelerine girer ve kök kortikal hücreleri içinde çoğalır. AMF, kök korteksinin apoplastik bölümünde lokalize kalır (Smith ve Read 2008). AMF'nin arbuskül adı verilen farklı yapıları ürettiği yer burasıdır (Smith ve Read 2008). Besin alışverişinin öncelikle bu özel fungus yapısında gerçekleştiği öne sürülmektedir (Bucher 2007). AMF, bitki köklerinin etkileşime girebileceği toprağın toplam hacmini artırır; bu durum bitkinin kök çevresindeki besin tükenme bölgesinin sınırlamalarının üstesinden gelmesine ve topraktan mineral alımının artmasına yardımcı olur. Çalışmalar, kök emilim yüzeyinin artmasına rağmen, AMF'nin köklere P alımını ve kullanılabilirliğini artırdığını göstermiştir. AMF ayrıca aktif olarak P'yi mantar vakuollerine gönderir ve depolar (Smith vd., 2003; Benedetto vd., 2005; Bucher 2007).

P karşılığında fungus, konakçısından sabit karbon alır. Bu oran, farklı bitkilerdeki toplam fotosentatın %4'ü ile %20'si arasında değişim gösrebilir. Karbon değişimi, bitkilerde karbon akışını ve parçalanmasını etkileyebilir (Bago vd., 2000). Bir bitkide karbon bölünmesindeki bir değişiklikle tetiklenebilecek tüm sinyallere rağmen, bitkiler ile AMF arasındaki ana sinyal molekülü SL'ler olarak kalır (Besserer vd., 2006). AMF'de SL algılamasının kesin mekanizması konusunda hala belirsizlik vardır, ancak fungus SL reseptörü oldukça hassastır, çünkü nanomolar konsantrasyonlarda rac-GR24'ü tespit edebilmektedir (Besserer vd., 2006). Bu reseptörü kodlayan gen veya protein yapısı henüz tanımlanmamıştır. AMF'nin SL'leri algılaması için bunların köklerden toprağa taşınması gerekir.

Hormonal Etkileşim

Oksinler

Oksin ve SL'ler arasındaki karşılıklı etkileşime ilişkin mevcut hipotezlerden biri, SL'nin daha dolaylı bir rol oynadığı, bu sayede PIN1 aktivitesini inhibe ettiği, kaynak ve tüketim dinamiğini değiştirdiği ve tomurculardan oksin ihracatını azalttığı yönündedir (Bennett vd., 2014). Benzer şekilde SL'ler, köklerdeki oksin akışının modülasyonu yoluyla kök tüylerinin uzamasını düzenleyebilir (Koltai vd., 2010).

Sitokininler

Sitokininler, kök gelişiminde ve düzenlenmesinde önemli rol oynayan fitohormonlardır. SL'lerde olduğu gibi sitokininlerde de PIN oksin taşıyıcılarının aktivitesini azaltarak lateral kök oluşumunu azaltır (Vanstraelen ve Benková 2012). Lateral kök gelişimini engellemek için GR24 ile birleşen AHK3/ARR1/ARR12 sinyalleme kompleksi yoluyla sitokinin sinyali ve SL

arasındaki etkileşim yakın zamanda aydınlatılmıştır (Jiang vd. 2016). Buna göre sitokininin sinyal kompleksinin mutantlarının rac-GR24'e yanıt vermediği ve lateral köklerin azaldığı gözlemlenmiştir (Jiang vd. 2016).

Etilen

SL ve etilen arasındaki çapraz etkileşim, etilen tepkisi için SL sinyallemesinin gerekli olmaması açısından ilginçtir, ancak bunun tersi doğru gibi görünmektedir (Claassens ve Hills, 2018). Yani etilen, SL yanıtında rol oynuyor gibi durmaktadır. Etilen sinyallemesine dahil olan etr ve ein mutantları, GR24'e yanıt vermeyen bir kök tüyü fenotipi sunmuştur. Böylece etilenin, SL'lere karşı epistatik olduğu görülebilir (Kapulnik vd., 2011b).

Strigolaktonların Asmada (*Vitis vinifera* L.) Kök Mimarisini Düzenlemedeki Roller

Vejetatif çoğaltılan asmalarda kökler odunsu çeliklerin kambiyum katmanından orijinlenir (Pratt, 1974). Gövdeden kökenlenen bu köklere adventif kök denir (Bellini vd., 2014). Bu köklerin çoğunluğu boğuma yakın yerde gelişir ancak boğum aralarında da oluşur. Bu kökler sıklıkla ana kök olarak isimlendirilir ve sekonder, tersiyer vb. lateral köklere dallanarak karmaşık bir yapı ile kök sistemini oluşturur (Osmont vd., 2007).

Oksinin aksine, sitokinin ve strigolakton normalde adventif köklenmeyi baskılar; strigolakton bu etkiyi oksin akışını azaltarak yapabilir (Rasmussen vd., 2012). Sitokinin ve strigolaktonun tipik kök sinyalleri olması nedeniyle, çelikte olmamaları kambiyumun yenileri başlatmak suretiyle kayıp kökleri yenilemesini teşvik edebilir.

Asmalar, P alımı için büyük ölçüde mikorizal funguslara güvenir ve P-aç bitkiler görünüşte fungusların kök teması kurmasına yardımcı olan SL'lerin salgılanması yoluyla köklerinin mikorizal kolonizasyonunu teşvik eder (Akiyama vd., 2005; Bais vd., 2006). Strigolaktonlar oksin akışını ayarlayarak, ayrıca P eksikliği olan bitkilerde lateral kök büyümesini teşvik ederken, P açısından yeterli koşullar altında lateral kök büyümesini baskılar (Ruyter-Spira vd., 2011, 2013).

Asmada kök kısıtlamasının içsel SL içeriği ve SL ile ilişkili gen ekspresyonu üzerindeki etkilerinin araştırıldığı bir çalışmada, aynı zamanda GR24 uygulamasının asma kökleri üzerindeki etkilerine de bakılmıştır. Sonuçlar, kök kısıtlaması altında kök mimarisinin önemli ölçüde değiştiğini göstermiştir. Çelik dikiminden 40 gün sonra, kök kısıtlaması altındaki köklerde iki tip SL'nin içeriği, kontrol bitkiciklerinin köklerindeki önemli ölçüde daha düşük olmuştur. SL içeriği, VVCCD8 ve VVD27'nin ekspresyon seviyeleriyle önemli ölçüde pozitif korelasyon göstermiştir. Bu durum, bunların SL sentezinde hayati roller oynadığını göstermektedir. 20 günlük GR24 uygulaması sonrasında, kök uzunluğu kontrole göre önemli

ölçüde kısalmıştır. Düşük GR24 konsantrasyonu (0.1 M) kök çapını önemli ölçüde azaltıp kılcal kök yoğunluğunu artırırken, yüksek GR24 konsantrasyonu (10 M), lateral kök uzunluğunu, önemli ölçüde azaltmasına rağmen yoğunluğunu artırmıştır. Aynı zamanda GR24 (0,1 M), içsel SL içeriğini azaltmıştır (Xu vd. 2021).

Hamburg Misketi çeliklerinin sürdürülmesiyle elde edilen saksı asmalarına 0.1 µM ve 10 µM konsantrasyonlarında uygulanan GR24, kılcal kök sayısını ve yoğunluğunu önemli ölçüde artırmıştır. GR24'ün her iki konsantrasyonu da lateral kök başlangıcı üzerinde olumsuz etkiler göstermiştir. 10 µM GR24, lateral kök gelişiminin başlatılmasında pozitif bir düzenleyici görevi görürken, 0.1 µM GR24 uygulaması lateral kök yoğunluğunu belirgin şekilde azaltmıştır. Ayrıca kök uzunluğu ve yüzey alanı, kontrol bitkiciklerine kıyasla 10 µM GR24 uygulamasında belirgin şekilde artmıştır (Jiu vd. 2022).

Sonuç

Strigolaktonlar (SL'ler), mono ve dikotiledon bitkiler de dahil olmak üzere, farklı türler arasında bir takım gelişimsel ve çevresel süreçleri düzenleyen bitki hormonlarıdır ve son birkaç yılda yoğun bir şekilde araştırılmaktadır. Her ne kadar SL'ler başlangıçta bitkilerin toprak üstü kısmının dallanmasını baskıladığı düşünülmüş olsa da yavaş yavaş bu kökten türetilmiş kimyasal sinyallerin, sırasıyla AMF ve kök parazitik bitkilerle simbiyotik ve parazitik ilişkilerin düzenlenmesinde de rol oynadığı ortaya çıkmıştır. SL'lerin bir hormon olarak kabul edilmesinden sonra, bu bileşiklerle ilgili araştırmalarda önemli ilerlemeler olmuştur.

Asmalarda kök büyüme ve gelişme özelliklerinin anlaşılması, üzüm kalitesinin düzenlenmesinin aydınlatılmasına katkı sağlayacak teorik araştırmalar için hayati önem taşımaktadır. Bu çalışmada ise SL'lerin asma bitkisi özelinde kök mimarisini düzenlemedeki rolleri literatür ışığında derlenmiştir. Sonuç olarak asmalarda kök büyümesini ve gelişimini düzenlemek için SL'lerin kullanılabileceği söylenebilir. Ancak asma köklerinin büyümesinde SL'lerin önemli rolünün daha fazla araştırılmasına ihtiyaç vardır. Zira, SL'lerin etkileri çeşide ve çevresel koşullara bağlı olarak değişiklik gösterebilmektedir.

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AN OVERVIEW OF THE MIRACLE TREE AND MORINGA GENUS

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Abstract

Moringa, scientifically known as *Moringa oleifera*, is a Lam. ersatile plant that is native to parts of Africa and Asia. It is commonly referred to as the drumstick tree, miracle tree, or ben oil tree. Moringa is valued for its nutritional, medicinal, and industrial properties. Moringa is exceptionally nutritious and is considered a superfood. The leaves are rich in vitamins and minerals such as vitamin C, vitamin A, calcium, potassium and iron. The leaves are often used as a forage dietary supplement or added to salads, smoothies, and other dishes. Various parts of the Moringa plant are edible. The leaves are commonly consumed as a leafy green, similar to spinach, and the immature seed pods (drumsticks) are used in culinary dishes. Moringa; It is known to have anti-inflammatory, antioxidant and antimicrobial properties. The long, slender seed pods, often referred to as drumsticks, are a common ingredient in South Asian and Middle Eastern cuisines. They can be used in curries, soups, and stews. Moringa seeds contain a significant amount of oil, known as ben oil or behen oil. This oil is clear, odorless, and has a high resistance to rancidity. It has been used traditionally for cooking and in cosmetics. Moringa seeds contain natural compounds that can help clarify water by binding to impurities and sediment. This property has led to the use of Moringa in water purification efforts in some regions. Moringa is a hardy, fast-growing tree that can thrive in a variety of climates. It is often cultivated in tropical and subtropical regions. Moringa is valued for its ability to grow in challenging environments, providing a potential source of nutrition and income in areas with poor soil quality or limited resources. Drumstick leaves are rich in protein, which is essential for animal growth and development. Some studies suggest that Moringa has antibacterial properties, which might be beneficial in promoting animal health. While drumstick can be a valuable addition to animal feed, it should be part of a well-balanced diet. Moringa species It is known that there are a total of 13 species of Moringa species, which are widely found in many The world's tropical and subtropical regions. This study aims to introduce the *Moringa oleifera* and all its species and their agricultural potential.

Keywords: Moringa, Drumstick, 13 species, forage, botanical

Introduction

A common tree in many tropical and subtropical nations is *Moringa oleifera* Lam. India, Africa, South and Central America, Mexico, Hawaii, and all over Asia and Southeast Asia are among the places where it is grown commercially. It is called the ben oil tree from oils derived from seeds, the horseradish tree from the flavour of preparations made from ground root, and the drumstick tree from the look of its immature seed pods. While the leaves are commonly used as a basic food due to their high nutritional content, immature seed pods are consumed in some areas (Thurber and Fahey, 2009; Mbikay, 2012; Razis et al., 2014). There are no human clinical trials investigating *M. oleifera*'s effectiveness in treating undernutrition.

Growing interest in the moringa plant, botanically known as *Moringa oleifera* Lam, has occurred during the last 20 years. With its many applications, moringa is regarded as a "Miracle Tree" and has been the focus of extensive global research and development efforts. Grown in many tropical and subtropical regions, this well-known and popular species is a versatile tree crop with numerous horticultural, environmental, and industrial uses (Palada, 1996; Fuglie, 1999; Foidl et al., 2001; Fahey, 2005, Palada and Ebert, 2015). Numerous plant scientists, researchers, extension agents, development organisations, farmers, and the industrial sector in numerous nations across the world have become interested in moringa due to its many uses. fresh discoveries and research This book, a second edition of 'The Miracle Tree: *Moringa oleifera* - Natural Nutrition for the Tropics', presents a comprehensive review of the past and most recent state of the art research and development studies on moringa, in various fields. Information presented in this book can be used as guide for future direction towards finding and exploiting new uses and opportunities for moringa, a truly multi-purpose tree. There are several varieties of moringa cultivated around the world, each with its own unique characteristics. Some of the commonly known types of moringa:

Types of moringa



Moringa stenopetala



Moringa oleifera



Moringa peregrina



Moringa drouhardii



Moringa concanensis



Moringa arborea



Moringa ovalifolia



Moringa hildebrandtii

Presentation title

5

Types of moringa



Moringa longituba



Moringa rivae



Moringa ruspoliana



Moringa borziana



Moringa pygmaea

Presentation title

6

Moringa oleifera Lam.: This is the most widely cultivated and well-known variety. It is native to the sub-Himalayan regions of northern India, but it is now grown in many tropical and subtropical areas around the world. Moringa oleifera is valued for its leaves, pods, and seeds, which are rich in nutrients. Moringa oleifera is a fast-growing, drought-resistant tree native to the sub-Himalayan regions of northern India, but it is now cultivated in various tropical and subtropical regions around the world. Commonly known as the drumstick tree, horseradish tree, or simply moringa, it belongs to the family Moringaceae. Moringa oleifera is highly valued for its nutritional and medicinal properties, and nearly all parts of the plant are used for various purposes. Key features and uses of Moringa oleifera include: The Moringa oleifera leafs are

rich in vitamins, minerals, and antioxidants. They are commonly used as a nutritious leafy green vegetable in cooking and are also dried and ground into a powder for use in supplements or as a tea. The long, slender pods of the moringa tree, often referred to as drumsticks, are edible and have a taste similar to green beans. They are used in various culinary dishes. Moringa seeds are a source of edible oil, known as ben oil or behen oil. The oil is rich in oleic acid and is used for cooking and in the cosmetic industry. The seeds can also be crushed and used as a water purifier. The roots of *Moringa oleifera* have a taste similar to horseradish and are sometimes used as a condiment. However, the roots also contain certain compounds that may have toxic effects in high concentrations. *Moringa oleifera* has been traditionally used in various cultures for its medicinal properties. It is believed to have anti-inflammatory, antioxidant, and antimicrobial effects. Research is ongoing to explore its potential in treating various health conditions. *Moringa oleifera* is known for its high nutritional content, including vitamins (such as vitamin A, vitamin C), minerals (such as iron, potassium), and protein.

Due to its nutritional richness and adaptability to diverse climates, *Moringa oleifera* has gained popularity as a valuable food source, especially in regions where malnutrition is a concern. The plant's ability to thrive in arid conditions and its multiple uses make it a significant resource for sustainable agriculture and food security.



Figure 1: *Moringa oleifera* pod, seed, flower, leaves and stem (Anonymous, 2023a)

There has long been debate over the relationships between Moringa and other plant families (Narayana and Parvathi, 1978; Rao et al., 1983; Dutt et al., 1984; Ronse de Craene et al., 1998). The Swedish biologist Linnaeus believed the tree belonged to the Legume Family when he named *M. oleifera* in 1785. This was a simple error to make because many legumes have pinnate leaves that resemble those of Moringa, and the bilaterally symmetrical flowers of *M. oleifera* superficially resemble legume flowers. Up until the middle of the 1800s, some well-known botanists maintained this opinion, while others promoted placement close to the family Violet. Still other botanists classified Moringa as a member of the Bignonia Family based on its long, woody pods and winged seeds. The identification of Moringaceae as one of the approximately 15 families that generate mustard oils (glucosinolates) was made possible by the development of studies that use DNA to infer relationships between organisms. These studies (Chase et al., 1993; Rodman et al., 1998; Karol et al., 1999) demonstrate the relatedness of almost all plants that produce mustard oils. The Nasturtium Family (Tropaeolaceae), the Caper Family (Capparaceae), the Mustard Family (Brassicaceae), and the Papaya Family (Caricaceae) are a few of these families. The Papaya Family and Moringaceae have shown to be most closely related in all of these investigations. Nobody had ever guessed that these two families were so closely related, based only on the morphological details of the plants (Olson, 2002a). This surprising outcome sparked a search right away Interactions among Moringaceae. It is common for closely related species to resemble each other more than distantly related ones Therefore, understanding the relationships among species is helpful for improving domesticated plants and animals. Answers to questions like "Which species are most closely related to *Moringa oleifera* and what properties do they share?" can be provided by it. The most common names for *Moringa oleifera*, which are incorrectly and commonly referred to by a number of other names before it finally forms a permanent stem are *M. pterygosperma* and *M. aptera* (Olson, 2010 and Olson, 2013). It is believed to be native to northwest India and neighbouring Pakistan, though there isn't much definitive information about its native range. The term "sub-Himalayan valleys" is commonly used to refer to the native range, which is the warm, arid lowlands situated directly south of the Himalayas. Although wild trees have been mentioned in old herbarium sheets and references (Haines, 1922).

Moringa stenopetala: Also known as African Moringa, it is native to certain regions of Ethiopia and Kenya. Like *Moringa oleifera*, it is valued for its nutritional content. *Moringa stenopetala*. While it shares the name "Moringa" with *Moringa oleifera*, the more widely known variety, *Moringa stenopetala* has distinct characteristics and is valued for its own set of

properties. *Moringa stenopetala* is native to the Horn of Africa, with Ethiopia being a primary location for its growth. It is well adapted to the semi-arid and mountainous regions of this area. Similar to *Moringa oleifera*, *Moringa stenopetala* is valued for its high nutritional content. The leaves, in particular, are rich in vitamins, minerals, and protein, making them a valuable food source in regions where malnutrition is a concern. In traditional medicine, various parts of *Moringa stenopetala* have been used for their potential medicinal properties. The plant is believed to have anti-inflammatory, antioxidant, and antimicrobial effects. Research is ongoing to explore its therapeutic potential.

The *Moringa stenopetala* leaf are used in local cuisines. The leaves can be cooked and consumed as a vegetable, similar to how *Moringa oleifera* leaves are used. The pods, often referred to as "drumsticks," are also consumed as a vegetable. *Moringa stenopetala* is known for its ability to thrive in challenging environmental conditions, including areas with poor soil quality and low water availability. This adaptability makes it a valuable resource for communities in arid regions.

It's important to note that while *Moringa oleifera* is more widely cultivated and researched, *Moringa stenopetala* has unique properties that make it significant in its own right, particularly in the context of the regions where it is naturally found. Ongoing research may reveal additional information about its nutritional composition and potential applications.



Figure 2: *Moringa stenopetala* tree, flowers, leaves, seeds (Anonymous,2023b)

Moringa stenopetala , One of the rare trees that can be found growing on rocky slopes in central Namibia and the southern portion of its range is *M. ovalifolia*. In cultivation, it is sensitive to low temperatures and overwatering, but it is incredibly resistant to drought. It has earned the moniker "ghost tree" due to its massive habit and bleached trunk. The massive habit of *Moringa stenopetala* is also seen on the right. This species is known to exist in a few wild locations,

including this one on an island in Lake Baringo, Kenya, but it is widely cultivated, particularly in southwest Ethiopia.

Following *M. oleifera*, *Moringa stenopetala* is the species with the greatest economic significance. According to reports, it's a significant food plant in northern Kenya and southwest Ethiopia, where the leaves are consumed as a vegetable (Jahn, 1991, Förch, 2003). Only five wild locations—at Lake Baringo and near Lake Turkana in southwest Ethiopia and northwest Kenya, respectively—have been reported to have it. The fact that so few people are aware of this significant plant in the wild is typical of many tropical species. The best chance of success for *Moringa stenopetala* breeding efforts would be to base them on collections from every wild stand and to work in tandem with searches for additional wild stands. It appears likely that *M. stenopetala's* genetic diversity

Moringa peregrina: This variety is native to parts of the Middle East, including Saudi Arabia and Yemen. It is adapted to arid conditions and is known for its drought resistance. Its ability to withstand extreme temperatures and low water availability makes it well-suited to these environments. One of the notable characteristics of *Moringa peregrina* is its adaptation to arid conditions. The plant has developed mechanisms to survive with minimal water, making it a valuable resource in regions where water scarcity is a challenge. Like other moringa species, *Moringa peregrina* is known for its nutritional value. The leaves of the plant are rich in vitamins, minerals, and antioxidants. In areas where food resources are limited, *Moringa peregrina* serves as a source of essential nutrients. In traditional medicine, various parts of *Moringa peregrina* have been used for their potential medicinal properties. The plant is believed to have therapeutic effects, and extracts from its various parts have been studied for their potential antioxidant and anti-inflammatory activities. The pods and leaves of *Moringa peregrina* are utilized in local cuisines. The leaves can be cooked and consumed as a vegetable, and the pods, similar to other moringa varieties, are also consumed as a food source. *Moringa peregrina* seeds contain oil, and the oil has been traditionally extracted for various uses. The oil is known for its nutritional value and potential applications. It's important to note that while *Moringa peregrina* shares some similarities with other moringa species, each variety has unique adaptations to its specific environment. As with other moringa species, ongoing research may reveal more about the nutritional content and potential applications of *Moringa peregrina*.



Figure 3: *Moringa peregrina* flower, and tree (Anonymous,2023c)

Moringa peregrina growing in a rocky wash in the mountains of the Arabian Peninsula's southeast, in northern Oman. This one has a thick covering of leaves, but the leaflets have all fallen off, exposing the bare leaf axes. Similar to other *Moringa* species like *M. ovalifolia*, this species frequently occupies the only dominant tree position in otherwise rocky, shrubby landscapes. The brown, wingless seeds that set this species apart are found in some of the pods on this tree.

***Moringa drouhardii*:** This species is found in Madagascar and is adapted to the island's unique ecological conditions. It is known for its thick, succulent stem. *Moringa drouhardii*, commonly known as Madagascar Moringa or simply Moringa, is a species of moringa tree that is native to Madagascar. Unlike some other moringa species, *Moringa drouhardii* has a distinctive appearance. It is characterized by a thick, succulent stem and is often described as a "bottle tree" due to the swollen base of its trunk. Similar to other moringa species, *Moringa drouhardii* has developed adaptations to withstand arid conditions and periods of drought. The plant's ability to store water in its succulent stem contributes to its resilience in dry environments.

While the leaves of *Moringa drouhardii* are edible, they are not as commonly consumed as those of *Moringa oleifera* or other varieties. The plant is more recognized for its unique appearance and adaptations to the local environment. In Madagascar, *Moringa drouhardii* has been traditionally used for various purposes. Different parts of the plant, including the leaves, bark, and roots, may have been utilized for medicinal or cultural practices. However, specific traditional uses can vary among communities. Like many species endemic to specific regions, *Moringa drouhardii* may face conservation challenges due to habitat loss and other environmental factors. Conservation efforts are sometimes initiated to protect and preserve unique species like *Moringa drouhardii*. As with other moringa varieties, ongoing research may provide more insights into the nutritional content and potential uses of *Moringa drouhardii*.

However, its unique characteristics, especially the succulent stem and adaptation to the Madagascar ecosystem, make it a distinct member of the moringa family.



Figure 4: *Moringa drouhardii* general view and seeds (Anonymous, 2023d)

The swollen trunk is composed of usually standing 2–10 m tall, *Moringa drouhardii* has a single, fatty trunk. The species is native to arid regions of southern Madagascar, where its pale, almost white bark is a striking feature. Its fruits have constrictions between the seeds, which are 2-3 cm long, pocked like golf balls, and wingless, setting it apart from the other native Malagasy species, *M. hildebrandtii* (Olson and Razafimandimbison, 2000). Though *M. drouhardii* has the strongest scent of all the Moringa species, they are all strongly scented of mustard oils. Most people call it "hazomalana." The speed at which *Moringa drouhardii* grows can reach flowering in as little as two years. The kind has been reported from locations in the island's southwest and southeast, however a thorough investigation of the tree's distribution between these two regions is lacking. The tree is used medicinally by the locals, and although it is said to be inedible, it is common to see bark stripped off or hollows in the trunk where wood has been removed.

Moringa arborea: *Moringa arborea* is found in various countries in Africa, including but not limited to Ethiopia, Kenya, Sudan, Tanzania, and Uganda. It is adapted to a range of climates within the continent. Found in parts of Africa, particularly in the coastal regions, *Moringa arborea* is valued for its timber and is also used for medicinal purposes. *Moringa arborea* is a deciduous tree that can reach heights of up to 20 meters. It has a straight trunk and a spreading crown. The leaves are compound, with leaflets arranged in pairs along the central stem. Similar to other moringa species, *Moringa arborea* is valued for its edible parts. The leaves, flowers, and pods are all used in traditional cooking. The young pods, often referred to as drumsticks, are cooked and consumed as a vegetable. Various parts of *Moringa arborea* have been used in traditional medicine in Africa. The plant is believed to have medicinal properties, and extracts from its leaves and other parts have been used for various therapeutic purposes. *Moringa*

arborea is also valued for its wood, which is used for timber. The wood is known for being lightweight and is used for construction, as well as for making tools and utensils. The attractive appearance of *Moringa arborea*, with its spreading crown and compound leaves, makes it suitable for ornamental planting in some areas. *Moringa arborea* is adaptable to a variety of environmental conditions, including both arid and humid regions. Its ability to thrive in different climates contributes to its cultivation in diverse areas of Africa. As with other moringa species, ongoing research may provide additional insights into the nutritional content and potential health benefits of *Moringa arborea*. It remains an important resource for food, medicine, and other uses in the regions where it is cultivated.



Figure 5: *Moringa arborea* different growing time (Anonymous, 2023e)

Moringa arborea has only been observed once and is restricted to a solitary, rocky canyon located in a remote area along the Kenyan border with Ethiopia. Below is a picture of the first leaf from this species that science is aware of. One of the rarest varieties of moringa, *Moringa arborea* is only found in a single rocky canyon near the Kenyan border with Ethiopia. In 1972, two botanists made the first collection of this lovely tree. One tree, devoid of leaves, was discovered and was covered in fruits and flowers. The tree was then lost to sight for almost thirty years.

Moringa ovalifolia: Native to southwestern Africa, this species is adapted to arid environments and is known for its distinctive rounded leaves. *Moringa ovalifolia* is found in arid and semi-arid regions of southwestern Africa. Its distribution includes the Namib Desert and other dry areas. This species of moringa is characterized by its distinctive rounded leaves, which set it

apart from other moringa varieties. The leaves are oval in shape, and the tree has a generally shrubby or small tree-like appearance. *Moringa ovalifolia* is adapted to thrive in arid conditions. It has developed mechanisms to conserve water and withstand periods of drought, making it well-suited to the challenging desert environment. While the leaves of *Moringa ovalifolia* are edible, they are not as commonly consumed as those of *Moringa oleifera*. The limited culinary uses may be due to the plant's adaptation to arid regions, where the availability of water and other resources for cultivation is constrained. In local communities, various parts of *Moringa ovalifolia* may have been used for traditional purposes. These uses can include medicinal applications and other practices based on the unique properties of the plant.



Figure 6: *Moringa ovalifolia* tree, leaves, flowers (Anonymous,2023 f)

The unique appearance of *Moringa ovalifolia*, with its distinctive rounded leaves and adaptation to arid environments, makes it suitable for ornamental planting in certain regions. It's important to note that while *Moringa ovalifolia* shares the moringa name with more well-known species like *Moringa oleifera*, each species may have unique characteristics and adaptations to its specific environment. As with other moringa varieties, ongoing research may provide further insights into its nutritional content and potential applications.

Moringa concanensis: Native to parts of southwestern India, this variety is adapted to drier conditions and is cultivated for its medicinal properties.



Figure 7: *Moringa concanensis* tree, flowers and general view (Anonymous,2023g)

The closest surviving relative of *M. oleifera* is *Moringa concanensis*, which is still occasionally found growing wild in patches of dry tropical forest that stretch from eastern Pakistan nearly to the southern tip of India and a small portion of Bangladesh (Naderuzzaman et al., 1996). Similar to *M. oleifera*, *Moringa concanensis* leaves have fewer branched segments (less tripinnate axes). Furthermore, *M. concanensis*'s deeply furrowed bark, which can be up to 10 cm thick, differs noticeably from *M. oleifera*'s. The name "murungai" is shared by *M. oleifera* and other pod-bearing trees with pinnate leaves, like *Erythrina indica* (a Legume Family tree), in the *M. concanensis* localities I visited in southern Tamil Nadu. The Out of all the thin trees that come out of Asia, *Moringa peregrina* has the broadest distribution. It extends from the eastern Arabian Peninsula's Musandam Peninsula, around its southern region, on both sides of the Red Sea, into northern Somalia, and north to the Dead Sea's steaming lowlands. Among the strangest species of *Moringa* is this one. In many parts of its range, the only trees in sight are the gnarled trunks of *Moringa peregrina*. The tree has erect, bluish pinnate leaves that resemble wispy mops when they mature, dropping their leaflets to reveal the bare leaf axes. The young plants' tubers are consumed in Oman.

Moringa longituba: It is impossible to misidentify this species compared to other moringa species. The bright red flowers are not found in other species, and the bases of the petals and sepals merge together to form a tube. It usually has large tubers located deep in the ground, from which emerges a single stem that connects to it in a manner similar to a knee. It then grows upward if the environmental conditions are suitable. It can grow. The tree has branches reaching more than 3m.



Figure 8: *Moringa longituba* flower, leaf, general view (Anonymous, 2023h)

Moringa longituba is easily recognisable in the wild. This small-statured species' tuber is typically found deep underground, but it is visible in the image to the left of a cultivated specimen. Among the *Moringa* species, *Moringa longituba* is one of the most distinctive. No other species has long tubes made of fused petal and sepal bases, nor does it have bright red flowers. It typically has one small shoot that rises to knee height above its large tuber, which is located deep underground

***Moringa hildebrandtii*:** It is a species of the *Moringa* genus, commonly referred to as the Hildebrandt's *Moringa*. Like other members of the *moringa* family, it is valued for its nutritional and potential medicinal properties



Figure 9: *Moringa hildebrandtii* tree, pod, plant (Anonymous, 2023i)

Moringa hildebrandtii, the other native species from Madagascar. It is said to grow to a height of 25 metres (Keraudren, 1965), it grow to a height of 15 metres. It resembles *M. drouhardii*, but with slightly bilaterally symmetrical flowers, rough, brown bark that exudes a reddish gum, and larger, coarser leaves that typically have red on the stalks between the leaflets. *Moringa*

hildebrandtii was believed to be extinct in the wild, despite being commonly grown in villages and around graves on Madagascar's west coast (Olson and Razafimandimbison, 2000). Fortunately, wild populations were found recently in a southwest island canyon (Castillon and Castillon, 2007). The common name for it is "hazomaroseranana," which translates to "tree." (Razafimandimbison and Olson, 2000). Similar to *M. drouhardii*, it's frequently used as a medicine but isn't consumed as food. It has been reported from locations in the island's southwest and southeast, however a thorough investigation of the tree's distribution between these two regions is lacking. The tree is used medicinally by the locals, and although it is said to be inedible, it is common to see bark stripped off or hollows in the trunk where wood has been removed. The largest Moringa is *Moringa hildebrandtii*, the other native species of Madagascar. It claimed to reach 25 metres (Keraudren, 1965), It resembles *M. drouhardii*, but with slightly bilaterally symmetrical flowers, rough, brown bark that exudes a reddish gum, and larger, coarser leaves that typically have red on the stalks between the leaflets. *Moringa hildebrandtii* was believed to be extinct in the wild, despite being commonly grown in villages and around graves on Madagascar's west coast (Olson and Razafimandimbison, 2000). Fortunately, wild populations were found recently in a southwest island canyon (Castillon and Castillon, 2007).

Moringa pygmaea: This is a dwarf species of moringa found in parts of Africa. It is smaller in size compared to other varieties and is adapted to specific ecological niches.



Figure 10: *Moringa pygmaea* leaves and flowers (Anonymous,2023j)

Moringa pygmaea was first identified in 1980, and Swedish botanist Mats Thulin—a specialist in Somali flora—recently located it once more at its type locality close to Qardho, Somalia. Geographically limited and exceedingly rare is the species *Moringa pygmaea*. The plant's aboveground section, which was only a few centimetres tall, bore several immature a yellow flower inflorescence and leaves.

Moringa borziana: is a plant species belonging to the Moringaceae family. It belongs to the same family as *Moringa oleifera*, but grows especially in regions such as Afghanistan, Pakistan and Iran. This plant has been used in traditional medicine, especially in parts of Central Asia.



Figure 11: *Moringa borziana* tree, flowers, stem, leaves (Anonymous,2023k)

Small-sized *Moringa borziana* grows within 100 miles of the coast, from southern Kenya to the Kisimayu region in southern Somalia. It produces one or two stems, each of which is typically one metre tall. The snips may occasionally grow into a small tree, especially in cultivation, but it may also die back to the tuber every few years. The enormous tuber has a maximum length of one metre. *M. borziana* produces greenish yellow flowers with brown smudges on the tips of the petals that have an almost sickeningly

Moringa rivae: This species is considered the most taxonomically difficult in the Moringa family. It is native to southern Lake Turkana to the Mandera region in Kenya and throughout southeastern Ethiopia. It does not seem to extend far into Somalia. This species is distinguished by the presence of three cream-colored fruits with a brown top and fruit. The short, subspecies *longisiliqua* has yellow flowers and very long fruits. Currently, specimens are being tested but there is still much to be done in collecting specimens in southeastern Ethiopia and northeastern Kenya which may contribute to solving the problem.



Figure 11: *Moringa rivae* flowers, leaf (Anonymous,2023l)

Moringa ruspoliana: is considered one of the most diverse species in the family. It is found from northern Somalia to southeastern Ethiopia, barely reaching northeastern Kenya. It is easily distinguished from all other species in the family, as it is the only species that has simple, pinnate leaves, and the leaflets are the largest in the family. The family, where it reaches 15 cm in diameter and is the thickest and roughest in the family.



Figure 12: *Moringa ruspoliana* flowers, leaves (Anonymous,2023m)

The main characteristics of the miracle tree *Moringa oleifera* and other species belonging to the moringa species, such as their botanical characteristics and growth requirements, are explained in detail, and it is also discussed that these species are widely used in the world and are evaluated in many ways both for human food, medicinal purposes and as feed.

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**THE EFFECT OF DOSES OF DIFFERENT NITROGEN FORMS AND DOSES
ON YIELD AND SOME OTHER YIELD CHARACTERISTICS OF
ANNUAL RYEGRASS (*Lolium multiflorum* Lam.)**

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Abstract

In order to develop animal husbandry in Türkiye, quality feed cultivation must be increased. In our country, which has many different ecological regions, Annual ryegrass, which is grown in a short time and can give high fresh and hay yield per unit area, has been evaluated especially in terms of forage production quality in recent years. Annual ryegrass, which is a quality, cheap and very effective feed source, has a very important place in animal feeds and mixtures. The research was carried out in the trial areas of Ege University Faculty of Agriculture, Department of Field Crops in the 2021-2022 growing season. The aim of the study is to determine the effects of different nitrogen forms (urea and urea+NBPT) and doses (0, 5, 15, 20, 25 kg/da) on yield and some other yield characteristics in Annual ryegrass (*Lolium multiflorum* Lam.). In the study; plant height (cm), stem diameter (mm), yield (kg/da), dry matter ratio (%) etc. were investigated. According to the results obtained, some differences were observed in different nitrogen doses and forms of Annual ryegrass. It has been concluded that there is an increase in yield with the increase of nitrogen doses and 20 kg/da nitrogen and Urea+NBPT fertilizer application can be the best fertilizer level that increases yield in Annual ryegrass.

Keywords: Annual ryegrass, *Lolium multiflorum*, nitrogen dose, yield, NBPT, urea.

Introduction

Living things need food to survive. As the world population increases, this need also increases. Consumption of animal foods is very important for human health. The protein requirement of a normal individual is 1 g per kilogram, 50% of which is from animal sources (Orak and Demirhan, 2016). Türkiye has a geographically favorable location for animal husbandry. Climatic conditions are suitable for animal husbandry, but climate characteristics, summer droughts and soil structures increases opportunities for ovine husbandry (Turan et al., 2017). However, one of the biggest problems related to animal husbandry in Türkiye is the low milk and meat yield per animal due to the lack of sufficient and high quality feed (Tuncel et al., 1997). In order to address the yield and quality investigated in forage crops, the plants must be fertilized in appropriate combinations and ratios at the required times. In addition to yield, feed quality has the greatest value for animal health. Nitrogen, the most important nutrient for plants, constitutes the majority of dry matter. In addition, nitrogen is incorporated into proteins, chlorophyll, enzymes and vitamins in plants. Nitrogen is the most widely used nutrient. Nitrogen fertilizers in appropriate amounts increase protein content, but excess nitrogen use in plants also leads to the accumulation of nitrates and alkaloids. A positive response of Italian ryegrass to nitrogen fertilizer application has been reported (Çolak, 2015; Özdemir et al., 2019). Nitrogen fertilizers cannot be used effectively in the soil. At most, they are lost from the soil by denitrification, soil erosion, washing and immobilization. For this reason, very special and technological fertilizers have been developed. *Lolium multiflorum* Lam. is one of the most valuable forage crops today as a cheap, efficient and high quality feed. Annual ryegrass, which is widely used in animal husbandry in developed countries, is a delicious foragecrop rich in protein, dry matter, soluble carbohydrates and minerals. It is also an excellent supplement to solve the feed problem of Turkish livestock. It is widely cultivated throughout our country, especially in the Mediterranean, Marmara and Aegean regions. Depending on the fertilizer application method, soil type and environmental factors, urea fertilizers tend to evaporate nitrogen as ammonia (NH₃) and this loss of nitrogen can reach up to half of the total nitrogen. One method to reduce nitrogen loss in urea fertilizers is to inhibit urease activity to reduce urea hydrolysis. NBPT is a recognized inhibitor of N-(n-butyl) thiophosphoric triamide. The most valuable significance of NBPT is that it can effectively inhibit urease in various soil types even at low concentrations. The aim of this study was to determine the effect of appropriate

nitrogen forms and doses on yield and some quality traits of Annual ryegrass in order to close the yield and quality feed deficit in our country.

MATERIALS AND METHODS

It is understood that a typical Mediterranean climate prevails in the research site where the

effects of two different nitrogen norms and different nitrogen doses on yield, yield components and quality of Annual ryegrass (*Lolium multiflorum* Lam.) were investigated in the trial fields of Ege University Faculty of Agriculture, Department of Field Crops during the 2021-2022 growing period.

In order to determine the soil properties of the trial area, soil samples (0-30 cm) taken from the field in the trial area in accordance with the procedure were physically and chemically analyzed at Ege University Faculty of Agriculture, Department of Soil Science and Plant Nutrition and the results obtained showed that the soil of the trial area is loamy at a depth of 0 to 30 cm, and this alluvial structure, which is the Bornova Plain, shows a very heavy soil quality. The pH value determined at 0-30 cm depth was 7.88, indicating that the soil in the parcel was slightly alkaline. For annual ryegrass a pH range of 5.0 to 7.8 is reported as the most suitable range (Assouma, and Çelen, 2022).

In the research; the material we used as seed was obtained from the private sector. *Lolium multiflorum* Lam. "Baqueano" variety was used. In the study, 5 different nitrogen doses (0, 5, 15, 20 and 25 kg/da) and 2 different nitrogen fertilizer forms, urea and urea+NBPT ((N-(n-butyl) thiophosphoric triamide)) inhibitor were used. The experiment was arranged according to randomized block design with 3 replications. Preparation of the research area and tillage was started 15 days before sowing, the field was first plowed with a plow at a depth of 20-25 cm and the field was made ready for sowing by milling.

Sowing was done manually on November 19, 2021, when the temperature and soil conditions were suitable for the rows opened with 20 cm row spacing with the help of a marker, with the calculation of 4 kg/da seed per decare, with 10 rows in each plot. Along with sowing, 25 kg/da 12.12.12 organomineral fertilizer was applied per decare. In the application of nitrogen fertilizer, which was considered as an experimental factor, half of the nitrogen was applied with sowing and the other half was applied during the spike emergence period. The plants were harvested from a height of 5 cm during the spike emergence period on May 15, 2022. Some characteristics were examined in the trial. Plant height (cm): The distance from the soil surface

to the top of the plant was measured with a ruler for 10 plants from each plot before harvesting. Stem diameter (mm): Before harvesting, 10 plant samples were randomly selected from each plot and the stem diameter of each plant was measured from a reference point. Dry matter content (%): Dry matter content was calculated after drying the samples in an oven at 105 °C for 2 days. Hay yield (kg/da): The samples taken from the plots where herbage yield was determined were dried in a drying cabinet at 50 °C for 48 hours and the hay yield of the plots was determined by proportioning the obtained value with the herbage yield.

The results obtained from the experiment were analyzed by using TOTEMSTAT statistical evaluation program at Ege University, Faculty of Agriculture, Department of Field Crops. The least significant difference (LSD 5%) values were calculated and shown at the bottom of the tables (Açıkgöz et al., 2004).

RESULTS and DISCUSSION

Plant Height and Stem Diameter: The mean values of plant height and stem diameter characteristics of different nitrogen forms and doses in annual ryegrass (*Lolium multiflorum* Lam.) are given in Table 1. When the results of the statistical analysis were evaluated, it was seen that fertilizer forms and nitrogen doses had significant effects, while fertilizer x nitrogen doses interaction was not statistically significant. According to Table 1, the highest average plant height value was obtained from Urea+NBPT application with 115,6 cm, while 111,10 cm plant height value was obtained in Urea application. In terms of nitrogen doses, the highest average plant height value was 122,27 cm. with 25 kg/da nitrogen application and the lowest mean value was obtained from the control (0 dose) application with 101.04 cm.

In studies conducted with annual ryegrass under different ecological conditions, different results were obtained in plant height. Our findings were higher than the plant height values obtained by Türemen (1988); 69.84 cm, Demiroğlu et al. (2007); 48.4 cm, Kesiktaş (2010); 60.3-71.6 cm, Pak and Türk (2019); 83-95 cm, Yaman (2019); 87-93 cm and lower than the plant height values obtained by Serin and Gökkuş (1996); 130 cm, Assouma and Çelen (2022); 131 cm. It is also similar to the values obtained by Çetin (2017); 125 cm and Ürem (1985); 121 cm. It is thought that the difference between the values obtained for plant height and the values reported by other researchers may be due to the ecological conditions in which the research was conducted and the doses and forms of nitrogen used.

Table 1: Effect of different nitrogen forms and doses on plant height (cm) and stem diameter (mm) in Annual ryegrass

NITROGEN DOSES (kg/da)	PLANT HEIGHT (cm)			NITROGEN DOSES (kg/da)	STEM DIAMETER (mm)		
	UREA	U+NBPT	Mean		UREA	U+NBPT	Mean
0	100.83	101.25	101.04	0	3.21	3.21	3.21
5	105.37	109.37	107.62	5	3.29	3.25	3.27
15	111.08	116.54	113.77	15	3.35	3.27	3.31
20	117.12	127.52	119.57	20	3.48	3.35	3.42
25	121.14	123.32	122.27	25	3.45	3.40	3.42
Mean	111.10	115.6	112.85	Mean	3.35	3.29	3.32
LSD (%5): F:1,76 ND:2,79 FxND:ns				LSD (%5): F: 0,01 ND: 0,02 FxND:0,03			

When the results of the statistical analysis of the stem diameter trait were examined, it was observed that fertilizer forms and nitrogen doses had a significant effect, and the fertilizer x nitrogen doses interaction was found to be statistically significant. As can be seen in Table 1, the highest stem diameter value was obtained from 20 kg/da nitrogen urea application with 3.48 mm, while the lowest stem diameter value was obtained from the control group of both fertilizer (urea and urea+NBPT) applications with 3.21 mm. The average stem diameter values were determined as Urea (3.35 mm) and Urea+NBPT (3.29 mm) in the applied fertilizer forms. When the data obtained were analyzed in terms of nitrogen doses, it was understood that the highest stem diameter values were obtained from 20 kg/da and 25 kg/da nitrogen applications with 3.42 mm. Stem thickness is one of the traits that mainly depends on the genetic structure of the variety. Especially the thickness of the stem, which enables the plant to stand upright from the ground, supports the leaves, which are the anabolic organs of the plant, and the flower, which is the reproductive organ of the plant. The stem diameter values obtained by us are consistent with the stem diameter values of 2.92-3.69 mm obtained by Çolak (2015), 3.2-3.8 mm obtained by Çetin (2017), 3.33-3.41 mm obtained by Assouma and Çelen (2022).

Hay yield and Dry matter ratio: The results of analysis of variance of hay yield values of different nitrogen forms and doses in annual ryegrass are given in Table 2. In the statistical evaluation, it is understood that the factors of nitrogen doses and fertilizer forms and fertilizer x nitrogen doses interactions have statistically significant differences in hay yield.

The highest hay yield value was 797 kg/da and the lowest hay yield value was obtained from Urea+NBPT application with 360 kg/da and from the control application with 359 kg/da. In terms of fertilizer forms, the highest hay yield value was obtained from Urea+NBPT application with 618 kg/da. When the data obtained in terms of nitrogen doses were analyzed; the highest hay yield value was recorded in 20 kg/da nitrogen application with 790 kg/da and the lowest yield was recorded in the control application with 360 kg/da. In many studies carried out in different regions; hay yield values were determined between 571 kg/da and 416 kg/da by Alison et al. (1989), 783,31 kg/da by Türemen (1988), Sağlamtimur et al. (1988) found 500-600 kg/ha and Pak (2019) found 514 kg/da. The hay yield values obtained as a result of the research were similar to the values obtained by the researchers.

Table 2 . Effect of different nitrogen forms and doses on dry matter ratio (%) and hay yield (kg/da) in Annual ryegrass

NITROGEN DOSES (kg/da)	DRY MATTER RATIO (%)			NITROGEN DOSES (kg/da)	HAY YIELD (kg/da)		
	UREA	U+NBPT	Mean		UREA	U+NBPT	Mean
0	26.27	26.40	26.34	0	359	360	360
5	25.52	25.37	25.44	5	546	551	549
15	24.88	24.66	24.77	15	657	685	671
20	25.23	25.00	25.12	20	782	797	790
25	25.48	25.32	25.40	25	658	698	678
Mean	25.48	25.35	25.41	Mean	600	618	609
LSD (%5): F:ns ND:ns FxND:ns					LSD (%5):		
F: 1 ND:2 FxND:3							

The percentage of dry matter depends on the amount of water in the plant, which in turn depends on the presence of structural and non-structural compounds or organelles in the plant. In

general, the percentage of water is high in young cells and tissues of plants, where physiological activity is strong, but as cells and tissues age, physiological activity and percentage of water tend to decrease (Mohr and Schopfer,1995). When plants have sufficient nitrogen, their vegetative growth is supported by a dark green color (Kaçar,1977). In this case, it is predicted that the dry matter ratio may decrease due to the relative decrease in structural matter in plants under normal nitrogen fertilization conditions. Furthermore, nitrogen application increased the water content and decreased the amount of unstructured carbohydrates in the plant (Brink and Fairbrother, 1992). However, it is conceivable that the greater number of cells with more wall surface area may have made the effect of nitrogen rate on the dry matter content of the plant negligible. The results of some studies on dry matter content of annual ryegrass (Kamacı (2022) 23.8%-26.1%) were similar to our findings and lower than Assouma and Çelen (2022) 42%-49%. It is thought that the ecological conditions of the regions, planting norm, type and dose of fertilizer used may be effective in the different results among the studies.

CONCLUSION

In order to make sustainable agriculture valuable in Türkiye and to increase yields in limited areas, important findings were found in the results of the research.

According to the results of the study conducted under Aegean region climate and weather conditions, 20 kg/da urea + NBPT nitrogen application can be recommended as top fertilizer for annual ryegrass plants. According to these results, it would be appropriate to repeat the study for one more year in order to make more reliable recommendations.

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HONEYBEES AS BIOINDICATORS AND THEIR POTENTIAL FOR ENVIRONMENTAL MONITORING

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ABSTRACT

A bioindicator is an organism or a biological system that is used to monitor the health and quality of the environment. Bioindicators are sensitive to changes in their surroundings, and their responses can provide valuable information about the condition of ecosystems, levels of pollution, or other environmental factors. By studying the behavior, abundance, growth, or other biological responses of these organisms, researchers can assess the impact of human activities or natural processes on the environment. Honeybees (*Apis mellifera* L.) have emerged as promising bioindicators due to their intricate interactions with the environment and sensitivity to various stressors. Honeybee colonies exhibit dynamic behaviors influenced by factors such as pesticide exposure, habitat loss, and climate change. As highly organized social insects, honeybees respond to environmental stressors through changes in foraging patterns, colony size, and overall hive productivity. These observable alterations in behavior serve as valuable indicators of environmental stress, offering real-time insights into the ecological impact on both local and global scales. The integration of honeybees into environmental monitoring programs provides a cost-effective and scalable solution for assessing the health of ecosystems. The monitoring of hive parameters, including hive weight, temperature, and bee communication signals, allows for the detection of subtle environmental changes that may otherwise go unnoticed. In this review, general information will be given about the characteristics, use and potential of honeybees and bee products as a biological indicator.

Keywords: Honeybees, bioindicator, environmental monitoring

Introduction

Environmental problems have an international importance today due to the influence of globalization. Although the environmental problems of developed and developing countries differ, these problems are generally; greenhouse gas emissions, deforestation, extinction of plant and animal species, damage to the ozone layer, climate change, urbanization and waste management (Özsoy and Dinç, 2016). The reasons for the emergence of environmental problems can be detailed further, but the main reasons can be listed as population growth rate, urbanization, industrialization, tourism, globalization and poverty (Görmez, 2018). Today, when environmental problems are considered, environmental pollution is the first thing that attracts attention. Environmental pollution in itself; They are grouped as soil pollution, water pollution, air pollution, noise pollution, nuclear/radioactive pollution and electromagnetic pollution. Changing the composition of the air in a way that disrupts human health or environmental balance, and the mixing of substances harmful to human health into the air causes air pollution. Soil pollution occurs as a result of the decrease in the fertility of the soil and the deterioration of soil properties. Soil pollution is pollution that cannot be eliminated or transformed in nature and threatens human health. Discharge of wastewater from industrial facilities into the environment without treatment and unconscious use of pesticides and fertilizers used in agriculture cause pollution of our surface and underground waters. Maintaining a healthy life is only possible with a healthy environment. Traditional methods and chemical analysis methods are applied to observe environmental pollution. However, the data obtained from these methods only show the presence of pollutants in the environment. It does not provide information about its effects on living organisms in the same environment (Taylan and Özkoç, 2007).

Biomonitoring is a valuable method for evaluating the effects of geothermal energy on vegetation and ecosystems, potentially aiding in establishing natural backgrounds before and after development (Lattanzi et al., 2020). In recent years, biological monitoring studies have been carried out to detect toxic substances that cause environmental pollution. Bioindicator organisms are used in biological monitoring studies.

Bioindicators and biomonitoring

Bioindicators are living organisms such as plants, plankton, animals, and microorganisms that are used to scan the health of the surrounding natural ecosystem. Bioindicators are used to evaluate environmental health and biogeographic changes occurring in the environment (Parmar et al., 2016). Indicator species are the species with well-known ecology, and their

decrease or increase in the ecosystem indicates the pressure of many factors (such as climate change, the mixing of various pollutants into the environment) on the ecosystem. Biomonitoring is a technique for monitoring environmental changes, identifying pollutants, and evaluating the effects on ecosystems (Lattanzi et al., 2020). Biomonitoring or biological monitors can be defined as living things that can provide quantitative information about the quality of their environment. Therefore, a good biomonitor should be able to provide information about the size and exposure duration of the pollutant in addition to indicating its presence in the environment. Biomonitoring organisms are organisms that absorb certain toxins from their environment over a certain period of time and accumulate them in their tissues. Detecting the presence of these species in the environment and their passive use provides information about the conditions of the environment (Gadzała-Kopciuch et al., 2004). Bioindicator species effectively indicate the state of the environment due to their moderate tolerance to environmental variability compared to rare species and ubiquitous common species. This tolerance gives them sensitivity to indicate environmental change but robustness to withstand some variability and reflect the overall biotic response (Holt and Miller, 2010).

Bioindicator species

Although they can be classified in different ways, biological monitors can be divided into three groups according to the type of organism used: Microbial bioindicators, plant bioindicators, animal bioindicators. Microbial indicators can be used in both water and soil ecosystem assessment. Their presence in large amounts provides an advantage over other types of bioindicators. Plants maintain ecological balance by cycling nutrients and gases. An indicator plant exhibits symptomatology when exposed to phytotoxic concentrations of a pollutant or mixture, and can act as air pollution indicators by accumulating the pollutant in their tissues (Bakiyaraj and Ayyappan, 2014). Besides, lichens can also be used as biomonitors. They react differently to different levels of pollutants, especially by storing airborne pollutants in their bodies. Since they do not have a developed root system, they exchange water and mineral substances with their entire surface. Thus, they accumulate air pollutants in their tissues. The populations of animal indicators respond either positively or negatively to the threat that environmental contamination poses to the ecosystem. Reactions including toxin accumulation in animal tissues and the population's rate of deformity, in addition to population changes, can also be utilized as indicator features. Species belonging to this category are often common. Fish, amphibians, birds, reptiles, mammals, and benthic invertebrates can all be employed as bioindicators. Vertebrates in particular are frequently employed as bioindicators.

Honeybees as unique bioindicators

Insects are the most common animal in all types of ecosystems, and they can be used to measure the effects of environmental changes. Research on taxonomy, behavior, and the environment will eventually be required to track biodiversity changes and their unavoidable effects. The use of biomonitors and bioindicators is crucial for evaluating environmental change. Biomonitors are used to collect quantitative data on the quality of the environment, while bioindicators can be used to determine the quality of changes occurring. As a result, using insects as a bioindicator to evaluate the caliber of environmental changes is essential (Chowdhury et al., 2023). Among insect species, bees are excellent bioindicators. Because they have a high death rate and accumulate toxins that cause environmental pollution in their bodies and products (Ponikvar et al., 2005). While solitary bees or bumblebees are susceptible to environmental stressors, the honeybee (*Apis mellifera* L.) colony as a whole is more resilient and can respond to or collect toxins without experiencing disruption (Cunningham et al., 2022). This makes it possible to map pollutants within a given geographic area and investigate ecotoxicology gradients through long-term colony monitoring. Honeybees' rapid reproduction, ubiquity, unique nutrition, hair-covered bodies and wide-area flight characteristics make them good bioindicators (Ponikvar et al., 2005). Bee products; especially honey, beeswax, pollen, propolis; It also carries samples from various environmental parts such as soil, water, air and plants. Honeybees as bioindicators; The feature of analyzing the products accumulated in the body of the bee, such as behavioral changes, mortality rates, heavy metal contents, pesticides and radionuclides, is also important (Zhelyazkova, 2012). Bees are social creatures and react to environmental changes.

Biological monitoring with honey bees can be examined in different ways:

- Monitoring colony growth and development in honey bees
- Monitoring the hive parameters (temperature, humidity, weight etc.)
- Presence of nectar and pollen in the hive
- Examination of the honeybee behavioral changes
- Temperature monitoring in colonies
- Examination of immune functions
- Examination of behavioral characteristics like foraging, flight activity, egg laying capacity of the queen bee.
- Examining the bodies of live and dead larvae;
- Examining the bodies and digestive systems of adult bees
- Determination of sublethal and lethal effects

- Mortality
- Analysis of bee products

A research found that 75% of honey samples taken from all over the world had pesticide residues in them. According to Mitchell et al. (2017), this finding indicates that pesticides are dispersed over a large geographic area by soil, water, and air. Analyses of honey residue are crucial, particularly when establishing the level of pesticide use in the area where it is gathered. In the research conducted by Nisbet et al. (2013), at the end of the four-month period, iron, nickel, copper, zinc, cadmium and lead levels were measured in bee and honey samples. It was determined that mineral levels in colonies differed depending on the areas where they were placed ($p < 0.05$). According to the results, bees and their products' mineral levels are influenced by environmental conditions, and they can serve as bioindicators for environmental monitoring. Heavy metals are substances that, even in small amounts, can be harmful. The body absorbs heavy metals through the mouth, respiratory system, and skin. The majority of these metals cannot be eliminated by the body's excretory tracts—the kidney, liver, intestine, lung, and skin—without the assistance of specialized support. The majority of heavy metals build up in living organisms. These metals can accumulate and lead to major illnesses (thyroid, neurological, infertility, and autism) and even death at appropriate quantities.

Honeybees fly within a three-kilometer radius to take advantage of nectar, pollen, and water, which are their primary food sources. They can therefore give information about the possible degree of contamination and convey the elements of pollution in this region to the hive. In a study by Zaferaki et al. (2022), the ICP-MS method was used to assess the amounts of 27 macro and trace elements in bee, honey, wax, pollen, and larvae samples that were taken from industrial sites. In comparison to honey, larvae, and pollen, they found that beeswax and bee samples had higher quantities of hazardous elements such mercury, lead, and mercury. Furthermore, it was reported in this study that adult bees gather more elements in their bodies than do larvae, making adult bees and beeswax better tools for tracking macro and trace elements in the environment. It is stressed that the area with the highest level of industrial activity is also the one where cadmium is found in bees and bee products at the highest concentration.

Polycyclic aromatic hydrocarbons (PAHs) are a large group of organic compounds that contain two or more aromatic rings and belong to the category of food and environmental pollutants. They are produced by both natural and anthropogenic processes. Among these sources, pyrogenic (incomplete combustion of coal, oil, gas, wood, garbage, or other organic matter)

and petrogenic inputs are the two main sources of PAHs. Cochard et al. (2021) used honeybees as biomarkers of PAH pollution in 36 industrial zones, covering more than 950 km² of biomonitoring area. In a 3-year study, they reported that PAH7 concentration increased with increasing anthropization in bee samples. The residual lead, chromium, and cadmium contents in honey bees and their products were assessed in the study done by Conti and Botre (2000). Over the course of three months, samples from five distinct sampling regions were gathered for the analysis. Based on the collected data, statistically significant variations were found between the levels recorded in Rome's downtown. These findings led them to conclude that, while pollen, propolis, beeswax, and honey bees are considerably more effective than honey analysis alone, honey bees and their products can be thought of as bioindicators in detecting heavy metal contamination.

Determining the effects of pesticides is also possible through biological monitoring with honey bees. Karahan et al. (2018b) examined the effect of the active ingredient Thiacloprid on the navigation behavior of honey bees. The mixture prepared at five different doses was tested on 300 Anatolian honey bees in five trials and one control group. As a result of the study, it was determined that honey bees exposed to high doses died or were unable to return to their hives. However, it was observed that the most hive surprise occurred in honey bees exposed to the lowest dose. As a result, it has been stated that in applications of Thiaclopridin lower than the label dose, the life span of bees changes and behavioral disorders and tremors are observed.

The SARS-CoV-2 virus enables the spread of infection outdoors, and in densely urbanized areas, airborne particulate matter (PMs) are considered to exacerbate viral transmission. Colonies of *Apis mellifera* are used as bioindicators because they allow environmental sampling of different natures, including PMs. The study demonstrated for the first time the possible use of honeybee colonies in SARS-CoV-2 monitoring. The study was conducted at the height of the third wave of the Italian pandemic. Sterile sticks were lined up at the entrance of the hive to sample the dusty material on the bodies of the field bees returning to the hive, and it was stated that all of them were positive for viral SARS-CoV-2 (Cilia et al., 2022). This results shows that *Apis mellifera* colonies can be used as a potential bioindicator in the environmental detection of airborne human pathogens, at least in a densely urbanized area.

Results

Biomonitoring uses sensitive, ubiquitous and stable organisms in the region of interest to obtain accurate information about the pollutants present in the region and their biotoxic effects. Honeybees appear to meet all these requirements. Honey bees are directly affected by the

toxicological conditions in their environment. The honey bee's sensitivity to environmental conditions has made it a successful bioindicator creature. As a bioindicator, the honey bee's sensitivity to environmental conditions allows it to serve as an early warning system for potential ecological disruptions. Its ability to detect changes in air and water quality, pesticide contamination, and habitat loss makes it an invaluable species for monitoring environmental health. The type and amount of macro-micro elements in the honey bee's body are related to the characteristics of the region where the apiary is located and the physiological state of the colony. In biological monitoring studies, the development of colonies can be followed and behavioral differences and mortality rates of bees can be reported. Different characteristics of bees can be used in different types of pollution. The chance to collect and compare homogeneous data from large regions using the same sampling technique as for honeybees makes it possible to obtain unexpected and very useful information for the integrated management of environmental aspects at scales larger than individual countries. Additionally, data obtained by analyzing bees and their products can help beekeepers protect bee populations by avoiding heavily polluted areas. Data from bees as bioindicators may also be useful when trying to establish environmental limits on concentrations of pollutants that are toxic to humans or bees. For this purpose, studies should be carried out to establish legal regulations regarding the use of bioindicators. More detailed and comprehensive studies are needed to further realize the incredible potential of honeybees in providing data that can be useful in the management of environmental problems.

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IMPACT OF ENVIRONMENTAL FACTORS ON BEE VENOM PRODUCTION AND QUALITY

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ABSTRACT

Bee venom, a complex mixture of bioactive compounds, holds significant therapeutic potential and plays a crucial role in apiculture and traditional medicine. Honey bee venom (apitoxin) is produced in the venom glands in the abdominal cavity of the worker bee and stored in the venom sac and their venom composition is known to vary under different environmental conditions. Bee venom has widespread use in health, Apitherapy, cosmetics and medicine due to its rich chemical content. Achieving the success in these areas is directly related to the quality and quantity of the products used. There are studies on the factors affecting both the amount of venom production and the quality of the bee venom in terms of content. It is important to investigate the effects of key environmental factors, including temperature, humidity, floral abundance, and pesticide exposure, on the synthesis and secretion of bee venom. Preliminary findings suggest a dynamic interplay between environmental variables and bee venom production. Temperature fluctuations impact the metabolic activity of venom-producing glands, while floral diversity influences the botanical origins of compounds found in the venom. Pesticide exposure emerges as a potential disruptor, affecting both the quantity and chemical profile of bee venom, raising concerns about the unintended consequences of agricultural practices. Understanding the relationship between environmental factors and bee venom production holds implications for both apicultural practices and medicinal applications. Beekeepers can optimize venom yield by developing hive management strategies in response to local environmental conditions. Furthermore, insights into the environmental determinants of venom composition contribute to the standardization of bee venom used in traditional medicine and apitherapy, enhancing the reproducibility and efficacy of therapeutic applications. This review delves into the intricate relationship between environmental factors and bee venom production, shedding light on the multifaceted influences that shape the quality and quantity of this valuable substance.

Keywords: Honeybee, bee venom, venom production, environment

Introduction

Bee products have been used for therapeutic purposes throughout history due to the many biologically active substances they contain, in addition to being used as food. In this treatment option called Apitherapy; products such as honey, beeswax, propolis, pollen, royal jelly and bee venom are used (Altıntaş and Bektaş, 2019). Apitherapy is a medical supplementary practice that is scientifically accepted as 'the whole of the applied methods of using the protective and therapeutic properties of bee products in human, animal and plant health'. In recent years, Apitherapy, in other words 'treatment with bee products', has come to the fore with the tendency of people to return to natural life (Hellner et al., 2007; Yücel and Ceylan, 2015; Wehbe et al., 2019). When the apitherapy applications are examined, it is noteworthy that bee venom has a special importance among other bee products.

Bee venom, also known as apitoxin; is produced in the venom glands in the abdominal cavity of the bee and stored in the venom sac (Kokuludağ, 2015). Bee venom is a unique mixture of proteins, enzymes and biogenic amines, used in medicine, pharmacy and cosmetology with therapeutic effects and anti-aging potential (Łukasiewicz, 2021). Bee venom (BV) therapy, which uses bee venom to treat various disorders, has been employed in traditional medicine since ancient times (Silva et al., 2015). Bee venom applications are named in two ways in the literature; Bee Venom Therapy (BVT) (intra-dermal, subcutaneous) and Bee Sting Therapy (BST) (Tanyuksel, 2015).

Today, there are methods of bee venom production to enable the use of bee venom in modern medicine as a complementary treatment, in the pharmaceutical industry and in cosmetics. While the old methods involved extracting venom from individual bees, the electro-shock method is now widely used for this purpose. Honey bee venom, which will be used especially for therapeutic purposes, should have a high purity and quality. This is only possible through the application of the right production techniques (Çaprazlı and Kekeçoğlu, 2021). Although many factors are effective in the production of bee venom, the effect of environmental conditions is an important parameter. The aim of this review is to reveal the environmental factors affecting the quality of honeybee venom.

Bee venom and its therapeutic properties

The stinger is the primary defensive and attack organ of bees, particularly honey bees. The bee stinger is a structurally modified ovipositor found in both queen and worker bees. The venom sac in the final segment of the worker bee's abdomen secretes the bee venom. A whole bee venom sac contains around 0.15 to 0.3 milligrams of bee venom (Ali, 2012). The first two

weeks of an adult worker bee's life are when venom production rises and reaches its peak when the worker bee becomes a forager and defender of the hive (Roat et al., 2006). Honeybee venom is a clear liquid that dries quickly even at room temperature, has an attractive pungent fragrance, a bitter taste, and is a hydrolytic combination of proteins with a basic pH (4.5 to 5.5) that bees utilize for defense (Abdela and Jilo, 2016).

A number of active compounds, including peptides and enzymes, have been found in bee venom that could be useful in the treatment of inflammation and disorders of the central nervous system, including amyotrophic lateral sclerosis, Parkinson's disease, and Alzheimer's disease. Furthermore, studies using bee venom have demonstrated encouraging results against many cancer forms and antiviral activities, including against the difficult human immunodeficiency virus (HIV) (Wehbe et al., 2019). Pharmacologically, bee venom has effects that increase blood circulation, rejuvenate the skin, increase smooth muscle contraction, bactericide, regulate heart rhythm and functions, increase blood flow in the heart and brain vessels, increase adrenaline level, protect against radiation, relieve pain before menstruation period in women, and lowers blood pressure. Bee venom has therapeutic effects in treating acne, atopic dermatitis, alopecia, and psoriasis, and has great anti-aging potential, but potential side effects like allergic reactions limit its use in cosmetics (Łukasiewicz, 2021). Also the components of bee venom exhibit encouraging anti-cancer effects on a variety of cancer types (Lebel et al., 2021).

The active ingredient called Melittin makes up about 50% of the venom. Mellitin is important if it is to be used for apitherapeutic or cosmetic purposes (Banks and Shipolini, 1986). Melittin only induces minor allergic reactions, but causes the majority of the pain associated with bee stings. PLA2 (Phospholipase A) is the most allergenic and immunogenic protein in bee venom. Alone, PLA2 is a non-toxic protein, but when PLA2 forms a complex with melittin, called bee hemolytic factor, it cleaves cellular membrane phospholipids (Damianoglou et al., 2010). It controls blood pressure and is antigenic. MCD Peptide, like Apamin, affects the nerves, but unlike apamin, it causes inflammatory events (Yıldız et al., 2012). Hyaluronidase is an enzyme found in bee venom (1–3%). Hyaluronidase is responsible for fast distribution of toxins, also known as the ‘spreading factor’. Hyaluronidase is considered a potent allergen in bee venom (Clinton et al., 1989).

Table 1. Application of honey bee venom components on different disease types

Disease Type	Component	References
Parkinson's disease	Bee venom (BV)	Alvarez-Fischer et al., 2013.
	Apamin	Alvarez-Fischer et al., 2013.
	BV acupuncture	Khalil et al., 2015.
Amyotrophic lateral sclerosis (ALS)	BV	Lee et al.,2015.
	Melittin	Lee et al.,2014.
	BV acupuncture	Lee et al., 2015; Cai et al.,2015.
Multiple sclerosis	BV	Karimi et al., 2012
Cancer	BV	Choi et al., 2014.
	Melittin	Co et al.,2012.
Liver fibrosis	BV	Kim et al., 2010.
	Apamin	Lee et al.,2014.
	Melittin	Park et al., 2014
	PLA2	Kim et al.,2010.
Atherosclerosis	BV	Son et al., 2006.
	Apamin	Kim et al., 2015.
	Melittin	Jeong et al.,2012
Skin disease (acne vulgaris)	BV	Kim et al., 2015.
	Melittin	Lee et al.,2014.
Learning deficit	Apamin	Kallarackal et al.,2013.
Pain	BV	Kang et al., 2012.
	BV acupuncture	Kang et al., 2015.
Lupus nephritis	BV	Lee et al.,2011.

Bee venom is very sensitive to variability depending on bee races, social status, geographical localization, among other factors (Abd El-Wahed, 2017).

Bee venom production

Bee venom production is a complex process influenced by various factors, including genetic, environmental, and physiological elements. Understanding these factors is crucial for optimizing venom yield in a sustainable and ethical manner. Traditional methods of bee venom collection, such as manual milking, have given way to more refined and humane techniques. The manual process, involving stimulation of bees to sting a collector surface, often led to bee mortality and stress within the hive. In response, modern extraction or bee venom collecting

methods prioritize the well-being of the bee colony while optimizing venom yield. Techniques such as electro-shock method, whereby mild electrical impulses prompt bees to release venom without stinging, have emerged as more ethical alternatives, minimizing harm to the bee population.

Factors effecting bee venom production

A variety of biological and hive management factors influence bee venom secretion and composition, including honey bee intraspecific variation, bee age, colony strength, defense behavior, food supply, season, and technique of venom collection (Nowar, 2016). Also, factors like variations of bee species, pollen source, foraging conditions, queen pheromones, hive conditions and management practices, stress factors, seasonal brood cycle is effective on bee venom prodction.

Understanding the interplay of these factors is essential for beekeepers and researchers seeking to optimize bee venom production while prioritizing the well-being of honeybee colonies. Implementing sustainable practices and minimizing stressors can contribute to ethical and efficient venom collection.

Environmental factors that effects bee venom quantity and quality

Honey bees are the creatures that their entire lives and nutrition depending on nature and environment. Therefore, environmental factors have a very high impact on colony development and production of bee products. As in other bee products; the production process, harvest time, temperature, humidity, and other environmental conditions all have a significant impact on the quality of bee venom (Ghany Zidan et al., 2018; Hussein et al., 2019).

Because of the bees' own life cycle, shifts in the food sources that they may access, and variations in the surrounding temperature and humidity, seasonal variations are one of the significant factors that could influence the composition and quantity of honeybee venom (Çaprazlı and Kekeçoğlu, 2021). During spring, honeybee colonies experience heightened foraging activity as floral resources become abundant. This increased foraging correlates with elevated venom production, as worker bees actively engage in defensive behaviors to protect the expanding colony (Bogdanov, 2015). Ferreira Junior et al., (2010) found that melittin and phospholipase A2 were controlled by seasonal changes without any specific connection with a climate parameter. In addition, the results obtained by El-Bassiony et al., (2016) in their study in Egypt revealed that spring and summer, the time period when the colony is active, are the best intervals for collecting honeybee venom. As a result, researchers stated that this situation has a relationship with the nectar and pollen status that meets the nutritional needs of the colony.

Summer is characterized by optimal weather conditions and a profusion of blooming flowers, leading to peak foraging activity. Research indicates that bee venom production tends to be highest during the summer months, aligning with the increased need for colony defense and resource gathering (Bogdanov, 2015; DeGrandi-Hoffman et al., 2010). As the availability of floral resources diminishes in the fall, honeybee colonies undergo a shift in behavior. Reduced foraging activity during this season is associated with a decline in bee venom production, as the colony prioritizes resource conservation in preparation for winter (Bogdanov, 2015; Simone-Finstrom and Spivak, 2012). Winter is a period of reduced activity for honeybee colonies, marked by lower temperatures and limited foraging opportunities. Bee venom production is minimal during winter, reflecting the colony's focus on survival and energy conservation rather than active defense (Bogdanov, 2015; Simone-Finstrom and Spivak, 2012).

Studies have indicated that the diversity and composition of pollen sources influence the chemical composition of bee venom. Bees foraging on a variety of pollen sources may exhibit variations in venom constituents, potentially impacting the therapeutic properties of the venom (Bogdanov, 2015; Bouzid, B. et al., 2013). The abundance of pollen in the environment has been linked to increased foraging activity among worker bees. Foragers actively collecting pollen may exhibit heightened defensive behaviors, resulting in elevated bee venom production (Bogdanov, 2015; Simone-Finstrom and Spivak, 2010). Bees foraging on specific plant species or sources may incorporate unique compounds from pollen into their venom. The chemical diversity of pollen sources contributes to the complexity of bee venom, potentially influencing its therapeutic properties (Bogdanov, 2015).

Another important factor among environmental conditions is pesticide use. Pesticides, widely used in agriculture to protect crops, have been identified as significant stressors for honeybee populations. The exposure to pesticides can affect various aspects of honeybee biology, including foraging behavior, navigation, and overall colony health, which may consequently influence bee venom production. Sublethal exposure to pesticides, even at concentrations below lethal levels, can have profound impacts on honeybee colonies. These effects may include decreased brood survival, impaired communication, and compromised immune function, all of which may contribute to changes in venom production (Alkassab & Kirchner, 2018; Sánchez-Bayo et al., 2016). Neonicotinoid pesticides, a class of insecticides commonly used in agriculture, have been linked to alterations in honeybee foraging behavior. Studies have shown that exposure to neonicotinoids can impair the ability of worker bees to locate and collect food resources, potentially affecting the overall defensive behavior and venom production within the

colony (Henry et al., 2012; Cresswell, 2011). Chronic exposure to pesticides over an extended period can result in cumulative effects on honeybee colonies. Long-term exposure may lead to sustained stress, compromised immune function, and overall colony decline, potentially influencing the ability of worker bees to produce venom (Kessler et al., 2015; Wu-Smart & Spivak, 2016). Pesticides, such as organophosphates and pyrethroids, can interfere with the normal functioning of honeybee neurotransmitter systems, affecting behavior and communication. Altered neurotransmission may lead to disruptions in the regulation of venom production as part of the defensive response (Desneux et al., 2007; Williamson & Wright, 2013).

Results

Bee venom is an important bee product that holds significant importance in various contexts, including traditional medicine, apitherapy, cosmetics, pharmacology and scientific research. For all these purposes, it is crucially important to ensure the quality of bee venom. Although there are various factors effecting bee venom production and quality, enviromental factors has a huge effect among these. The seasonal patterns align with the natural life cycle and ecological dynamics of honeybee colonies. The intricate interplay between environmental factors, floral availability, and colony needs contributes to the observed variations in bee venom production across seasons. Understanding the interplay between pollen source, nectar availability, pesticides and bee venom production provides valuable insights into the factors influencing the biochemical composition of bee venom. These insights contribute to a broader understanding of the potential therapeutic applications of bee venom. Also it is crucial for developing sustainable agricultural practices that minimize adverse effects on pollinators too.

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AZƏRBAYCANIN XİLASI-QAFQAZ İSLAM ORDUSU

Lətafət Beybutova Ələsgər qızı

Quba şəhərində “Soyqırımı Memorial Kompleksi”

Elmi araşdırmalar, ekspozisiya və fond şöbəsinin müdiri

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Abstract

Ermənilər Çar Rusiyası tərəfindən Azərbaycan ərazilərində yerləşdirildiyi gündən etibarən dövlət yaratmaq uğrunda ardıcıl səyləri bir an belə səngiməmiş, nisbətən əlverişli tarixi şərait yarandıqda isə bu səylər daha da yüksəlmişdir. Erməni millətçilərinin “böyük Ermənistan” dövləti yaratmaq xülyası, Azərbaycan türklərini kütləvi surətdə məhv etmək, yaşadıkları yurdlarından qovub çıxarmaqla həmin ərazidə ermənilərin sayca üstünlüyünə nail olmaq və beləliklə, "milli çoxluğun" dövlətini yaratmaq ideyasını reallaşdırmaq planı idi. Bu planın həyata keçirilməsini qarşılıqlı məqsəd qoyan ermənilər xarici himayədarların köməyi ilə müxtəlif vaxtlarda azərbaycanlılara və türklərə qarşı dəhşətli terror, deportasiya, soyqırımı və etnik təmizləmə siyasəti həyata keçirmişlər. Erməni millətçiləri tərəfindən davamlı olaraq təcavüzkarlıq siyasətinə məruz qalan Azərbaycan xalqı öz tarixi torpaqlarından didərgin salınmış, qaçqın və məcburi köçkünə çevrilmişlər. Ermənilər Azərbaycan torpaqlarında dinc əhaliyə qarşı qətl və qarətlərlə yanaşı, tarixi binalar, məscidlər yandırılmış, maddi-mədəniyyət nümunələrini də məhv etmişlər.

Açar sözlər: dövlət, erməni-bolşevik işğalı, Türkiyə-Azərbaycan birliyi,

Keywords: establishing a state, armenian-bolshevik occupation, Turkish-Azerbaijani union

1917-ci il oktyabr çevrilişindən sonra ermənilər öz iddialarını bolşevik bayrağı altında həyata keçirməyə başlamışdılar. 1918-ci ilin martında Stepan Şaumyan Qafqazın fəvqəladə komissarı təyin edilərək Bakıya göndərildi. Həmin vaxtdan “Əks-inqilabi ünsürlərlə mübarizə” şüarı altında maskalanaraq, daşnak-bolşevik Şaumyanın rəhbərliyi ilə Bakı Kommunası Bakı şəhərini azərbaycanlılardan təmizləmək kimi mənfur bir planı həyata keçirməyə qalxmışdı. 1918-ci il martın 30-dan aprelin 3-dək Bakıda və Bakı quberniyasının müxtəlif bölgələrində, eləcə də Qarabağ, Naxçıvan, Şamaxı, Quba, Xaçmaz, Lənkəran, Salyan, Zəngəzur və digər ərazilərdə Bakı Soveti qoşunlarının və daşnak erməni silahlı dəstələrinin azərbaycanlılara qarşı soyqırımını nəticəsində rəsmi mənbələrə əsasən on minlərlə soydaşımız məhz etnik və dini mənsubiyyətinə görə qətlə yetirilib, yaşayış məntəqələri, tarixi abidələr, məscid və qəbiristanlıqlar viran edilib. [1,səh.257] 1918-ci il martın 31-də Bakı şəhərində azərbaycanlıların kütləvi qırğınına başlanılıb. Dinc azərbaycanlıların qırğınında Bakı Sovetinin 6 min silahlı əsgəri, eyni zamanda, “Daşnaksütyun” partiyasının 4 minlik silahlı dəstəsi iştirak edib. Üç gün davam edən soyqırımını zamanı erməni silahlıları bolşeviklərin köməyi ilə azərbaycanlıların yaşadıkları məhəllələrə qəflətən basqınlar edərək rastlarına çıxan uşaqlardan böyüyədək hər kəsi qətlə yetiriblər. Tarixi faktlardan belə görünür ki, ermənilər “böyük Ermənistan” dövləti yaratmaq arzusunu həyata keçirə bilməsələr də, **1918-ci ildə Azərbaycan torpaqlarında– keçmiş İrəvan xanlığının ərazisində Ermənistan Respublikasının yaradılmasına** nail oldular.

1918-ci ilin may ayının 28-də Azərbaycan Xalq Cümhuriyyəti elan olunandan sonra xarici qüvvələr onun devrilməsi üçün bütün imkanlardan istifadə etməyə çalışarkən Osmanlı Türkiyəsinin göstərdiyi hərbi və siyasi yardım milli dövlətçilik tariximizdə çox mühüm rol oynadı. [2,səh.59] Bakıda hakimiyyəti ələ keçirmiş Stepan Şaumyanın başçılıq etdiyi daşnak-bolşevik rejiminin Azərbaycanın türk-müsəlman əhalisinə qarşı həyata keçirdiyi kütləvi soyqırımının qarşısını almaq və Azərbaycan xalqının müstəqilliyini qorumaq üçün Osmanlı Türkiyəsi və Azərbaycan silahlı qüvvələrindən təşkil edilmiş hərbi struktur Azərbaycan Xalq Cümhuriyyətinin elan edildiyi günlərdən 1918-ci ilin noyabrına qədər fəaliyyət göstərmişdir. Qafqaz İslam Orusunun yaradılmasına hələ 1918-ci ilin əvvəllərində başlanmışdı. Azərbaycan xalqına qarşı daşnak-bolşevik soyqırımının yaxınlaşması ilə bağlı olaraq Azərbaycan milli azadlıq hərəkatının liderləri yeganə çıxış yolunu Osmanlı Türkiyəsindən hərbi yardım almaqda görürdülər. Eyni zamanda I Dünya müharibəsindən sonra ermənilərin Şərqi Anadoluda törətdikləri vəhşilikləri və soyqırımını Azərbaycanda da həyata keçirmələri burada yaşayan türkləri Osmanlı dövlətindən yardım

istəməyə məcbur qoydu. Bolşevik çevrilişinin Rusiyada yaratdığı sarsıntı, Qafqazda rus hakimiyyətinin iflası uğraması, Azərbaycanın demokratik qüvvələrinin Osmanlıdan yardım istəməsi, burada hərbi hərəkata başlamaq üçün əlverişli şəraitin yaranması Ənvər paşaya müharibənin əvvəlindən bəri gözlədiyi tarixi fürsəti həyata keçirməyə imkan verdi. [3]

Qafqaz İslam Ordusunun hissə və bölmələrindən ibarət struktur yaranan gündən Azərbaycanın istiqlaliyyətini məhv etmək üçün irimiqyaslı hərbi əməliyyatlara başlamış bolşevik-daşnak qüvvələri ilə ağır döyüşlərə atıldı. Azərbaycan Hökuməti və bütün Azərbaycan xalqı tərəfindən hərtərəfli dəstəklənən Qafqaz İslam Ordusunun türk və Azərbaycan hərbi qüvvələri Gəncə ermənilərinin tərksilah edilməsində, Qaraməryəm, Kürdəmir, Şamaxı, Binəqədi döyüşlərində və s. vuruşmalarda, hərbi tapşırıqların icrasında misilsiz şücaət göstərdilər, bolşevik-daşnak qüvvələrinə ağır zərbə endirərək, onları bütün cəbhə boyu geri çəkilməyə məcbur etdilər. [4.səh.33]

Qafqaz İslam Ordusu vasitəsilə Azərbaycan hökuməti öz hakimiyyətini tezliklə yerlərdə yaya bildi, ucqarlarda dövlət orqanları yaratmağa başladı. Bakı Xalq Komissarları Sovetinin liderləri Azərbaycan Xalq Cümhuriyyətini bələkdə ikən boğmaq üçün yollar axtarırdılar. Hələ Gəncə üzərinə yürüşə başlamazdan əvvəl Leninin tapşırığı ilə Şaumyan türk qoşunlarının Azərbaycana yolunu bağlamaq üçün Gürcüstan hökumətinin başçısı Jordaniyaya müraciətində, əgər Gürcüstan türk qoşunlarını öz ərazisindən Azərbaycana buraxmasa, Sovet Rusiyası onun müstəqilliyini tanıyacaqdır deyə vəd vermişdir. Azərbaycanın şərqində kommunist dikturası yaradan Şaumyan Bakı Sovetinin ixtiyarında olan 18 min döyüşçü ilə Güney Qafqazdakı milli hərəkəti boğmaq üçün hücumla başladı. İyunun 10-da Bakı Sovetinin Gəncə istiqamətində yürüşləri başlandı. İyunun 12-də Kürdəmiri işğal edən Bakı Soveti qüvvələri Göyçaya yaxınlaşdılar. İki həftədən çox davam edən qanlı döyüşlər Türkiyədən göndərilən əlavə qüvvələrin və Azərbaycan könüllüləri hesabına Qafqaz İslam Ordusunun qələbəsi ilə nəticələndi. Qafqaz İslam Ordusunun Göyçay ətrafındakı qələbəsi Azərbaycanın Şərq hissəsini, o cümlədən Bakını bolşevik-daşnak işğalından azad etmək uğrunda apardığı şərəfli mücadilədə dönüş nöqtəsi oldu.

Bu döyüşlərdə Bakı Soveti qoşunlarına elə ağır zərbələr vuruldu ki, onlar bir daha özlərinə gələ bilmədilər. [4.səh.33-34] Qafqaz İslam Ordusu bolşevik-daşnak birləşmələrini darmadağın edərək Bakı istiqamətində azadlıq yürüşünə başladı. İyulun 20-də bu istiqamətdə mühüm strateji məntəqə olan Şamaxı şəhəri azad edildi. İyulun sonunda S.Şaumyanın rəhbərlik etdiyi Bakı Soveti istefa verməyə məcbur oldu. 1918-ci il avqustun

1-də Bakıda eser, menşevik və daşnaklardan ibarət "Sentrokaspi" diktaturası adlanan mürtəce bir qurum yaradıldı. Qafqaz İslam Ordusu sentyabrın 15-də Bakı üzərinə həlledici hücumu başladı.

Bakı üzərinə hücumu uğurla başa çatdırmaq üçün Qafqaz İslam Ordusunun əsgər və zabitlərinin sayını 14 minə çatırdı. Bunların 8 mini osmanlı, 6 mini isə azərbaycanlı əsgər və zabit idi. Hücum planına görə, Ermənikəndin cənubundan keçmək şərti ilə şəhərin qərb hissəsinin ələ keçirilməsi həvalə olunmuş 15-ci diviziya sağ cinahı Ermənikənddən keçmək şərti ilə şəhərin şimal və şərqindən irəliləməli, Qaraşəhər ərazisini nəzarət altına almalı idi. Azərbaycan könüllü hissələri isə Sabunçudan şəhərə gələn dəmir yolu xətti boyunca hücumu keçib Keşləyə girməli və orada möhkəmlənməli idi. Milli qüvvələrin digər bir hissəsinə Əhmədli istiqamətindən şəhərə doğru hücumu keçmək həvalə olunmuşdu. [4.səh.101] Şəhər saatlarında bütün istiqamətlərdə başlanan hücum öz uğurlu nəticəsini verdi. Qaraşəhər, Ermənikənd və Əhmədli istiqamətində düşmənin hücumu qətiyyətlə dəf edildi.

Qafqaz İslam Ordusunun qarşısının alınmasının qeyri-mümkünlüyünü görən "Sentrokaspi" ordusunun qərb cəbhəsinin komandanı ağ bayraq qaldıraraq danışıqlara gəlir və ona aşağıdakı şərtlər diktə edilir: 1. Şəhərin qeyd-şərtsiz təslim edilməsi; 2. Şəhərdəki düşmən qüvvələrin təslim edilməsi; 3. Top və silahların, binaların və digər obyektlərin təslim edilməsi; 4. Nargin adasında olan türk, alman və Avstriya əsirlərinin azad edilməsi; 5. Silah anbarlarının, ərzağın, avtomobillərin, yük maşınlarının, zirehli avtomobillərin, təyyarələrin və digər hərbi mülkiyyətin təslim edilməsi. Bu şərtlərin qəbul edilməsi ilə yanaşı, əhalini sakitliyə, onların həyatları və mülklərinin təhlükəsizliyi üçün xüsusi bəyanat hazırlanaraq, "Sentrokaspi" nümayəndə heyətinə verildi.

Osmanlı Türkiyəsi qardaş Azərbaycanın ərazi bütövlüyünü təmin etmək məqsədilə Nuru paşanın rəhbərlik etdiyi Qafqaz İslam Ordusu Bakını erməni-bolşevik əsarətindən, ermənilərin soyqırımına məruz qalan azərbaycanlıları qaniçən Şaumyanın başçılıq etdiyi daşnak-bolşevik quldur dəstələrindən xilas edərək, sözün əsl mənasında, azərbaycanlı qardaşlarına kömək oldular. Məlum olduğu kimi, ermənilərin azərbaycanlılara qarşı həyata keçirdikləri soyqırımı siyasətinin əsas məğzi xalqımızı cismən məhv etmək və "böyük Ermənistan" xülyasını gerçəkləşdirmək idi. Amma türk qardaşlığı bu mənfur planın reallaşmasına imkan vermədi. [4]

Beləliklə, sentyabrın 15-i saat 15-dən sonra Bakı şəhəri bütünlüklə Qafqaz İslam Ordusunun nəzarəti altına keçdi. Nuru paşa Bakının ələ keçirilməsilə bağlı hərbi nazir Ənvər paşaya,

Gəncədəki Azərbaycan hökumətinə təbrik teleqramı göndərirdi. Nuru paşa Azərbaycan hökumətindən xahiş edirdi ki, Bakıda asayişin təmin edilməsi üçün Gəncədən polis qüvvələrinin göndərilməsini tezləşdirsin.

Azərbaycan hökuməti sentyabrın 17-də Bakı şəhərinə köçdü. 1918-ci il mayın 28-dən sonrakı dövrdə Azərbaycanın həyatında ikinci mühüm hadisə baş verdi: Bakı azad edildi və Azərbaycan hökuməti tam heyətdə əsl paytaxtda qərarlaşdı. [4.səh.33-35]

Bakı şəhərinin azad edilməsi həm Azərbaycan ictimaiyyətinin, həm də Osmanlı dövlət rəhbərlərinin, xüsusilə Ənvər paşanın çox böyük sevincinə səbəb oldu. O, Şərqi Ordular Qrupunun komandanı Xəlil paşaya göndərdiyi teleqramda deyirdi: “Bakı başarısından dolayı gözlərindən öpərək təbrik edirəm”. Ənvər paşa Nuru paşaya göndərdiyi teleqramda yazırdı: “Böyük Turan İmperatorluğunun Xəzər kənarındakı zəngin bir qonaq yeri olan Bakı şəhərinin azad edilməsi xəbərini böyük bir sevinc və mutluluqla qarşıladım. Türk və İslam tarixi sizin bu xidmətinizi unutmayacaqdır. Qazilərimizin gözündən öpür, şəhidlərimizə fatihələr ithaf edirəm”. Bu tarixi günü və hadisəni M.Ə.Rəsulzadə belə dəyərləndirirdi: “15 sentyabr Azərbaycan xalqının tarixində 28 mayı qədər böyük dəyərə malikdir. Əgər 28 mayda Cümhuriyyətin istiqlalı bütün dünyaya elan edilmişdisə, 15 sentyabrda bu istiqlal real bir təməl üzərində qurulmuş oldu. 15 sentyabrda Qafqaz İslam Ordusu tərəfindən Bakının azad edilməsi ilə başla bədən birləşmiş oldu. Bakı baş, bədən isə Azərbaycandır”.

Azərbaycan hökumətinin başçısı Fətəli xan Xoyski Bakının azad edilməsi münasibətilə Nuru paşaya yazırdı: “Cəsur türk əsgərlərinin Azərbaycanın baş kəndi olan Bakının düşməndən təmizlənməsi münasibətilə millətimin adından dünyanın ən cəsur və soylu əsgəri olan türkün oğullarına minnətdar olduğumuzu ərz etməklə iftixar duyuram. Millət sizə minnətdardır”.

[5] Bakıya daxil olan Türk Ordusunun komandanları Nuru paşa, Xəlil paşa, Mürsəl paşa və başqaları Hacı Zeynalabdin Tağıyevin dəvətini qəbul edərək onun evində qaldılar. Qoşunların Bakıya gəlib bu şəhəri azad edəcəyi təqdirdə ikimərtəbəli böyük malikanəsini türk qoşunları komandanlığına bəxşiş edəcəyini vəd edən Tağıyev sözünə sahib çıxdı. O, öz mülkünü türk qoşunlarının komandanlığının istifadəsinə verdi.

Tarix boyu Türkiyə və Azərbaycan arasında sarsılmaz dostluq və qardaşlıq münasibətləri mövcud olan hər iki xalq istər xoş günlərdə, istərsə də çətin vaxtlarda birlik nümayiş etdiriblər. Türkiyə-Azərbaycan birliyinin çoxəsrlik tarixində yaddaqalan məqamlardan biri də və mən deyərdim ki, ən önəmlisi 15 sentyabr qəhrəman türk əsgərlərinin şücaəti və qanı bahasına Bakı və digər rayonların azad olunması idi. [7] Sevindirici haldır ki, Türkiyə-Azərbaycan birliyi, dostluğu və qardaşlığı bu gün də uğurla davam edir, xalqlarımız arasındakı doğma münasibətlər

daha da d rinl ş r k yeni m rh l y  q d m qoyur. B t n bunlar onu g st rir ki,  b di v   z li
Az rbaycan-T rkiy  birliyi, dostluęu, qardaşlıęı sarsılmazdır v  daim bel  d  olacaę.

Ədbiyyat siyahısı:

Yaqub Mahmudov, Kərim Şükürov “Qarabağ real tarix, faktlar, sənədlər”, Bakı ”Təhsil”, 2005.380 səh.

Professor Anar İsgəndərov; Qafqaz İslam Ordusu və Azərbaycanın xilasını 2019

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Anar İsgəndərov; Azərbaycan Xalq Cümhuriyyəti (1918-1920) Bakı 2008; s.33

Azərbaycan Xalq Cümhuriyyəti Ensiklopediyası, II cild, Bakı, 2005, səh 107

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<https://genprosecutor.gov.az/az/post/3892>

15 sentyabr 1918-ci il: Türkiyə-Azərbaycan qardaşlığının zəfər günü. (15.09.2021)

<https://ikisahil.az/post/248144>

YAŞAM BECERİLERİ DAVRANIŞLARINDA SPORUN ETKİSİ: GENÇLİK VE SPOR PERSONELİ ÜZERİNE BİR ARAŞTIRMA

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ÖZET

Bu araştırmanın amacı; Şırnak Gençlik ve Spor İl Müdürlüğü çalışanlarının yaşam becerilerinde sporun etkisini çeşitli değişkenler perspektifinden incelemektir. Araştırmanın örneklemini 35'i kadın ve 71'i erkek olmak üzere toplam 106 kişi oluşturmaktadır. Anketler, Şırnak Gençlik ve Spor merkezinde ve ilçelerinde yer alan merkezlerde yüz yüze anket yolu ile elde edilmiştir. Araştırmada veri toplama aracı olarak; "Kişisel Bilgi Formu" ve "Sporun Yaşam Becerilerine Etkisi Ölçeği" kullanılmıştır. Veriler SPSS programı kullanılarak analiz edilmiştir. Verilerin normal dağılım gösterip göstermediğinin tespit edilmesinden sonra analizler gerekli testler ile yapılmıştır. Katılımcıların demografik verilerinin dağılımının belirlenmesi için betimsel istatistik yöntemler, yüzde (%) ve frekans (f) analizleri uygulanmıştır. Araştırmada verilerin incelenmesinde t testi ve One-Way ANOVA testlerinden faydalanılmış olup, anlamlılık düzeyi $p < 0,05$ olarak kabul edilmiştir. Bulgular ışığında incelendiğinde cinsiyet değişkenine göre katılımcıların yaşam becerileri incelendiğinde istatistiksel olarak anlamlı bir fark tespit edilmemiştir. Katılımcıların yaşam becerileri eğitim düzeyine göre incelendiğinde duygusal beceri ve amaç belirleme alt boyutlarındaki farkın istatistiksel olarak anlamlı olduğu belirlenmiştir. Katılımcıların yaşam becerileri spora katılım şekline göre incelendiğinde liderlik, takım çalışması, duygusal beceri, amaç belirleme alt boyutlarında ve toplam puanda anlamlı farklılık tespit edilmiştir. Çalışmada, katılımcıların yaşam becerileri üzerinde eğitim düzeyi, spora katılım şekli ve düzenli spor yapma gibi birçok demografik değişkenin etkili olduğu sonucuna ulaşılmıştır.

Anahtar kelimeler: Yaşam Becerileri, Spor, Gençlik ve Spor.

**THE EFFECT OF SPORTS ON LIFE SKILLS BEHAVIORS: A RESEARCH ON
YOUTH AND SPORTS PERSONNEL**

ABSTRACT

The purpose of this research; The aim is to examine the effect of sports on the life skills of Şırnak Youth and Sports Provincial Directorate employees from the perspective of various variables. The sample of the research consists of a total of 106 people, 35 women and 71 men. The surveys were obtained through face-to-face surveys in Şırnak Youth and Sports Center and its districts. As a data collection tool in the research; “Personal Information Form” and “The Impact of Sports on Life Skills Scale” were used. The data were analyzed using the SPSS program. After determining whether the data showed normal distribution, analyzes were carried out with the necessary tests. Descriptive statistical methods, percentage (%) and frequency (f) analyzes were applied to determine the distribution of the demographic data of the participants. In the study, t-test and One-Way ANOVA tests were used to examine the data, and the significance level was accepted as $p < 0.05$. When examined in the light of the findings, no statistically significant difference was detected when the life skills of the participants were examined according to the gender variable. When the life skills of the participants were examined according to their education level, it was determined that the difference in the emotional skills and goal setting sub-dimensions was statistically significant. When the life skills of the participants were examined according to the type of participation in sports, a significant difference was detected in the sub-dimensions of leadership, teamwork, emotional skills, goal setting and the total score. The study concluded that many demographic variables, such as education level, type of participation in sports and regular sports activities, were effective on the life skills of the participants.

Keywords: Life Skills, Sports, Youth and Sports.

GİRİŞ

Dünya Sağlık Örgütü'ne (1993) göre, yaşam becerileri bireyin yaşamında son derece önemli olan yeteneklerdir. Bu beceriler, kişilerin özel yaşamları veya iş hayatları gibi farklı bağlamlarda başarılı olmalarını sağlar. Bu yetenekler sayesinde bireyler yaşadıkları ortama uyum sağlayarak yaşam kalitelerini artırır. Yüksek seviyede yaşam becerilerine sahip olmak, günlük yaşamda karşılaşılan olumsuz deneyimlerle başa çıkmayı ve daha üretken bir şekilde mutlu bir yaşam sürmeyi mümkün kılar (Özer, 2023). UNICEF (United Nations Children's Fund), yaşam becerilerini, bireylerin bilinçli olarak kararlar alabilmelerine, etkili bir iletişim kurabilmelerine, sağlıklı ve üretken bir hayat sürdürebilmelerine, zorluklarla baş edebilme ve öz yönetim yeteneklerini geliştirebilmelerine yardımcı olabilecek çeşitli psiko-sosyal ve kişilerarası becerilerin bir grubu olarak tanımlamaktadır (UNICEF, 2019).

Spor kavramı; içerisinde belli kuralları barındıran, bireyin üstünlük ve güç gibi duygularını tatmin etmeyi hedefleyen, sosyal bütünleşme ve rekabete duygusuna dayalı ruhsal, bedensel ve zihinsel aktivitelerin tamamıdır (Aydemir, 2014). Yaşam becerilerinin geliştirilmesi ve aktarılmasında spor bir araç olarak kullanılabilir. Spor, gençlerin katılım sağladığı kıymetli bir sosyal aktivite olarak görülmektedir. Bu bağlamda yaşam becerilerinin geliştirilmesinde sporu kullanmak hem spor camiası tarafından hem de gençlik geliştirme kampanyaları ile okullar da büyük öneme sahiptir. Sporun kimlik ve özgüven gelişimi önemli faktörlere sahip olmak gibi pek çok pozitif sürece katkı sağladığı bilinen bir gerçektir (Allen vd., 2015). Bu bilgiler ışığında araştırmanın amacı; Şirnak Gençlik ve Spor İl Müdürlüğü çalışanlarının yaşam becerilerinde sporun etkisini incelemektir.

YÖNTEM

Araştırma Modeli

Araştırma nicel araştırma desenine bağlı kalınarak yapılmıştır. Araştırma betimsel tarama modelinde gerçekleştirilmiştir. Tarama modelleri, önceden veya günümüzde mevcut olan bir durumu olduğu gibi betimlemeyi amaçlamaktadırlar (Karasar, 2014).

Evren ve Örneklem

Araştırmanın örneklemini toplam 106 kişi (35 kadın-71 erkek) oluşturmaktadır. Anketler, Şirnak Gençlik ve Spor merkezinde ve ilçelerinde yer alan merkezlerden elde edilmiştir.

Veri Toplama Araçları

Bu araştırma kapsamında spor yapan bireylerden veri toplamak amacıyla bireylerin demografik özelliklerine ilişkin verileri elde etmek için "Kişisel Bilgi Formu" kullanılmıştır. İlaveten katılımcılara "Sporun Yaşam Becerilerine Etkisi Ölçeği" uygulanmıştır.

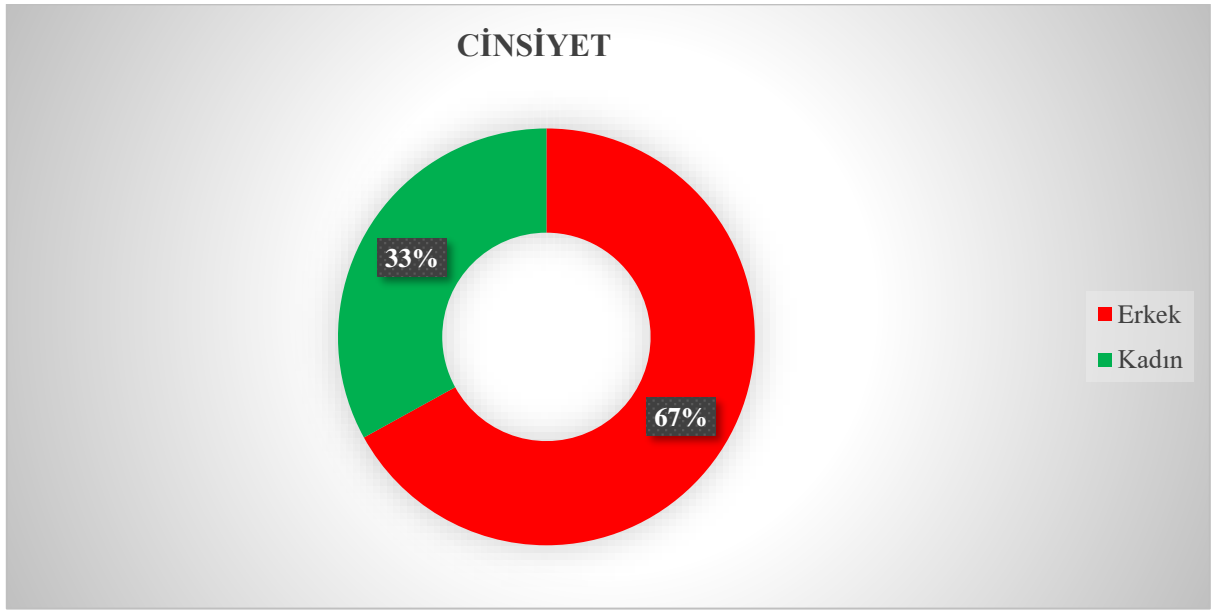
Sporun Yaşam Becerilerine Etkisi Ölçeği: Cronin ve Allen (2017) tarafından geliştirilen bu ölçek 5'li Likert tipindedir. Düz ve Aak (2018) tarafından Trk kltrne uyarlanmıřtır. lek 7 alt boyut ve 31 maddeyi kapsamaktadır. Bu alt boyutlar; zaman ynetimi, iletiřim, liderlik, takım alıřması, ama belirleme, sosyal beceriler ve duygusal becerilerdir. alıřmanın i tutarlık katsayısı .92 olarak hesaplanmıřtır (Dz ve Aak, 2014).

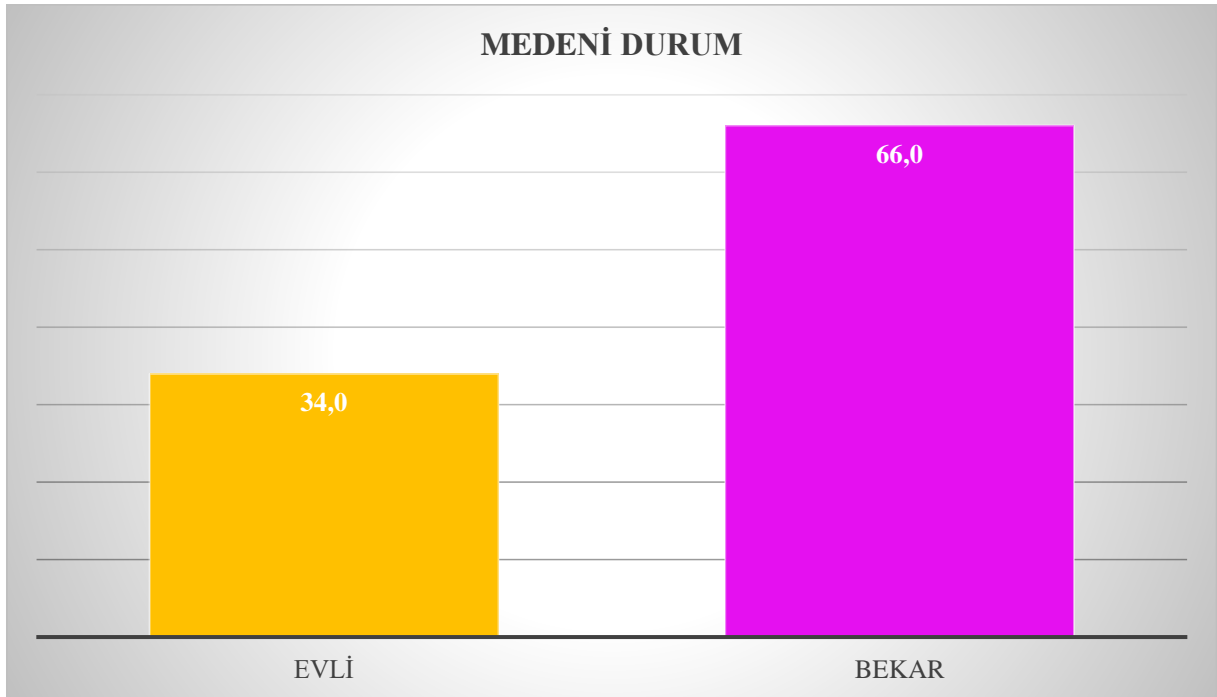
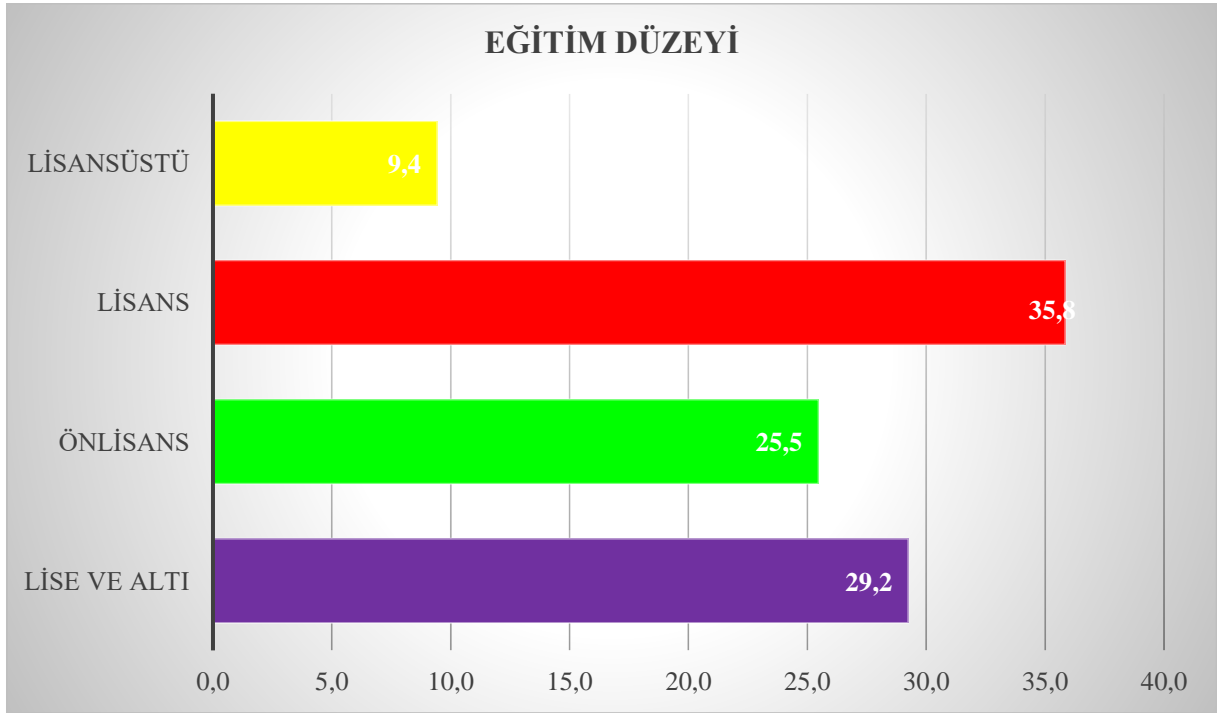
Verilerin Analizi

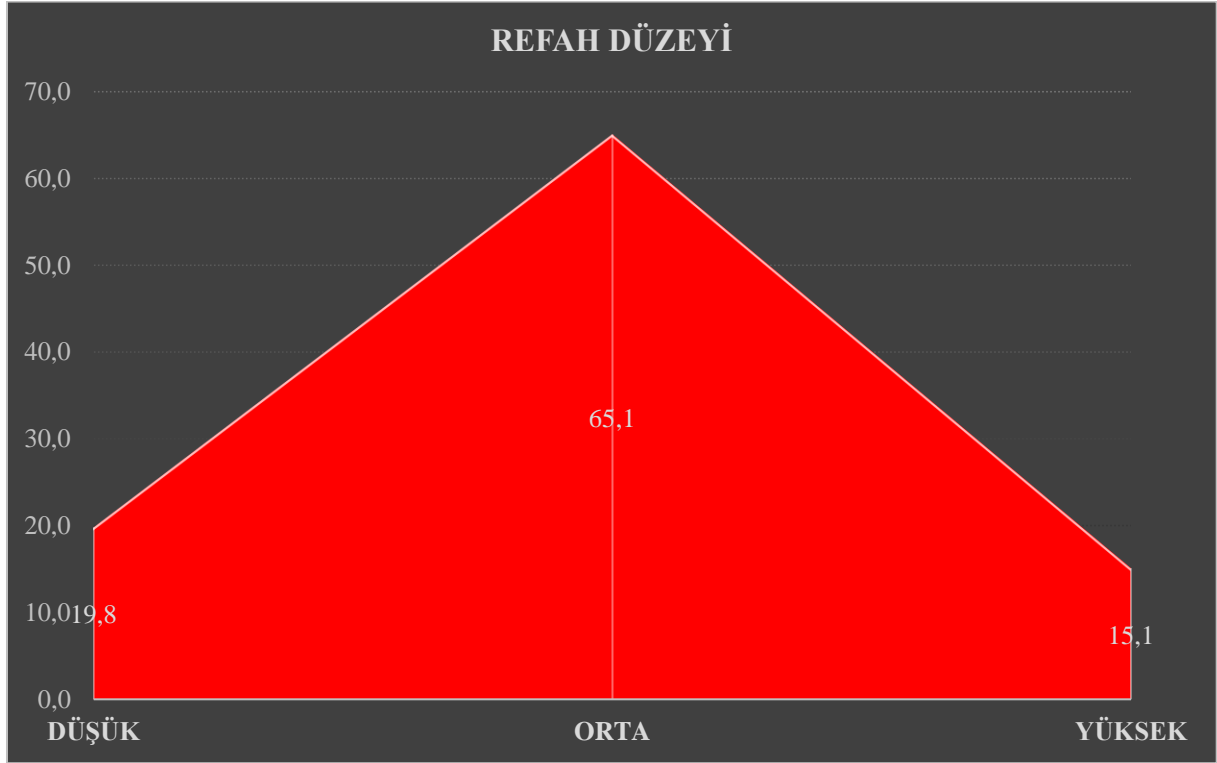
Demografik verilerin belirlenmesinde yzde (%) ve frekans (f) analizleri yapılmıřtır. İlaveten t testi ve ok Ynl Varyans Analizi (ANOVA) kullanılmıřtır. Farklılık tespitinde ise Tukey post-hoc uygulanmıřtır.

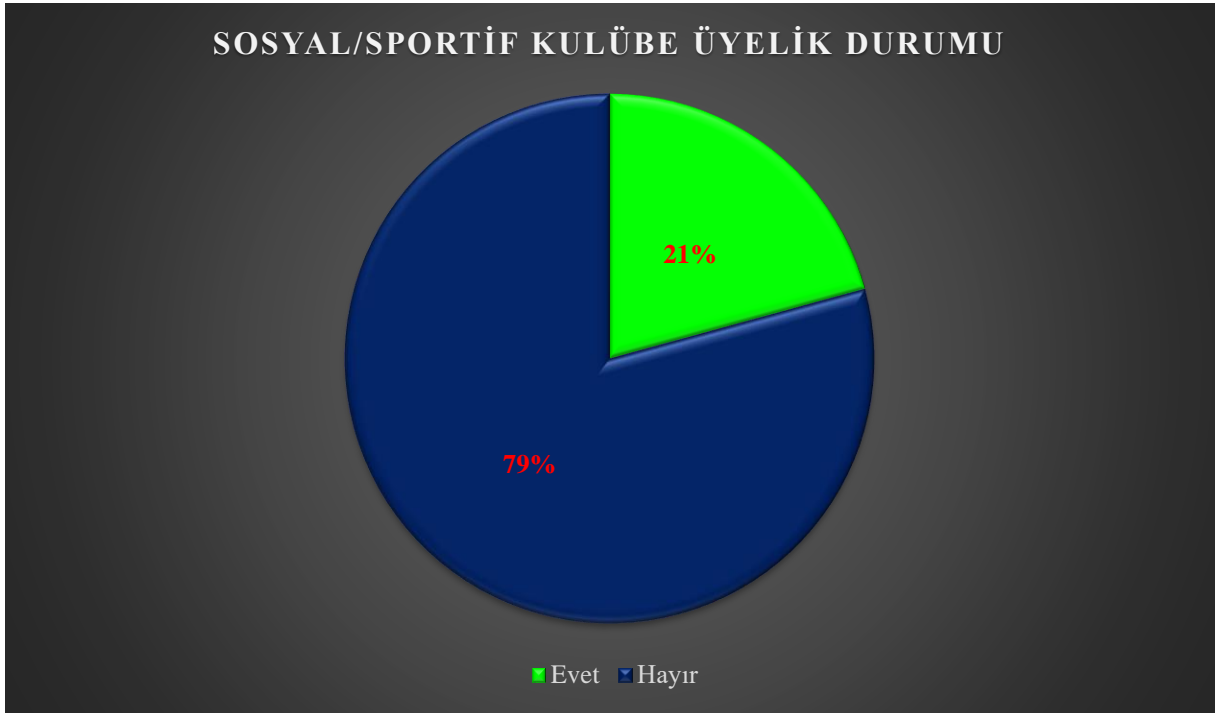
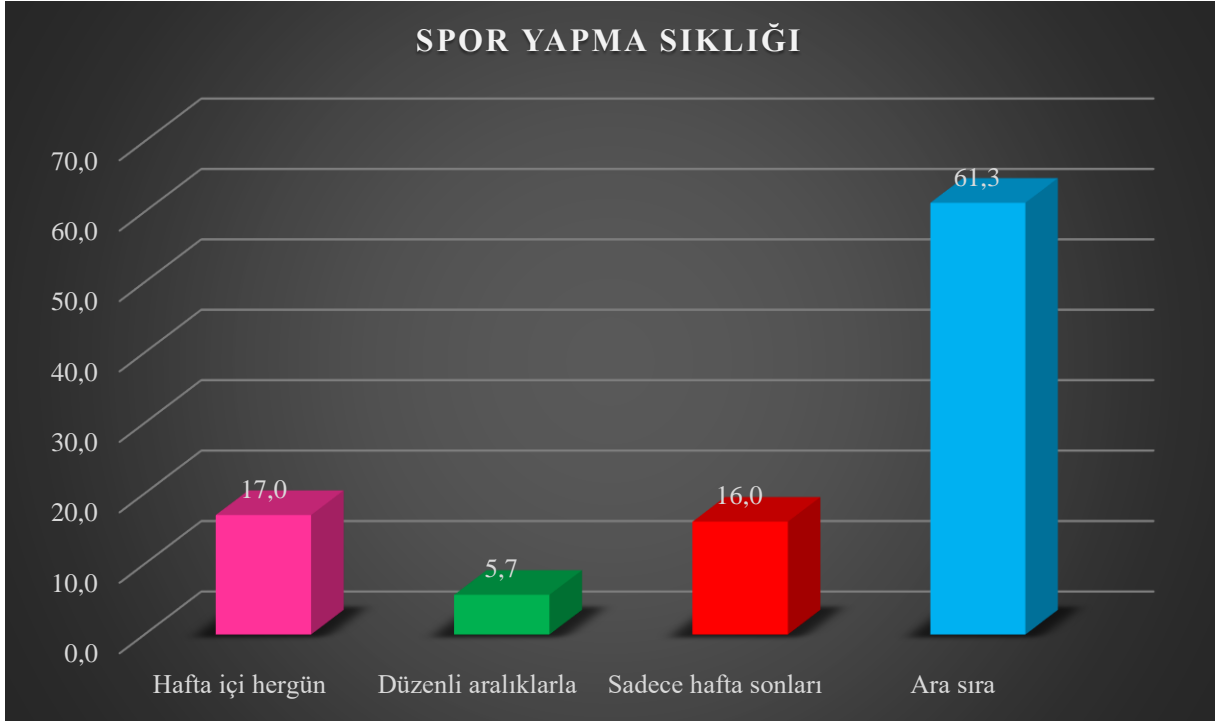
BULGULAR

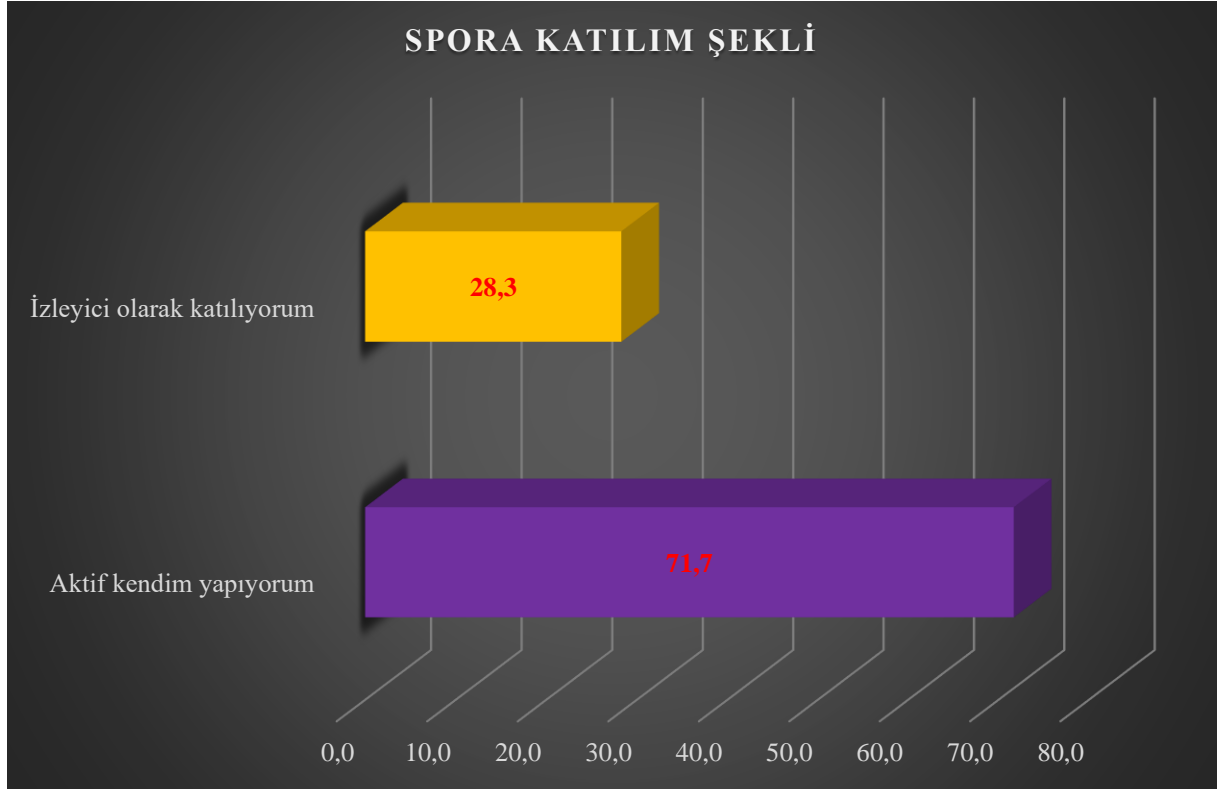
Bu blmde demografik bilgiler grafik řeklinde gsterilmiřtir. İlaveten alıřmanın amacı doęrultusunda gerekleřtirilen hipotez testlerine ait bulgulara yer verilmiřtir.











Tablo 1. Cinsiyet Değişkenine Göre Sporun Yaşam Becerilerine Etkisi Ölçeği Alt Boyutlarının İncelenmesi

	Cinsiyet	N	Ort.	SS	t	p
Zaman yönetimi	Erkek	71	13,9859	3,69746	-,098	,922
	Kadın	35	14,0571	3,15243		
İletişim	Erkek	71	14,3380	3,70692	-,334	,739
	Kadın	35	14,7143	7,90596		
Liderlik	Erkek	71	16,9155	3,99909	1,356	,178
	Kadın	35	15,8286	3,62577		
Takım çalışması	Erkek	71	20,7183	4,88784	1,962	,052
	Kadın	35	18,8286	4,16205		
Sosyal beceri	Erkek	71	13,7042	3,47807	1,809	,073
	Kadın	35	12,3714	3,74233		
Duygusal beceri	Erkek	71	13,8451	3,33230	1,462	,147
	Kadın	35	12,7714	3,97851		
Amaç belirleme	Erkek	71	13,8732	3,33779	,659	,512
	Kadın	35	13,4000	3,75108		
TOPLAM	Erkek	71	107,3803	20,26423	1,310	,193
	Kadın	35	101,9714	19,42177		

$p > 0,05$

Tablo 2. Eğitim Düzeyine Göre Sporun Yaşam Becerilerine Etkisi Ölçeği Alt Boyutlarının İncelenmesi

		N	Ort.	SS	Min.	Max.	F	p
Zaman yönetimi	Lise ve altı	31	13,6774	3,93605	5,00	20,00	1,766	,158
	Önlisans	27	14,5926	3,15326	5,00	20,00		
	Lisans	38	13,3684	3,20828	6,00	20,00		
	Lisansüstü	10	15,9000	3,75500	11,00	20,00		
	Total	106	14,0094	3,51187	5,00	20,00		
İletişim	Lise ve altı	31	14,7419	3,53051	7,00	20,00	,874	,457
	Önlisans	27	15,2963	9,10543	4,00	56,00		
	Lisans	38	13,3684	3,24180	8,00	20,00		
	Lisansüstü	10	15,5000	3,24037	12,00	20,00		
	Total	106	14,4623	5,42512	4,00	56,00		
Liderlik	Lise ve altı	31	17,0968	4,00296	11,00	25,00	,779	,508
	Önlisans	27	16,6296	2,80313	9,00	22,00		
	Lisans	38	15,8421	4,13637	6,00	25,00		
	Lisansüstü	10	17,4000	5,16828	7,00	23,00		
	Total	106	16,5566	3,89647	6,00	25,00		
Takım çalışması	Lise ve altı	31	20,3226	4,57812	11,00	29,00	,300	,825
	Önlisans	27	19,3704	4,58382	10,00	26,00		
	Lisans	38	20,2632	4,91377	7,00	29,00		
	Lisansüstü	10	20,7000	5,33437	10,00	29,00		
	Total	106	20,0943	4,72587	7,00	29,00		
Sosyal beceri	Lise ve altı	31	14,0323	3,42037	6,00	20,00	,978	,406
	Önlisans	27	12,5926	3,77501	4,00	20,00		
	Lisans	38	13,3421	3,58131	4,00	20,00		
	Lisansüstü	10	12,4000	3,80643	8,00	20,00		
	Total	106	13,2642	3,60503	4,00	20,00		
Duyusal beceri	Lise ve altı	31	13,7742	3,45166	7,00	20,00	2,637	,054
	Önlisans	27	14,3704	3,40981	5,00	20,00		
	Lisans	38	13,3421	2,88778	4,00	20,00		
	Lisansüstü	10	10,8000	5,55378	5,00	20,00		
	Total	106	13,4906	3,57570	4,00	20,00		
Amaç belirleme	Lise ve altı	31	14,0645	2,52897	10,00	18,00	3,467	,019
	Önlisans	27	14,7037	3,38338	5,00	20,00		
	Lisans	38	13,5000	2,93856	7,00	20,00		
	Lisansüstü	10	10,8000	6,12463	4,00	20,00		
	Total	106	13,7170	3,46892	4,00	20,00		
TOPLAM	Lise ve altı	31	107,7097	20,39639	74,00	141,00	,438	,727
	Önlisans	27	107,5556	19,76464	63,00	160,00		
	Lisans	38	103,0263	18,68875	58,00	139,00		
	Lisansüstü	10	103,5000	26,15870	63,00	145,00		
	Total	106	105,5943	20,06075	58,00	160,00		

*** $p < 0,05$**

Tablo 3. Medeni Duruma Göre Sporun Yaşam Becerilerine Etkisi Ölçeği Alt Boyutlarının İncelenmesi

	Medeni Durum	N	Ort.	SS	t	p
Zaman yönetimi	Evli	36	13,7222	3,29164	-,602	,548
	Bekar	70	14,1571	3,63412		
İletişim	Evli	36	14,1667	4,06026	-,401	,689
	Bekar	70	14,6143	6,02962		
Liderlik	Evli	36	15,9444	4,68398	-1,162	,248
	Bekar	70	16,8714	3,41744		
Takım çalışması	Evli	36	19,9167	5,22836	-,276	,783
	Bekar	70	20,1857	4,48279		
Sosyal beceri	Evli	36	13,2222	3,78803	-,085	,932
	Bekar	70	13,2857	3,53509		
Duyusal beceri	Evli	36	13,6111	3,41658	,248	,805
	Bekar	70	13,4286	3,67747		
Amaç belirleme	Evli	36	13,7500	2,78132	,070	,944
	Bekar	70	13,7000	3,79301		
TOPLAM	Evli	36	104,3333	22,32359	-,462	,645
	Bekar	70	106,2429	18,93041		

$p > 0,05$

Tablo 4. Spora Katılım Şekline Göre Sporun Yaşam Becerilerine Etkisi Ölçeği Alt Boyutlarının İncelenmesi

	Spora Katılım Şekli	N	Ort.	SS	t	p
Zaman yönetimi	Aktif kendim yapıyorum	75	14,2267	3,37148	,990	,324
	İzleyici olarak katılıyorum	31	13,4839	3,83728		
İletişim	Aktif kendim yapıyorum	75	14,7467	6,09407	,838	,404
	İzleyici olarak katılıyorum	31	13,7742	3,27322		
Liderlik	Aktif kendim yapıyorum	75	17,1067	3,83291	2,307	,023
	İzleyici olarak katılıyorum	31	15,2258	3,78338		
Takım çalışması	Aktif kendim yapıyorum	75	20,7600	4,42914	2,301	,023
	İzleyici olarak katılıyorum	31	18,4839	5,09818		
Sosyal beceri	Aktif kendim yapıyorum	75	13,6000	3,65025	1,501	,136
	İzleyici olarak katılıyorum	31	12,4516	3,41408		
Duygusal beceri	Aktif kendim yapıyorum	75	13,9733	3,54116	2,201	,030
	İzleyici olarak katılıyorum	31	12,3226	3,43887		
Amaç belirleme	Aktif kendim yapıyorum	75	14,3600	3,24928	3,087	,003
	İzleyici olarak katılıyorum	31	12,1613	3,54116		
TOPLAM	Aktif kendim yapıyorum	75	108,7733	19,74197	2,607	,010
	İzleyici olarak katılıyorum	31	97,9032	18,99360		

***p<0,05**

Tablo 5. Spor Yapma Durumuna Göre Sporun Yaşam Becerilerine Etkisi Ölçeği Alt Boyutlarının İncelenmesi

	Spor Yapma Durumu	N	Ort.	SS	t	p
Zaman yönetimi	Evet	61	15,1148	3,35707	4,038	,000
	Hayır	45	12,5111	3,17392		
İletişim	Evet	61	15,4098	6,29385	2,129	,036
	Hayır	45	13,1778	3,64498		
Liderlik	Evet	61	17,1311	3,87503	1,786	,077
	Hayır	45	15,7778	3,83103		
Takım çalışması	Evet	61	20,7049	4,36022	1,559	,122
	Hayır	45	19,2667	5,11415		
Sosyal beceri	Evet	61	14,2459	3,21276	3,427	,001
	Hayır	45	11,9333	3,71361		
Duygusal beceri	Evet	61	14,0000	3,88158	1,724	,088
	Hayır	45	12,8000	3,01963		
Amaç belirleme	Evet	61	14,0328	3,91989	1,092	,277
	Hayır	45	13,2889	2,72715		
TOPLAM	Evet	61	110,6393	19,71550	3,139	,002
	Hayır	45	98,7556	18,63301		

***p<0,05**

TARTIŞMA VE SONUÇ

Araştırmanın amacı, Şirnak Gençlik ve Spor İl Müdürlüğü çalışanlarının yaşam becerilerinde sporun etkisini incelemektir. Analizlerin akabinde elde edilen bilgiler ışığında bu bölümde aşağıdaki yorumlamalara yer verilmiştir.

Bulgular ışığında cinsiyet değişkenine göre katılımcıların yaşam becerileri incelendiğinde istatistiksel olarak anlamlı bir fark tespit edilmemiştir. Çalışmaya benzer şekilde, bazı yapılan araştırmalarda cinsiyet değişkeni açısından istatistiksel olarak anlamlı farklılığa rastlanmamıştır (Akıncı ve Çimen, 2021; Kardağ, 2019; Yılmaz, 2020). Aksine bazı çalışmalarda cinsiyet yönünden anlamlı farklılıklar tespit edilmiştir (Yılgin, 2022; Sarı ve Bozdağ, 2021).

Katılımcıların yaşam becerileri eğitim düzeyine göre incelendiğinde duygusal beceri ve amaç belirleme alt boyutlarındaki farkın istatistiksel olarak anlamlı olduğu belirlenmiştir. Yilmiz (2020) eğitim durumuna göre inceleme yapmış ve sporun yaşam becerileri üzerinde olumlu etkisi olduğunu belirlemiştir. Çimen ve Akıncı (2021) ise çalışmalarında yaşam becerileri üzerinde eğitim durumunu incelemiş olup sosyal beceriler ve duygusal beceriler alt boyutlarında anlamlı farklılıklar tespit etmiştir.

Katılımcıların medeni durumlarına göre yaşam becerileri incelendiğinde; alt boyutlardaki farkın istatistiksel olarak anlamlı düzeyde olmadığı tespit edilmiştir. Yapılan bir araştırmada medeni durum bağlamında yaşam becerileri incelenmiş olup farkın anlamlı olduğu belirlenmiştir (Çimen ve Akıncı, 2021).

Katılımcıların yaşam becerileri spor yapma durumlarına göre incelendiğinde zaman yönetimi, iletişim, sosyal beceri alt boyutlarında ve toplam puanda anlamlı farklılık tespit edilmiştir. Girmen (2012) araştırmasında iletişim, karar verme, iş birliği ve takım olma, eğlenme, problem çözme, öz yönetim, duygu yönetimi gibi bazı özelliklerin etkinlikle birlikte geliştirilebileceği sonucuna ulaşmıştır. Ryan ve Dzewaltowski (2002) çalışmalarında spor yapan gençlerde özgüvenlerin arttığı ve onların sorunlara daha kolay çözüm bulabildikleri saptanmıştır. Ayrıca daha sosyal oldukları belirlenmiştir.

Katılımcıların yaşam becerileri spor yapma sıklığına göre incelendiğinde yaşam becerileri alt boyutlarında anlamlı farklılık meydana gelmemiştir. Turan vd. (2022) araştırmalarında katılımcıların yaşam becerilerini spor yapma sıklığına göre değerlendirmiş ve zaman yönetimi alt boyutunda gruplar arasında anlamlı farklılıklara rastlamışlardır.

Katılımcıların yaşam becerileri spora katılım şekline göre incelendiğinde liderlik, takım çalışması, duygusal beceri, amaç belirleme alt boyutlarında ve toplam puanda anlamlı farklılık tespit edilmiştir. Buna karşın katılımcıların yaşam becerileri spor yapma amacına göre incelendiğinde istatistiksel olarak anlamlı bir fark tespit edilmemiştir. Turan vd. (2022) çalışmalarında sportif etkinliklerin yaşam becerileri üzerinde yüksek düzeyde etkiye sahip olduğunu belirlemişlerdir. İlâveten başka bir çalışmada da belirtildiği gibi sporun yaşam becerilerindeki birçok durumu etkilediği için bireylerin hayatında çok önemli bir yere sahip

olduđu vurgulanmıřtır. İř hayatı, bireysel iliřkiler, sosyal yařam, empati kurma, yaratıcı dūřunme, öz farkındalık oluřturma, problem cözme ve sađlık aısından ve birok yönden bireye katkı sunmaktadır (Botvin ve Griffin, 2004). Yine pek ok alıřmada da yařam becerilerinin bireyin yařamında ok büyük öneme sahip olduđu ve sporun kiřisel ve yařam becerileri üzerinde olumlu yönde katkıları olduđu ifade edilmiřtir (Burton vd., 2001; Judge vd., 2005; Claessens vd., 2007; Jones ve Lavalley, 2009; Gould ve Carson, 2010; Humphrey vd., 2011; Sevindik ve Kıyıcı, 2021).

alıřmada, katılımcıların yařam becerileri üzerinde eđitim düzeyi, spora katılım řekli ve düzenli spor yapma gibi birok demografik deđiřkenin etkili olduđu sonucuna ulařılmıřtır. Buna karřın cinsiyet ve medeni durum gibi unsurların yařam becerileri üzerinde bir etkiye sahip olmadıđı görölmektedir.

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DOĞA YÜRÜYÜŞLERİ KATILIM MOTİVASYONLARININ İNCELENMESİ: ŞIRNAK İLİ ÖRNEĞİ

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ÖZET

Bu araştırmanın amacı; Şırnak'ta doğa yürüyüşlerine katılan bireylerin motivasyonlarını çeşitli değişkenler açısından incelemektir. Araştırmanın örnekleme tesadüfi örnekleme yöntemi ile seçilen 118 katılımcıdan oluşmuştur. Bu katılımcıların 69'u erkek ve 49'u kadın katılımcıdır. Araştırmada veri toplama aracı olarak; "Kişisel Bilgi Formu" ve "Doğa Yürüyüşlerine Katılım Motivasyon Ölçeği" kullanılmıştır. Veriler Jamovi. (Version 2.4) programı ile analiz edilmiştir. Katılımcıların demografik verilerinin dağılımının belirlenmesi için betimsel istatistik yöntemler, yüzde (%) ve frekans (f) analizleri uygulanmıştır. Araştırmada verilerin incelenmesinde t testi ve One-Way ANOVA testlerinden faydalanılmış olup, anlamlılık düzeyi $p < 0,05$ olarak kabul edilmiştir. Bulgular ışığında incelendiğinde cinsiyete göre doğa yürüyüşleri katılım motivasyonu düzeylerinde zaman alt boyutunda kadınlar lehine anlamlı bir farklılık tespit edilmiştir. Katılımcıların yıl değişkenine göre doğa yürüyüşü katılım motivasyonları düzeylerinde herhangi bir farklılığa rastlanmamıştır. Katılımcıların doğa yürüyüşü yapma sıklığı değişkenine göre doğa yürüyüşü katılım motivasyonları arasında sosyal, eğitim ve zaman boyutunda anlamlı farklılık tespit edilmiştir. Çalışmada, katılımcıların serbest zaman motivasyonları üzerinde cinsiyet ve doğa yürüyüşü yapma sıklığı gibi demografik değişkenlerin etkili olduğu sonucuna ulaşılmıştır. Buna karşın medeni durum, yıl değişkeni ve yaş gibi unsurların doğa yürüyüşlerine katılım motivasyonları üzerinde bir etkiye sahip olmadığı görülmektedir.

Anahtar kelimeler: Doğa Yürüyüşleri, Motivasyon, Spor.

**INVESTIGATION OF NATURE WALKS PARTICIPATION MOTIVATIONS:
ŞIRNAK PROVINCE CASE**

ABSTRACT

The purpose of this research; The aim is to examine the motivations of individuals participating in nature walks in Şırnak in terms of various variables. The sample of the research consisted of 118 participants selected by random sampling method. 69 of these participants are male and 49 are female participants. As a data collection tool in the research; “Personal Information Form” and “Nature Walk Participation Motivation Scale” were used. Data Jamovi. It was analyzed with the program (Version 2.4). Descriptive statistical methods, percentage (%) and frequency (f) analyzes were applied to determine the distribution of the demographic data of the participants. In the study, t-test and One-Way ANOVA tests were used to examine the data, and the significance level was accepted as $p < 0.05$. When examined in the light of the findings, a significant difference was detected in favor of women in the time sub-dimension in nature walk participation motivation levels according to gender. There was no difference in the participants' hiking participation motivation levels according to the year variable. According to the variable of the participants' frequency of hiking, a significant difference was detected between the motivations for hiking participation in social, educational and time dimensions. The study concluded that demographic variables such as gender and frequency of hiking were effective on the participants' leisure motivation. On the other hand, it seems that factors such as marital status, year variable and age do not have an effect on motivations to participate in nature walks.

Key words: Nature Walks, Motivation, Sports.

GİRİŞ

Doğada yapılan her türlü spor doğa sporları olarak tanımlanmaktadır (Ardahan ve Yerlisu Lapa, 2011). Doğa yürüyüşleri tüm insanların rahat bir şekilde yapabileceği çok fazla teknik beceri ve yeterlilik gerektirmeyen bir faaliyettir. Bu bağlamda biraz bilgilendirme ve kondisyon ile birlikte tüm bireylere hitap eden bir aktivitedir. Doğa sporları adrenalini yüksek seviyede tutmaktadır. Ayrıca gerek insan sağlığına katkıda bulunmasıyla gerekse bireylerin gelişimine fayda sağlaması yönüyle tartışma gerektirmeyen diğer bir gerçektir. Doğa sporları bireyin dayanıklılık, uygulama, disiplin, uyum, kararlılık ve karar verme gibi becerilerini geliştirmektedir (Moynier, 2004). İbrahim ve Cordes (2002), doğa yürüyüşünün ağaçların çok olduğu güzel manzaralar içinde gününbirlik yürüyüş yapılması olarak tanımlanmaktadır. Araştırmalarda doğa sporlarının liderlik, sorumluluk alma, yenilik arayışı, kendini tanıma-geliştirme, rekabet ihtiyacı, risk alma gibi durumlar ortaya konmuştur. Bireylerin doğa sporlarında ekip halinde çalışmalarını onlara sosyal etkileşim ve takım çalışması gibi becerilerini geliştirme fırsatı sağlamaktadır (Wagner ve Campbell, 1994; Demir, 2003; Plummer, 2009; Ardahan ve Yerlisu Lapa, 2011; Burak ve ark., 2016). Bu bilgiler ışığında araştırmanın amacı; Şırnak'ta doğa yürüyüşlerine katılan bireylerin motivasyonlarını incelemektir.

YÖNTEM

Araştırma Modeli

Araştırma nicel araştırma desenine bağlı kalınarak yapılmış olup betimsel tarama modelindedir. Bu model, önceden olan ya da günümüzde hali hazırda olan bir durumu olduğu gibi betimlemektedir (Karasar, 2014).

Çalışma Grubu

Çalışmanın evreni Şırnak ilinde doğa yürüyüşlerine katılan katılımcılardır. Örneklem ise tesadüfi örnekleme yöntemi ile seçilen 118 katılımcıdan oluşmuştur. Bu katılımcıların 69'u erkek ve 49'u kadın katılımcıdır.

Veri Toplama Araçları

Bu araştırma kapsamında spor yapan bireylerden veri toplamak amacıyla bireylerin demografik özelliklerine yönelik verileri belirlemek için "Kişisel Bilgi Formu" kullanılmıştır. İlaveten katılımcılara "Doğa Yürüyüşlerine Katılım Motivasyon Ölçeği" uygulanmıştır.

Doğa Yürüyüşlerine Katılım Motivasyon Ölçeği: Ekinci ve arkadaşları (2012) tarafından geliştirilmiştir. Ölçek 24 madde ve 5 alt boyuttan oluşmaktadır. Güvenirlilik analizleri sonucuna göre ölçeğin iç tutarlık katsayısı 0,83 olarak bulunmuştur. Bu araştırma için ise iç tutarlılık katsayı değeri $\alpha=0.943$ olarak bulunmuştur. Anket beşli likert (hiç katılmıyorum=1 Tamamen

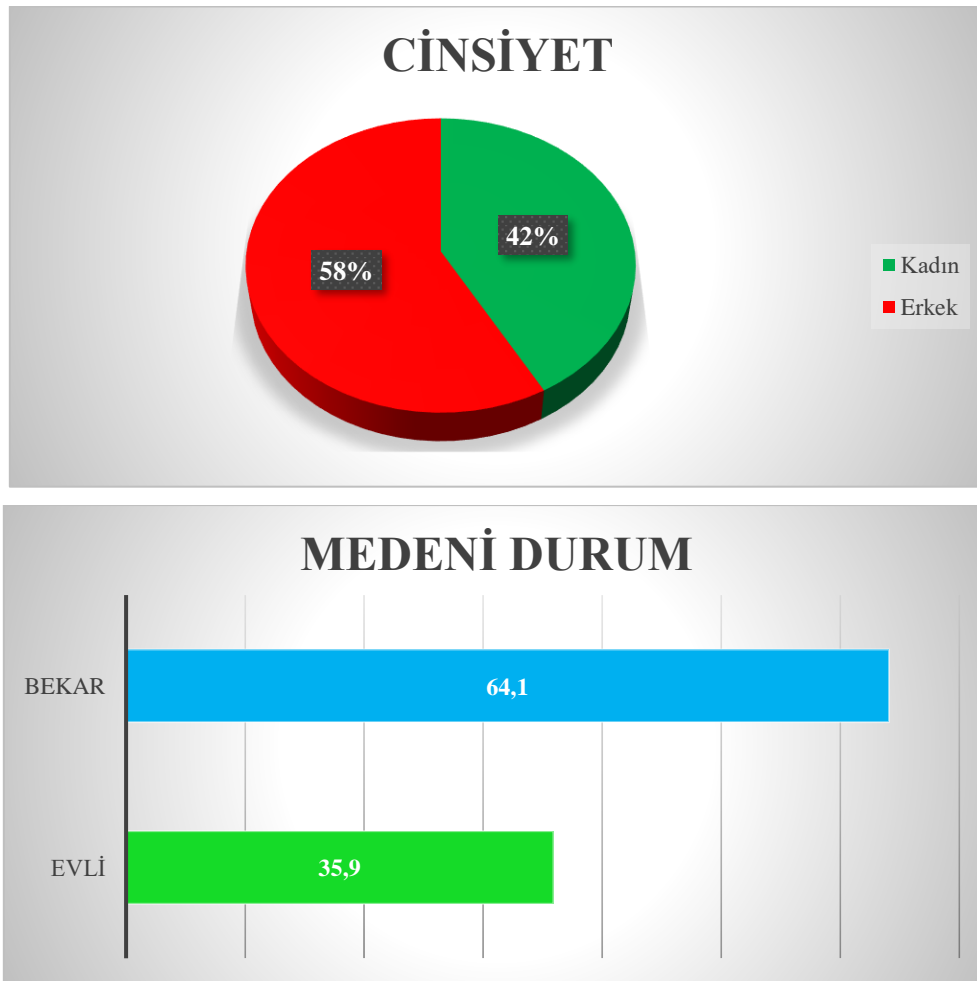
Katılıyorum =5) tipine göre hazırlanmıştır. Veriler Jamovi. (Version 2.4) programı ile analiz edilmiştir.

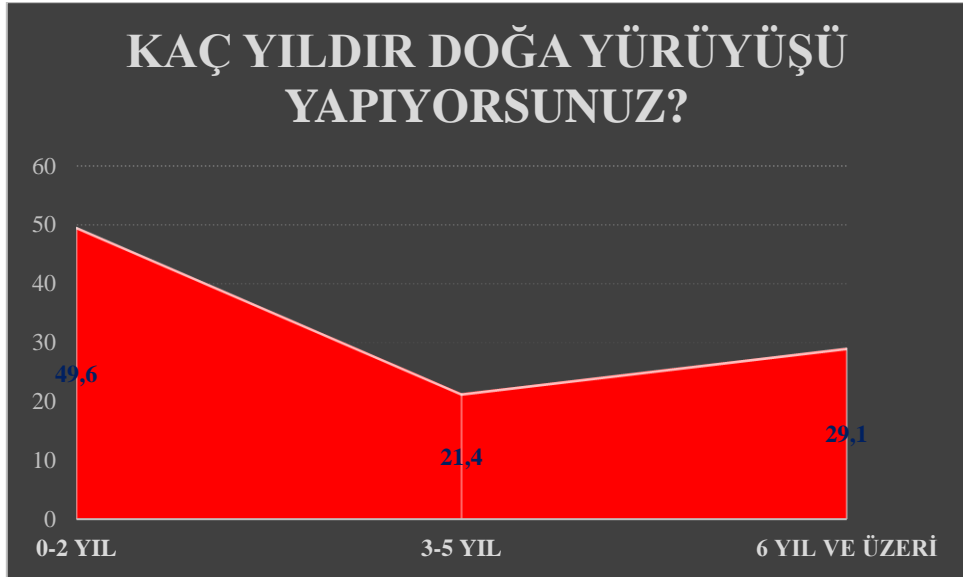
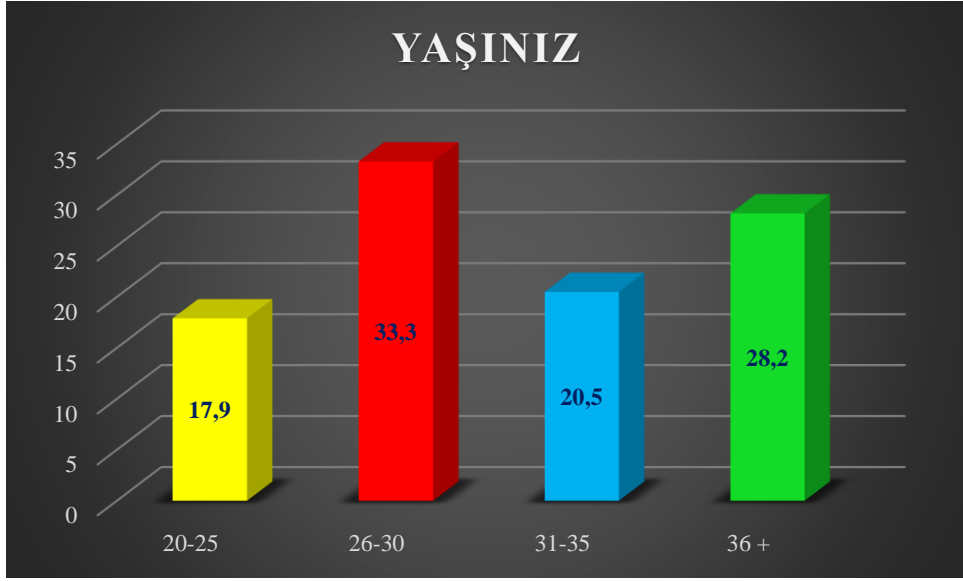
Verilerin Analizi

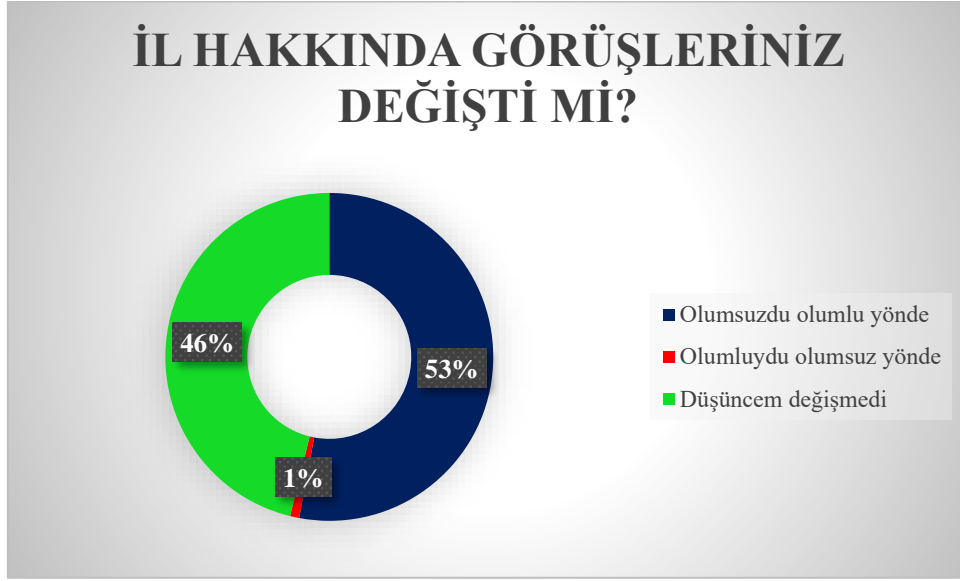
Demografik verilerin belirlenmesinde yüzde (%) ve frekans (f) analizleri yapılmıştır. İlaveten t testi ve Çok Yönlü Varyans Analizi (ANOVA) kullanılmıştır. Farklılık tespitinde ise Tukey post-hoc uygulanmıştır.

BULGULAR

Bu bölümde demografik bilgiler grafik şeklinde gösterilmiştir. İlaveten çalışmanın amacı doğrultusunda gerçekleştirilen hipotez testlerine ait bulgulara yer verilmiştir.







Tablo 1. Cinsiyete göre doğa yürüyüşlerine katılım motivasyon düzeyleri

Alt Boyutlar	Cinsiyet	N	Ort.	SS	t	p
Sosyal	Kadın	49	4.54	0.446	1.261	0.210
	Erkek	68	4.43	0.489		
Sağlık	Kadın	49	4.58	0.496	0.420	0.675
	Erkek	68	4.54	0.542		
Eğitim	Kadın	49	4.59	0.485	0.655	0.514
	Erkek	68	4.53	0.485		
Zaman	Kadın	49	4.48	0.428	2.367	0.020*
	Erkek	68	4.26	0.552		
Gözlem	Kadın	49	4.61	0.480	0.327	0.744
	Erkek	68	4.57	0.549		

* $p < 0,05$

Tablo 2. Medeni duruma göre doğa yürüyüşlerine katılım motivasyon düzeyleri

Alt Boyutlar	Medeni durum	N	Ort.	SS	t	p
Sosyal	Evli	42	4.52	0.497	0.772	0.442
	Bekar	75	4.45	0.460		
Sağlık	Evli	42	4.54	0.508	-0.340	0.735
	Bekar	75	4.57	0.532		
Eğitim	Evli	42	4.50	0.464	-0.959	0.340
	Bekar	75	4.59	0.494		
Zaman	Evli	42	4.33	0.540	-0.429	0.669
	Bekar	75	4.37	0.502		
Gözlem	Evli	42	4.53	0.594	-0.859	0.392
	Bekar	75	4.62	0.474		

$p>0,05$

Tablo 3. Yıl değişkenine göre doğa yürüyüşü katılım motivasyonu düzeyi

	Alt Boyutlar	Gruplar	N	Ort.	SS	F	P
Kaç yıldır doğa yürüyüşü yapıyorsunuz?	Sosyal	0-2 yıl	58	4.48	0.466	0.476	0.624
		3-5 Yıl	25	4.55	0.435		
		6 yıl ve üzeri	34	4.43	0.516		
	Sağlık	0-2 yıl	58	4.50	0.513	1.038	0.360
		3-5 Yıl	25	4.65	0.402		
		6 yıl ve üzeri	34	4.59	0.609		
	Eğitim	0-2 yıl	58	4.51	0.489	0.468	0.629
		3-5 Yıl	25	4.61	0.464		
		6 yıl ve üzeri	34	4.59	0.496		
	Zaman	0-2 yıl	58	4.35	0.480	0.463	0.631
		3-5 Yıl	25	4.28	0.542		
		6 yıl ve üzeri	34	4.42	0.556		
	Gözlem	0-2 yıl	58	4.52	0.527	0.919	0.404
		3-5 Yıl	25	4.65	0.414		
		6 yıl ve üzeri	34	4.65	0.574		

$p>0,05$

Tablo 4. Yaş değişkenine göre doğa yürüyüşü katılım motivasyonu düzeyi

	Alt Boyutlar	Gruplar	N	Ort.	SS	F	P
Kaç yaşındasınız?	Sosyal	20-25 Yaş	21	4.60	0.404	1.206	0.316
		26-30 Yaş	39	4.52	0.466		
		31-5 Yaş	24	4.35	0.518		
		36 Yaş ve Üzeri	33	4.44	0.481		
	Sağlık	20-25 Yaş	21	4.57	0.434	1.955	0.131
		26-30 Yaş	39	4.71	0.433		
		31-5 Yaş	24	4.46	0.520		
		36 Yaş ve Üzeri	33	4.45	0.637		
	Eğitim	20-25 Yaş	21	4.58	0.374	0.878	0.458
		26-30 Yaş	39	4.65	0.494		
		31-5 Yaş	24	4.47	0.513		
		36 Yaş ve Üzeri	33	4.50	0.510		
	Zaman	20-25 Yaş	21	4.46	0.405	0.800	0.499
		26-30 Yaş	39	4.39	0.506		
		31-5 Yaş	24	4.28	0.512		
		36 Yaş ve Üzeri	33	4.30	0.588		
Gözlem	20-25 Yaş	21	4.62	0.451	0.789	0.505	
	26-30 Yaş	39	4.68	0.436			
	31-5 Yaş	24	4.49	0.606			
	36 Yaş ve Üzeri	33	4.54	0.583			

$p>0,05$

Tablo 5. Doğa yürüyüşü yapma sıklığına göre doğa yürüyüşü katılım motivasyonu düzeyi

	Alt Boyutlar	Gruplar	N	Ort.	SS	F	P	Fark
Ne sıklıkla doğa yürüyüşü yapıyorsunuz?	Sosyal	Her Hafta	31	4.62	0.443	3.34	0.041*	Her hafta > Her ay
		Her Ay	37	4.34	0.458			
		Yılda Birkaç Kez	49	4.49	0.481			
	Sağlık	Her Hafta	31	4.72	0.432	2.51	0.088	
		Her Ay	37	4.52	0.528			
		Yılda Birkaç Kez	49	4.48	0.555			
	Eğitim	Her Hafta	31	4.75	0.375	4.96	0.010*	Her hafta > Her ay
		Her Ay	37	4.44	0.519			
		Yılda Birkaç Kez	49	4.52	0.488			
	Zaman	Her Hafta	31	4.58	0.440	5.29	0.007*	Her hafta > Her ay
		Her Ay	37	4.20	0.568			
		Yılda Birkaç Kez	49	4.33	0.474			
	Gözlem	Her Hafta	31	4.71	0.461	1.36	0.264	
		Her Ay	37	4.52	0.596			
		Yılda Birkaç Kez	49	4.56	0.488			

$*p<0,05$

TARTIŞMA VE SONUÇ

Araştırmanın amacı, Şırnak'ta doğa yürüyüşlerine katılan bireylerin motivasyonlarını incelemektir. Analizlerin akabinde elde edilen bilgiler ışığında bu bölümde aşağıdaki yorumlamalara yer verilmiştir.

Bulgular ışığında cinsiyete göre doğa yürüyüşleri katılım motivasyonu düzeylerinde zaman alt boyutunda kadınlar lehine anlamlı bir farklılık tespit edilmiştir. Brömen (2008) tarafından yapılan bir çalışmada doğa yürüyüşçülerinin büyük bir bölümünün erkeklerden oluştuğu belirtilmektedir. Önceki çalışmalar kadın ve erkek katılımcılar arasında doğa yürüyüşü konusunda bazı farklılıklar olduğunu göstermektedir. Çeşitli çalışmalarda erkeklerin doğa yürüyüşlerinde daha zorlu ve uzun parkurları tercih ettiği, kadınların ise kısa ve kolay parkurlarda doğa yürüyüşü yapmayı istedikleri belirtilmektedir (Schmidt, 2007). Kalkan'ın (2012) yürüttüğü araştırmada ise katılım nedenleri arasında ilgi alanı olması ve doğayla bütünleşme konusunda kadınlar daha ön plana çıkarken erkeklerin daha çok çevresindekilerin etkisiyle doğa yürüyüşlerine katıldığı tespit edilmiştir. Katılımcıların medeni durumuna göre doğa yürüyüşleri katılım motivasyonu arasında anlamlı bir farklılık tespit edilememiştir. Gürsoy ve Tengilimoğlu (2019) çalışmalarında katılımcıların medeni durumlarına göre yapılan katılım nedeni ortalama karşılaştırmaları sonucunda evli ve bekar katılımcılar arasında her önerme için küçük farklar bulunmasına karşın “yeni bir çevre edinme” ve “yeni beceriler edinme ve onları kullanma” önermeleri dışında anlamlı bir fark tespit etmemişlerdir.

Katılımcıların yıl değişkenine göre doğa yürüyüşü katılım motivasyonları düzeylerinde herhangi bir farklılığa rastlanmamıştır. Kalkan (2012) araştırmasında katılımcıların çoğunluğu aktiviteye beş yıldan daha az zamandır katılım sağlamaktadırlar. Uzun zamandır bu etkinlikleri yapanların oranının düşük olması birçok sebepten yorumlanmaktadır. Bunlar; aktivitelerin yeni yaygınlaşmaya başlaması, araç-gereçlere erişilebilirliğin zor olması, doğaya ulaşım noktasında güçlük yaşanması, eğitimin eksikliği, doğaya gidilen yerlerle alakalı düzenlemelerin olmaması ve güvenlik problemleridir.

Katılımcıların yaş değişkenine göre doğa yürüyüşü katılım motivasyonları düzeylerinde herhangi bir farklılığa rastlanmamıştır. Bireyin yaş durumu serbest vakitlerinde hangi etkinlikleri yaparak geçirdiğini büyük oranda etkilemektedir. Bireyin yaşı arttıkça etkinliğe aktif katılımı da azalmaktadır. Genç bireyler daha çok güce dayalı aktiviteleri tercih etmekte ve aktif şekilde katıldıkları etkinlikleri tercih etmektedirler. Örneğin genç yaşlarda açık alan etkinliklerine katılım sağlayan aktif bir kişi ileriki yaşlarında kampçılık ve karavan gibi gezileri tercih etmekte ve daha pasif olmaktadır (Ardahan ve Lapa, 2011).

Katılımcıların doğa yürüyüşü yapma sıklığı değişkenine göre doğa yürüyüşü katılım motivasyonları arasında sosyal ($F=3.34$), eğitim ($F=4.96$) ve zaman ($F=5.29$) boyutunda anlamlı farklılık tespit edilmiştir. Farkın hangi gruptan kaynaklandığı bulmak için yapılan Tukey analizinde her hafta doğa yürüyüşü yapılanlar ile her ay doğa yürüyüşü yapanlar arasında her hafta doğa yürüyüşü yapanlar lehine olduğu tespit edilmiştir.

Çalışmada, katılımcıların serbest zaman motivasyonları üzerinde cinsiyet ve doğa yürüyüşü yapma sıklığı gibi demografik değişkenlerin etkili olduğu sonucuna ulaşılmıştır. Buna karşın medeni durum, yıl değişkeni ve yaş gibi unsurların doğa yürüyüşlerine katılım motivasyonları üzerinde bir etkiye sahip olmadığı görülmektedir. Daha geniş örneklem gruplarına yönelik araştırmalar yapılabilir. İlaveeten farklı coğrafik bölgelere yönelik incelemelerde ayrıntılı bir şekilde incelenebilir. Sosyal platform, doğaya ilgi duyan kitleye ulaşmak için etkili bir mecradır. Bu bağlamda sosyal platform üzerinde Şırnak iline ait doğal güzelliklerin fotoğraf ve videolarının paylaşılarak gerekli tanıtımın yapılması sağlanabilir ve böylece bireylerin bu alanlara yönlendirilmesi teşvik edilebilir.

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İMİC MÜASİR POSTSƏNAYE MƏKANINDA KOMMUNİKASIYA VASİTƏSİ KİMİ

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SUMMARY

The modern post-industrial society has entered the stage of non-linear development and today it cannot be evaluated as a simple continuation of the industrial society. In its turn, culture also consists of a complex evolutionary structure and also implies the possibility of transformation and structural regrouping of elements, where one of the manifestations of transformation is fashion. As a result of the change of worldview directions and traditional values, which is currently occurring in the post-industrial era, the construction of new fashion trends is formed, whose condition, main signs, and characteristic features allow us to talk about it as a system with elements of self-organization. Its very situation is of great interest to the researcher. The concept of image is closely related to the concept of sales. Any action that occurs as a result of human interaction is directly or indirectly related to sales in one way or another. In order to be useful to each other in the future, people try to win each other's sympathy and be liked. From this point of view, only close friends and family members are exceptions. All other people communicate with each other, sometimes even without thinking, just to get one benefit or another for themselves. Therefore, the concept of image is quite widespread in the business world. Image - is the perception of other people about the personality and activities of any person. As a rule, the concept of image is mostly attributed to one or another personality. The complex nature of fashion develops together with the dynamics of society, therefore, the social conditioning and direction of fashion, its consolidation within society, is an invariably relevant topic for research. Existences of fashion, as a rule, are expressed in continuous changes, orientation to novelty and unpredictability. In this regard, the problem of the choice of individuals in the field of fashionable innovations becomes even more acute. It is impossible not to mention the regulatory effect of fashion, fashion is able to determine the consciousness of a person, which is especially relevant for a society of mass extreme consumption.

Keywords: fashion, image, clothing, fashionable innovations

Müasir postsənaye cəmiyyəti qeyri-xətti inkişaf mərhələsinə qədəm qoymuşdur və bu gün sənaye cəmiyyətin sadə davamı qismində dəyərləndirilə bilməz. Öz növbəsində, mədəniyyət də həmçinin mürəkkəb təkamül strukturundan ibarət olmaqla yanaşı həmçinin elementlərin transformasiya və struktur yenidən qruplaşma imkanını nəzərdə tutur ki, burada transformasiya təzahürlərindən biri dəbdir. Hazırda postsənaye dövründə mövcud olan dünyagörüşü istiqamətlərin və ənənəvi dəyərlərin dəyişməsi nəticəsində yeni dəb təmayüllərinin konstruksiyasını əmələ gətirir ki, onun vəziyyəti, əsas əlamətləri, xarakterik xüsusiyyətləri onun haqqında özünü təşkeidicilik elementlərinə malik sistem kimi danışmağa imkan verir. Məhz belə vəziyyət tədqiqatçı üçün böyük maraq kəsb edir.

İmic anlayışı satış məfhumu ilə sıx bağlıdır. İnsanların qarşılıqlı fəaliyyəti nəticəsində meydana gələn istənilən aksiya bu və ya digər şəkildə birbaşa yaxud dolaylı satışla bağlıdır. Gələcəkdə bir - birinə faydalı olmaq üçün insanlar bir-birinin rəğbətini qazanmağa, xoşuna gəlməyə çalışır. Bu baxımdan ancaq yaxın dostlar və ailə üzvləri istisna təşkil edir.

Bütün qalan insanlar məhz özləri üçün bu və ya digər fayda əldə etmək üçün bir-birilə, bəzən hətta düşünülməmiş də olsa ünsiyyət qurur. Odur ki, biznes aləmində imic məfhumu kifayət qədər geniş yayılmışdır. İmic – hər hansı insanın şəxsiyyəti və fəaliyyəti haqqında digər insanların təsəvvürüdür. Bir qayda olaraq imic məfhumu daha çox bu və ya digər şəxsiyyətə aid edilir.

Dəbin mürəkkəb təbiəti cəmiyyətin dinamikası ilə birgə inkişaf edir, buna görə dəbin sosial şərtlənməsi və yönəldilməsi, solum daxilində onun möhkəmlənməsi tədqiqat işləri üçün dəyişməz olaraq aktual mövzu kəsb edir. Dəbin ekstensiyaları, bir qayda olaraq, fasiləsiz baş verən dəyişikliklərdə, yenilik və gözlənilməzlik oriyentasiyasında ifadə olunur. Bununla əlaqədar, dəbli innovasiyalar sahəsində fərdlərin seçimi problemi daha da kəskinləşir. Dəbin tənzimləyici təsirini qeyd etməmək mümkün deyil, dəb insanın şüurunu determinasiya etmək iqtidarındadır, bu da kütləvi ifrat istehlak cəmiyyəti üçün xüsusilə aktualdır.

Həmçinin, dəbin vahid dünya sahəsinin formalaşmasına Qərbi Avropa dəyərlərinin tarixən şərtləndirilmiş təsirini qeyd etmək lazımdır. Məhz Qərbi Avropa dəbin beynəlmilləşdirilməsi üçün təməl yaratmışdır. Bu hadisə şübhəsiz müsbət cəhətlərə malikdir (istənilən zaman istənilən insanın planetimizin hər hansı yerində vahid dəb məkanına qoşulmaq imkanı) və bu, müəyyən şərtlər çərçivəsində mənfi tendensiyalar nümayiş etdirməyə başlayır (məsələn, kütləvi Amerika mədəniyyətinin ümumdünya ekspansiyası).

Bununla əlaqədar olaraq, mütəlif xalqların mədəniyyət ənənələrinin özünəməxsusluğunun və orijinallığının itirilməsi ilə bağlı məsələ son dərəcə kəskinləşir. Bundan əlavə, dəb sferasında

qloballaşma tendensiyalarının öz istiqamətini dəyişməsinin də qiymətləndirilməsinə ehtiyac duyulur.

Geyim imicinin seçimi həyat tərzindən və iş yerindən asılıdır. Maliyyə, ədliyyə, mühasibat uçotu kimi bəzi sahələrdə ciddi geyimin istifadəsi məcburi xarakter daşıyır. Digər sahələrdə isə, misal üçün, kütləvi informasiya vasitələrində, eləcə də reklam sferasında daha sərbəst üslubda tikilmiş geyim əşyalarının istifadəsinə yol verilir.

Belə situasiyalar da var ki, orada geyim xüsusi əhəmiyyətə malikdir – müsahibələrdə, prezentasiyalarda və yeni müştərilərlə görüşlərdə geyim amili mütləq şəkildə nəzərə alınmalıdır. Məsələn, müsahibənin nəticələrinə əsasən şirkətə işə qəbul edilməsi haqqında qərar veriləcək, bu zaman müsahibədə iştirak edəcək potensial namizədin xarici görkəmi şirkətin kollektivinə asanlıqla daxil ola biləcəyini ifadə etməlidir. Şirkət üçün hər hansı xidməti yerinə yetirərkən ümumilikdə həmin şirkətin imicinə uyğun olmaq lazımdır. Komanda daxilində iş fəaliyyəti həyata keçirildiyi zaman çalışmaq lazımdır ki, insanın xarici görkəmi qrupun digər üzvlərindən fərqlənməsin.

Geyimin amiranə, lakin güc olmayan üslubu hal-hazırda olduqca populyardır və geniş surətdə təqlid olunur. Əlçatan adı ilə tanınan üslubla bağlı xeyli daha çox sual yaranır. Şirkət direktorunun ciddi tünd-göy kostyumu direktorlar şurasının iclasında əla görünəcək, lakin həmkarlar ittifaqı liderləri ilə aparılan danışıqlarda distansiya yarada bilər. Belə situasiya üçün ciddiliyi daha az olan kostyum yaxud sadəcə olaraq şalvar və idman gödəkcəsi daha münasib olacaq: bu geyim sərbəst, təbii atmosferin yaradılmasına kömək edəcək. Əgər qadın menecer onun tabeliyində olan işçilərə töhmət verməlidirsə, ciddi qara rəngli kostyumdansa mavi yaxud yaşıl rəngli trikotaj kostyumu geyinmək onun üçün daha məqsədəuyğun olacaq, bu hal qeyd olunan vəziyyətdə onu daha anlaşılan görkəmdə təqdim edəcək.

İş yerində irəli çəkilməyə səy göstərməklə, rəhbər elə geyinməlidir ki, sanki o daha yüksək vəzifə üçün nəzərdə tutulmuş işi yerinə yetirəcəkdir. Bu zaman daha yüksək rəhbər vəzifələrdə olan insanlarda onun arzuladığı daha yüksək rəhbər qismində görmək, daha böyük vəzifədə təsəvvür etmək üçün rahat şanslar yaranacaq. Söhbət zamanı insanlar adətən ünsiyyətdə olduqları digər insanın üzünə yaxud çiyinlərinə baxır. Odur ki, qadınlar öz fərdliliyini bəzək əşyaları və boyun dəsmalları vasitəsilə ifadə edə bilər, kişilər isə yaxalıqların, köynəklərin və qalstukların seçilməsi prosesinə son dərəcə diqqətli və daha böyük həssaslıqla yanaşmalıdırlar. Kişi - menecerlərin böyük əksəriyyəti aeroport üslubunda geyinməyi xoşlayır – onlar qalstuk, köynək və pencəklərə üstünlük verirlər. Bu cür geyim əşyalarını yaxşı mağazadan almaq tövsiyyə olunur. Orada əldə edilən geyim nümunələri insanın zahiri görünüşünə daha böyük

fərdlilik gətirmiş olacaq. Geyimin biçimi, materialı və rəngi ilə yaradılan hisslər və assosiasiyalar özündə müəyyən dəyərlər daşmış olur. Üslubun seçilməsi kənd mentaliteti yaxud, əksinə, şəhər oriyentasiyası haqqında məlumat verə bilər. Əgər insan istifadə etdiyi geyim vasitəsilə yüksək standartlar və detallara qarşı diqqət və həssaslıq nümayiş etdirirsə, onda zənn etmək olar ki, bu insan öz iş fəaliyyətində də eyni keyfiyyətləri ortaya qoymuş olacaq. İş yerində aksesuarlar çox vaxt öz funksional təyinat dəyişir: portfellərdə işçilər öz əmək fəaliyyətlərinin nəticələrini daşıyır, zaman onlara öz vaxtını düzgün və səmərəli bölüşdürməyə imkan verir və s. Həmin aksesuarlara insanlar adətən fikir verir, çünki onlardan daim istifadə etməli olurlar. Odur ki, onların seçiminə xüsusi həssaslıqla və incədən-incəyə yanaşmaq lazımdır. Aksesuarların həddindən artıq çox sayda olması insanın xarici görkəmini narahatedici edə və diqqəti yayındıra bilər. Mobil telefonu, portfeli və orqanayzeri daşıyan insan bəzən bəzək-düzək dəlisi təəssüratı yaradırdı. Təəssüratı əlində olan əşyalar deyil, görülən işlərin nəticələri yaratmalıdır. Detalların, məsələn, bəzəklərin, hədsiz dərəcədə çoxlu sayda olması diqqəti yayındıra bilər. Açıq çalarlı yaxud parlaq rəngli aksesuarlar, ayaqqabı və qadın çantaları daha çox funksional deyil, dekorativ görkəmə malikdir. Onlar qeyri-iş mühitində daha münasib və uyğundur. Eynəkləri seçərkən daha ehtiyatlı davranmaq lazımdır. Unutmaq olmaz ki, eynək – zahiri görünüş elementidir və hər zaman göz qabağında olur. Eynək çərçivəsi üzə uyğun olmalı və yaraşmalıdır. Eynəyin girdə şüşələri insanın üzünün dəyirmiliyini daha da nəzərə çarpdıracaq. Məhz bu səbəbə görə üz dəyirmi olanda düzbucaqlı şüşələri seçmək tövsiyyə olunur. Özünə hədsiz dərəcədə diqqət çəkən eynək çərçivəsindən uzaq durmaq lazımdır. Belə olan halda sizin üzünüzün deyil, məhz eynəyin insanların yanında qalacağına ehtimalı son dərəcə böyükdür. Geyim və saç düzümü imicin yaradılması istiqamətində əhəmiyyətli rola malikdir. Hər bir insan əmtəə istehsalçıları sanki təqlid edərək, özünü müəyyən qablaşdırmada təqdim etməyə çalışır ki, özünə, öz daxili aləminə və bacarıqlarına diqqətləri cəlb edə bilsin. Məlumdur ki, insanın xarici görkəminə imicin digər komponentləri ilə müqayisədə daha çox diqqət ayrılır. Dəb, kosmetika və sağlamlıq sənayesi nəhəng informasiya həcmi təqdim edir və insanın xarici görkəmini əhəmiyyətli dərəcədə yaxşılaşdırmağa imkan verən çoxlu sayda ən müxtəlif əmtəə və xidmətləri təklif edir. Jurnal və internet saytlarda geyimə və saç düzümünə, kosmetika və bu kimi digər məsələlərə həsr olunmuş çoxlu sayda məsləhətlər yer alır. Müşahidə etməyi bacaran insan geyim və saç düzümünə görə daxili imic, şəxsi dəyərlər haqqında nəticə çıxara bilər. Bugünkü gündə insanların böyük əksəriyyəti başa düşür ki, onların xarici görkəmi nə dərəcədə böyük əhəmiyyətə malikdir. Əvvəllər mövcud olmuş düşüncələrin əksinə olaraq, zəka, bacarıq və səriştələr, eləcə də yaxşı xarici görkəm bir-birilə uzlaşdırıla

bilməz. Əgər insan yaxşı və səliqəli xarici görkəmə malikdirsə, yəni əgər o, təmizkar, saç düzümü səliqəli, dərisi təmiz, əllər və dişlər isə cəlbedicirdirsə, bu o deməkdir ki, həmin insan sanki müsbət özünüqiymətləndirmə ideyası əks etdirir. Özünəqulluq bir vərdəstdir, həmin vərdəşin möhkəmləndirilməsi üçün isə müvafiq hərəkətlər çoxlu sayda təkrarlanmalıdır. Məhz bu səbəbə görə, xarici görkəmə qulluq edilməsinə və sağlamlığın dəstəklənməsinə yönəlmiş hərəkətləri öncədən və daim planlaşdırmaq lazımdır. İşdə hər gün yaxşı geyimdə və səliqəli saç düzümü ilə görünmək, və burada ardıcılığa diqqətlə və ciddi surətdə riayət etmək lazımdır.

Rəng də həmçinin emosional assosiasiyaların yaranmasına gətirib çıxarır. İsti, parlaq, yüngül rənglər, məsələn, qırmızı və sarı, gözəgəlimli və mehriban insan imicinin yaradılmasına xidmət edir. Soyuq, qəmgin, tünd rənglər isə, misal üçün qara, tünd-göy, boz kimi rənglər müəyyən distansiya yaradır, hökmlü, zəhmli və çox təkəbbürlü bir insan imicinin yaradılmasına səbəb olur. Neytral təng tonlarında tikilmiş geyim daha universaldır. Parlaq rənglə malik geyim.ş xüsusən də əgər insanın dərisi solğun rəngdədirsə insanın görünüşünə təzyiq edə bilər. Bundan əlavə, parlaq geyim diqqətləri insanın özündən yayındırır ki, bu da rəhbər üçün qətiyyən yol verilən deyil. Tünd neytral rənglər insanı daha əhəmiyyətli edir, isti neytral rənglər, misal üçün, bej və açıq-qəhvəyi rəng, daha böyük əlçatanlıq təəssüratı oyadır. İnsanın üzü rənginə daha yaxın rəng əsas və daha vacib hesab olunur. Köynəklər, bluzalar, qalstuklar üz çalarına yaxın və uyğun çalarda olmalı və ona yaraşlıq gətirməlidir. Geyimdə rəngin düzgün istifadəsi insanın xarici görkəmini daha dinamik və əmin edir. Bütün həyat situasiyaları üçün qarderobun seçilməsi zamanı rənglərin kombinasiyalarını nəzərə almaq lazımdır ki, geyimin müxtəlif detallarının variasiyalarını həyata keçirməyə mümkün olsun. Məsələn, iki bahalı kostyum - tünd-göy və açıq-boz yaxud boz rəngli kostyumları ala bilərik. Göy kostyumun bleyzeri ola bilər ki, bu da müxtəlif ətəklərlə yaxşı uzlaşacaq, odur ki, bu geyimi ilboyu asanlıqla istifadə etmək mümkündür. Boz rəngli penceyi yaxalısız da almaq olar. Onun kəsiyi olacaq, həmin pencek müxtəlif aksesuarlarla çox uğurla dekor etmək imkanı olacaq. İki rəngi əsas kimi götürməklə, düşünmüş surətdə bluzaları, sviterləri, şərfləri, paltonu, şlyapanı, uzunboğaz corabları, tufilləri, bəzəkləri və çantaları seçmək lazımdır. Bir neçə eyni tonlu bluzalar almaq olar ki, onlar rəng baxımından geyim sahibinin əsas kostyumlarla uzlaşacaq, yaxud digər tonlu çox da nəzərə çarpmayan rəsmləri ola bluzaları götürmək olar ki, onların da rənglənmə baxımından hər iki kostyumla uzlaşması mümkün olsun. Daha bir mühüm şərt ondan ibarətdir ki, seçilən bluzaların boğaz kəsiyinin müxtəlif bəzəməsi olmalıdır. Açıq-boz yaxud boz kostyumdan olan pencek göy rəngli ətəklə və boz-çəhrayi-göy şərf dekor edilmiş bluz ilə yaxşı görünəcək. Bu variantda muncuq, qızıl zənciri, yarımqiymətli daşlardan ibarət boyunbaq kimi

bəzək elementləri uğurla istifadə oluna bilər. Tünd-göy rəngli kostyumdan olan pəncək ən müxtəlif uzlaşmalarda tətbiq edilə bilər. Çanta və tuflilər qara yaxud göy olmalıdır ki, geyimin istənilən dəsti ilə yaxşı görünür. Bir halda ki, geyim əşyalarının seçimi insanlar tərəfindən könüllü və şüurlu surətdə həyata keçirilir, həmin geyim əsasında onun sahibinin şəxsiyyəti barədə müəyyən nəticələrə gəlmək mümkündür. İnsanların bir qismi bilərəkdən belə geyinir ki, ətrafdakıları şoka salsın və onları cavab reaksiyaya təhrik edə bilsin. Başqaları o dərəcədə insan kütləsi ilə qarışır ki, onların xarici görkəmini yadda saxlamaq çətin olur. Geyimdə özünü ifadə etmək imkanını reallaşdırdıqda bu zaman üç əsas element kömək edir: geyimin biçimi, materialı, rəngi. Geyimin biçimi dəblə müəyyənləşir və onun nə dərəcədə qeyri-adi, ekstravaqant olması həmin biçimin bir o qədər də tez bir surətdə dəbdən düşəcəyinin göstəricisidir. Tez-tez görüşlərin və toplantıların keçirilməsini nəzərdə tutan iş üçün ciddi kostyumlar daha münasib və məqsədəuyğun hesab olunur. Boş və asudə vaxtın keçirilməsi üçün idman üslublu kostyumların və sviterlərin istifadəsinə yol verilir. İnsanların müxtəlif hündəsi formalara reaksiyası fərqli-fərqli olur və onlara müəyyən keyfiyyətlər verir. Ciddi hündəsi formaya və böyük sayda iti bucaqlara malik detallarla müqayisədə girdə formalı yaxalıqlar, ciblər və latskanlar daha yumşaq görünüşə malikdir. İnsanların müxtəlif hündəsi fiqurlara sərgilədiyi reaksiyanı geyimin düzgün seçiminin yerinə yetirilməsi üçün istifadə etmək olar. Dəyirmi kəsiyə malik sadə yun sviteri sakitlik və əlçatanlıq görünüşü gətirir, lakin kəskin hündəsi formalara malik işgüzar kostyum - hökmranlıq və ciddilik. İşgüzar insana çoxlu sayda detalları - cibləri, ilgəkləri, mürəkkəb formalı yaxalıqları, parlaq düymələri olan kostyumlardan uzaq durmaq lazımdır. Belə geyim bütün diqqəti insandan və onun dediklərindən yayındırır. Parça rəsmnin müxtəlif növləri də həmçinin müəyyən hisslər və assosiasiyaların əmələ gəlməsinə səbəb olur. Gündəlik geyim üçün düz xətlərdən, eləcə də xana-xana və zolaqlardan ibarət rəsmlər daha çox yaraşır. Beləliklə, imic müasir dövrdə kommunikasiya vasitəsi rolunda kimi çıxış edir, insanın xarakteri, onun hansı mühitdə yaşadığı, hansı sənət sahibi olduğu və s. haqda informasiyalar toplusunu ətrafdakılara ötürür.

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**IMPORTANCE OF RESILIENCY ON FIRM COMPETITIVE ADVANTAGE AND
PERFORMANCE IN PRESENT DAY ECONOMY**

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Abstract

Nigeria's organizations and global economy have been faced with herculean task of sustainability due to economic crises such as the latest Covid-19 pandemic that kept all the nations and business organizations at a disarray. Also, the growing competition associated with globalization, technology and economic liberalization have necessitated the call for firms' proactiveness, strategic foresight, and ability to surmount challenges and maintain competitive advantage to remain productive in the dynamic business environment. The aim of the study was to critically ascertain the significance of resiliency on gaining firm competitive advantage and sustainable performance. The present day economy has witnessed unprecedented economic crises and market rivalries which have led to loss of quality manpower and low productivity. The organizational low performance could be linked to employees' inability to learn from experience, being proactive and inability to adapt in any given environment to achieve sustainable performance. The study identified organizational resilience as the ability of organization to foresee, prepare, absorb or develop resistance in the face of challenges or threats within its environment, and could be able to bounce back and improve performance. Therefore, the study concluded that organizational learning, adaptive capacity, dynamic capability, and strategic foresight have significant relationships with firm competitive advantage and sustainable performance. The study recommended that management should reinvigorate organizational learning, adaptive capacity, strategic foresight, and dynamic capability of employees, which will lead to retention, foster competitive advantage and increased productivity.

Keywords: Resiliency; Organizational Learning, Adaptive Capacity; Dynamic Capability; Competitive Advantage; Productivity.

Introduction

The main objective of emerging Organizations is how to achieve high performance at all times, irrespective of turbulent and dynamic business environment.

According to Aki et al.(2011), performance refers to excellence, and includes profitability attainment by an organization, productivity from the employees, among other non-cost factors such as quality, speed, delivery, flexibility, market share and so on. Many researchers have concluded that achieving sustainable performance could depend on the resiliency of the organizations.

Organizational resilience aids a firm in surmounting challenges from environmental threats and risks, improving the chance of project success, and fostering the firm to sustain its performance during the time of crises and stability (Manfield, 2016).

According to Alastir (2010), companies are more susceptible to disruptive events from risks and survival threats as our environment grows more complicated and crisis-ridden. He argued that the goal of building resilience is to lessen an organization's exposure to threats and hazards by developing safety measures that lessen the chance and impact of disruptive events, responding to them effectively and efficiently when they do occur, and recovering from them as soon as possible.

According to Seville et al. (2008), organisational resilience may be defined as the capacity of an organisation to not just survive but perhaps even grow in the face of adversity. According to Mitroff (2005), organisational resilience is a constantly evolving aim that helps to performance during both times of business as usual and disaster. It is necessary for organisations to be flexible and highly dependable, and it gives them the ability to deal with situations that are disruptive. (Durodie, 2003).

Conceptual Framework

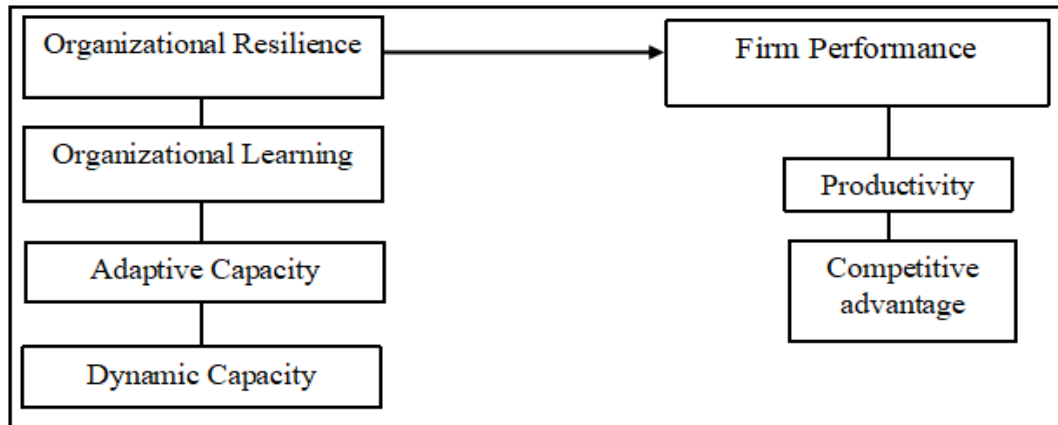


Figure 1 Conceptual framework showing the relationship between organizational resilience with its dimensions as organizational Learning, Adaptive Capacity and Dynamic Capability, and Employee Performance as dependent variable.

Source: Researchers' Framework (2023)

Aim/Objectives of the Study

The aim of the study is to examine the effect of organizational resilience on firm competitive advantage and performance. The specific objectives of the study are:

1. Ascertain the relationship between organizational learning and firm performance
2. Ascertain the relationship between adaptive capacity and firm performance
3. Ascertain the relationship between dynamic capability and firm performance

Theoretical Background

Darwin Theory of Change

For Charles Darwin, the years 1809-1882 are his own. "it is not the strongest or most intelligent that survive, but rather, it is the most adaptable to change."

Although Darwin may have had the survival of the species in mind when he spoke of the resiliency of individuals, the concept is still relevant to organisations that must not only "survive" continuous change but also grow and evolve in their own right to become stronger, fitter, and more capable of adapting to any kind of challenge. In fact, leaders and managers in all organisations should constantly work to cultivate organisational resilience (Denhardt and Denhardt, 2010). Organisational resilience can be defined as the capacity to recover from adversity in a way that makes the organisation more flexible and better able to adjust to future adversity.

Measures of Organizational Resilience

Organizational Learning

Aggestam (2006) argues that in order to be considered a learning organisation, a company's culture must promote and reward exploration, experimentation, and improvement at all levels. The environment promotes a culture of learning, a community of learners, and ensures that every worker's development adds to the organization's growth and success. The act of learning should not be seen as only a solution to a specific issue but rather as something that should eventually become ingrained in the culture. Learning organisations need a fresh perspective on leadership: the leader in the role of designer. Leadership is the first step in developing a culture; yet, since culture is the product of a group's acquired knowledge, the culture itself will, in the long run, define the desired leadership.

According to Aggestam (2006), a learning organisation is one that is structured in such a manner that it actively searches for information in its surrounding environment, generates information on its own, and actively encourages people to share their knowledge with one another within teams. This has to be directed by the organization's structure, as well as the vision, which should be directed by the strategic leadership of the organisation.

Organizational learning in Complex System

Learning is an ability that is present in organisations to variable degrees since they are complex adaptive systems. Schein (1996) identifies four variables that are fundamental to the capacity for learning that an organisation has as well as the health of the system as a whole. These are the following:

- ✧ A feeling of one's own uniqueness, purpose, or mission.
- ✧ The ability of the system to adjust to new conditions and continue functioning normally, despite the presence of both internal and external changes.
- ✧ a capability of seeing and evaluating reality; and
- ✧ The degree to which the many components of the whole are coordinated with one another

There are a variety of causes that might explain why a company has such a high learning capacity. A few examples of such abilities include seeing the world as fundamentally interconnected (the systems view), being able to transform one's perception of the world (generative learning), and being able to adapt to new situations and circumstances (adaptive learning) (Murray, 2002; Schein, 1996; Senge, 1990). The capacity to generate new ways of thinking is at the heart of generative learning. Adaptive learning is the process of easily

adjusting to novel circumstances. It is the ability of an organization's culture to ensure that learning is not simply based on adaptive learning, but rather that it becomes tolerant of both kinds of learning—adaptive and generative—instead of exclusively basing learning on adaptive learning. However, in order to accomplish this goal, new learning methods are necessary since it is very doubtful that cognitive improvements alone would suffice to accomplish this goal (Murray, 2002). The following discussion will provide an introduction to the ideas and concepts that underpin adaptive and generative learning with regard to the adaptability and situation awareness of organisations.

According to Daft and Weick (1984) and Murray (2002), adaptive learning is predicated on an organization's capacity to cope, as well as its ability to learn and change concurrently and to align itself with its environment.

It is essential to understand that the potential for adaptation is not a trait that remains constant in every system. There are a number of research (Folke, 2006; deVries, 1985) that investigate the dynamics of change and adaptation of these elements across time (Smit and Wandel, 2006) in various contexts (economic, social, political, institutional). The preceding statement referred to a few of these investigations. There has also been consideration of the connections between the many components that influence adaptive ability. They've realised that a person's management skills, for better or worse, may affect other variables, such how much stress their employees feel (Smit and Wandel, 2006).

It has been shown that certain businesses have productive workplace cultures that help them adjust to changes in their operating environment, even when such shifts are sudden and unexpected. Some of the organisations have shown to be an example of this. Coca-Cola (Seaman & Williams, 2005), Nokia (Sheffi, 2005), Toyota (Sheffi, 2006a), Dell (Sheffi, 2005), and UPS (Coutu, 2002) are just a few companies that have done this (these characteristics are described more below).

Furthermore, workers who are trained to anticipate the unforeseen make a substantial contribution to a firm with a high degree of adaptability. An organization must be able to strike a crucial balance between developing and testing a strategy while assisting its employees become skilled at handling unforeseen circumstances. Since no firm can prepare for every eventuality, the organizational culture becomes essential (Sheffi, 2005).

Complex Adaptive Capacity

Leading scholars in the field of complex adaptive systems, such as Gell-Mann (1994), Holland (1995), and Dooley (1996, 1997), give advice about the key components of CAS, which may be summarised as follows:

- A CAS is made up of agents, each of which may operate in a semi-autonomous manner and which develop over the course of time.
- Agents analyse the settings in which they operate and create mental models, also known as schema, of those environments.
- Agents may improve their fitness either by acting to modify the schema in order to suit the observation or by acting in order to alter the observation in order to match the schema.

"The schema define how agents interact with other agents in the environment around them," and "the environment" refers to the space that the agents occupy.

- In addition, CAS will often demonstrate the following traits (adapted from Vogelsang, 2002):
- "individual agents interacting with one another and recreating their relationships at the neighbourhood level."
- 'emergence of self-organization and the formation of global patterns'
- "constant creation of variety; the capability of developing new methods for action that build on the successes of the past." A conscious awareness that one can only exert influence on the system and not direct it.

It's possible to make the case that any organisation is complicated due to the intricate nature of its most fundamental component, which is people (Schein, 1980).

Increases in technological capability are often blamed for the increased complexity that occurs inside the internal settings of organisations. The idea that certain technological systems are subject to what are considered to be 'natural' or inevitable mishaps and events was first proposed by Perrow (1984). This theory is predicated on two interrelated dimensions: interactive complexity and loose/tight coupling. The phenomenon known as interactive complexity refers to the occurrence of unexpected and unplanned sequences of events inside a system that are hidden from view. The degree to which different components of a system are coupled to one another is referred to as its loose or tight coupling. Any changes made to one component of a tightly connected system have immediate ramifications and effects on all of the other components of the system because the components of the system are linked extremely closely to one another. This might have very negative consequences. On the other side, loosely linked

systems do contain linkages, but the performance of one part of the system is not reliant on the performance of another element of the system. According to Marias et al. (2004), loosely connected systems often have the capacity to withstand disturbances and perturbations without causing the overall system to become unstable. Perrow's technique is based on the notion that tightly connected systems that also display interaction complexity are prone to experience 'system accidents' that are wholly unanticipated and also have the capacity to cascade in their effects. This is the central thesis of Perrow's methodology. The chemical accident that took place in Bhopal (Shrivastava, 1992) is an example of this kind of failure. To cite only a few examples, there was the Chernobyl nuclear power plant (Pidgeon and O'Leary, 2000), the Exxon Valdez oil spill (Grabowski and Roberts, 1996), and the Marin Gulch tragedy (Weick, 1993).

Additionally, academics have found that certain kinds of organisations who display the interaction complexity and closely connected systems highlighted by Perrow tend to encounter surprisingly few 'system accidents'. These businesses have been given the designation of High Reliability Organisations, or HROs, according to Weick (1989). (Vogus and Welborne, 2003; Weick and Sutcliffe, 2001) Have you ever heard of the notion of mindfulness? It's one of the key components of healthy relationship orientations.

Folke et al. (2003), writing on resilience in a socioecological context, define adaptive capacity as the ability to learn, to try new things and adjust to them, and to build broad, generalised answers to different types of issues. Resilience includes adaptive ability, which indicates one's potential for learning, openness to change, and adoption of fresh solutions and strategies.

Armitage (2005) employs the four dimensions provided by Folke et al. (2003) for the study of socio-institutions. Adaptive capacity in the context of socio-institutions is linked to the traits of people, groups, and institutions that can promote learning in the face of ambiguity and change. Among these traits are the aptitude for self-improvement, cooperation in decision-making structures, and support for institutional variety.

Adaptive capacity may be defined as the ability of an individual or group to maintain an open mind towards novel experiences and to adjust to shifting conditions. This competency is useful for both solo and collaborative endeavours. In this context, adaptive capacity is addressed from both a social and an organisational perspective (McManus, 2007).

As Amah and Baridam (2012) note, the aim of adaptation is to gain an edge over competitors who are unable to or unwilling to change. This suggests that there is a link between flexibility and success in the business world. Adaptive capacity, as defined by Dalziell-and-McManus

(2004), is "the extent to which an organization's employees are concerned with, and actively contribute to, the development of the organization's resilience through the course of their work" (p. 1). Adaptive capacity may be described as the ability of an organisation to adjust effectively to changing settings and situations.

Dalziell and McManus (2004) continue by drawing a distinction between adaptive capacity and vulnerability, two concepts that, according to the authors, are commonly confused with one another since definitions of vulnerability typically incorporate adaptability. According to Dalzille and McManus (2004), vulnerability is defined as the length of departure from the organization's initial condition to the point at which it suffers substantial change or repercussions as a consequence of the catastrophe. In other words, vulnerability is the amount of time that an organisation has to deviate from its original state before it is considered vulnerable. An organization's adaptive capacity is the range of possible responses to a disaster within which it can find a stable state of operation. This can be seen of as the space in which the organisation operates.

Within the context of McManus's (2007) Relative Overall Resilience (ROR) model, the markers of adaptive capacity known as AC1 through AC7 may be found.

Adaptive Characteristics of Highly Resilient Organisations

Some scholars have proposed a set of adaptive qualities to boost organisational and social resilience. This was done as a result of the interest in developing a greater capacity for adaptation both during and immediately after a catastrophe (Dalziell & McManus, 2004) provide the idea that systems, more especially organisational systems, may respond to changes in a variety of ways. To begin, they may make use of previously developed solutions and apply them to the issues at hand, which might require expanding the scope of this answer. Second, answers that have been used in the past may sometimes be adapted to work in new situations when a crisis occurs. Thirdly, an organisation may come up with original solutions and implement them in order to solve an issue. The issues may be brand-new and unanticipated, or they could be ones that the organisation has been able to anticipate and prepare for. According to Dalziell and McManus (2004), when confronted with a crisis, organisations would often resort either to a command and control type structure or to an approach that is more spontaneous and imaginative.

Capabilities to Adapt to Change

Organisational agility is "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments," as defined by Teece et al.

(2010). Separating operational capabilities, which are patterned after an organization's current activities, from dynamic capabilities is possible. Teece et al. (2010) define dynamic capacities as "the capacity of an organisation to purposefully create, extend, or modify its resource base," citing Helfat et al. (2007). Static capabilities, on the other hand, relate to "an organization's capacity to deliberately create, expand, or modify its resource base."

According to Nelson and Winter (1982), the notion of "routines" in evolutionary theories of the organisation led to the development of the literature on dynamic capabilities. This was observed by Teece et al. (2010). So, it connects the dots between studies of economic strategy and those of evolutionary theories of organisation. They are of the opinion that in order to successfully take on new challenges, one must possess three dynamic characteristics. Both organisations and the people working inside them need the capacity to learn new things rapidly and to develop strategic assets. It is necessary for the organisation to incorporate newly acquired assets, such as capabilities, technologies, and feedback from customers. There is a need for transformation or reconfiguration of existing strategic assets.

"threat sensing, opportunity seizing, and competitiveness maintenance via the enhancement, combination, protection, and, if required, reconfiguration of the business's intangible and physical assets. Business agility, as described by Teece's idea of dynamic capabilities, include "the capacity to sense and shape opportunities for threat, (2) to seize opportunities, and (3) to maintain competitiveness."

You can't simply decide to be resilient one day; it doesn't work that way. Nor is it something that occurs all of a sudden. The study reveals that the concepts, actions, and behaviours that underpin resilience can be learnt and developed, making resilience a dynamic process that can be maintained in most individuals. It's important to remember that the skills and attitudes that foster resilience can be taught and honed.

Strategic Foresight

An additional characteristics of resilience is strategic foresight, which is a technique of anticipating changes and prepare to respond to the changes when they occur, and reduce uncertainties (Vecchiato, 2015).

According to Paliokaite and Pacesa (2014), strategic foresight may be seen as an organisational structural and cultural strength that identifies changes, analyses the results, and develops actions that are successful.

The factors that influence an individual's capacity for resilience

The question now is, what factors have an impact on an individual's potential to be resilient? According to the available research, resilience seems to be the result of a dynamic process involving the interplay of internal/personal qualities and external/situational elements.

Individual Factors According to the findings of several pieces of research, there are a number of personal qualities that may exist inside people that can either function as protective factors or boost one's potential to be resilient.

Why Should an Organisation Invest in Its Employees' Resilience?

Problems in the workplace have the ability to affect persons not just physically but also emotionally and mentally if they are not treated properly. The organisation will almost always be subject to severe expenses, some of which will be obvious while others will remain covert.

Firm Competitive Advantage

According to Kwak, Seo, & Mason (2018) firm's competitive positioning is determined by the high degrees of technological, environmental, superior flexibility and demand unforeseen influences.

According to de Oliveira and Werther (2013), a competitive edge and subsequent success in a market that is highly competitive are often the results of proper foresight of changes and rapid adaptation to those changes.

According to Porter (1985), a corporation is said to have a competitive advantage if it has the ability to establish a defensible and unique ground component in comparison to its other companies operating in the same sector.

The resources that a company uses to gain a competitive advantage ought to be useful, scarce, distinctive, and able to be imitated (ibid). There are two different sorts of competitive strategies, namely differentiation strategy and cost-leadership strategy (ibid). According to the findings of a recent study (Mahidieh et al., 2021) researchers, the performance of an organisation is considerably impacted when differentiation and cost leadership tactics are combined.

Khan et al. (2019) discovered a positive correlation between a firm's success and the presence of a durable competitive advantage.

According to Sharma and Sharma (2020), in today's highly competitive marketplaces, businesses that have resilient persons, systems, and processes are better able to adapt to the shifting needs of their consumers. This results in an increase in the firm's competitive edge, which in turn immediately leads to an improvement in the performance of the business..

Empirical Review

The authors of the aforementioned study, Mahdiah et al. (2021), investigated the connection between organisational resilience, strategic foresight, competitive advantage, and business performance. A study was administered to 202 pharmaceutical businesses in Iran, and each of those companies was asked to fill out a questionnaire in its entirety. In order to verify the validity of the assumptions, the partial least squares structural equation modelling (PLS-SEM) method was used. According to the results, an organization's strategic foresight, competitive advantage, and organisational resilience all have a positive and substantial association with a company's overall success.

One definition of resilience offered by Madni (2007) is the ability to anticipate interruption and continue functioning as best one can despite it. Awareness of the environment, degree of readiness, anticipation of disruptions, flexibility, capacity to recover, and other capacities are among the many ideas that emerge from definitions of organisational resilience, as stated by McMonus et al. (2008). One indicator of an organization's preparedness to weather a financial storm is its ability to either absorb shock or produce resistance in the face of perturbations in its surroundings.

Managers of resilient companies, as argued by Alastir (2010), need to be cognizant of potential threats to their people, infrastructure, activities, services, and supply chains at the board level. Additionally, these managers should comprehend the environment in which their businesses function. Managers, he argues, must be aware of and adapt to the ever-changing cultural, political, legal, regulatory, economic, technological, natural, and competitive environment in which their organisations function. They must also keep an eye out for key issues and trends that could have an effect on the organization's goals and the opinions and values of its external stakeholders

Summary

It can be seen from the study that organizational resilience could positively and significantly influence competitive advantage and performance. All the dimensions of organizational resilience of organizational learning, adaptive capacity and dynamic capability are all very significant on firm performance. Hence employees are keen to learn, adapt to changes, and capable to overcome all odds and challenges, bounce back and achieve greater success.

Conclusion

The findings of the study, which were based on previous research, came to the conclusion that organisational learning had a positive correlation with the competitive advantage and performance of businesses.

There is a favourable correlation between a company's adaptive ability and its competitive advantage and performance.

There is a favourable correlation between dynamic capacity and competitive advantage as well as performance.

Foresight in strategy has a favourable correlation with both the competitive advantage and performance of a company

Recommendations

The study recommends as follows:

1. Management should reinvigorate organizational learning as robust training and development of employees will lead to employees' resourcefulness and firm competitive advantage and increased productivity.
2. Management should reinvigorate and foster adaptive capacity, as flexible work systems will allow for employee retention, firm competitive advantage and productivity.
3. Management should reinvigorate and foster dynamic capability so that there will be employee less resistant to change, hence employees are able to meet the current prevailing technology in order to achieve firm competitive advantage and productivity.
4. Management should focus on strategic foresight, which will enable firm to be proactive and quick adaptation to environmental issues, leading to firm competitive advantage and productivity.

Contribution to Knowledge

The study contributed to knowledge by enriching the existing literature and demonstrating that quick adaptation to keystone vulnerability assist firms to remain productive and sustainable in turbulent economy.

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TARIMSAL ARAŞTIRMALARDA KAYIP VERİLERİ TAMAMLAMA YÖNTEMLERİNİN İNCELENMESİ

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ÖZET

Tarımsal arařtırmalarda iklim kořulları, uygulama hataları, teknik arızalar ve veri toplama süreçlerindeki eksiklikler gibi çeřitli nedenlerle bazı verilerde kayıpların olması söz konusudur. Veri setinde oluřan bu kayıplar, arařtırma sonuçlarını olumsuz yönde etkileyebilmektedir. Arařtırmadaki kayıp verilerin tamamlanması, verilerin analizlerinde güvenilirlik, dođruluk ve etkinlik sađlamak adına önem tařımaktadır. Nitekim kayıp verilerin potansiyel etkilerinin azaltılarak arařtırmadan daha güçlü ve anlamlı sonuçların elde edilmesi mümkündür. Bu nedenle, denemelerde karřılařılan kayıp veri sorununu çözmek amacıyla kayıp verilerin analiz dıřı bırakılması ve veri atama gibi klasik yöntemler kullanılmaktadır. Ayrıca, bu konuda geliřtirilmiř çeřitli istatistiksel yöntemler de bulunmaktadır. Bu çalıřmada tarımsal arařtırmalarda ortaya çıkan kayıp verileri tamamlamak için kullanılan farklı yöntemler tanıtılacaktır. Bu amaçla Seriler Ortalaması (Series Mean), Yakın Noktaların Ortalaması (Mean of Nearby Points), Yakın Noktaların Ortancası (Median of Nearby Points), Doğrusal Deđer Kestirimi (Linear Interpolation), Noktanın Doğrusal Eğimi (Linear Trend of Point) yöntemleri incelenerek yöntemler tanıtılacaktır.

Anahtar Kelimeler: Kayıp veri, Veri tamamlama, Eksik gözlem, Tarımsal arařtırma

Giriş

Tarımsal üretim, insanlık tarihinde köklü ve eski bir üretim faaliyetidir. Gıda temini açısından kritik bir rol üstlenen tarımsal üretim, her dönemde stratejik bir öneme sahip olmuştur. Günümüzde modern tarım uygulamalarının giderek dijitalleşmesiyle birlikte, tarımsal araştırmalardan elde edilen verilerin önemi de artmıştır. Fakat bazen çeşitli nedenlerden dolayı tarımsal veriler kaybolabilir. Veri toplama süreçlerindeki hatalar, araştırmacı hataları, teknik sorunlar ve veri kaydetme yöntemlerindeki eksiklikler gibi birçok faktörlere bağlı olarak kayıp veriler ortaya çıkabilmektedir.

Tarımsal araştırmalarda kayıp veriler, bir araştırmacının sonuçlarının doğrudan etkileyebilmektedir. Nitekim bir denemede kayıp verilerin olması örneklem büyüklüğünü azaltması nedeniyle araştırmacının istatistiksel gücünü düşürmekte ve bu nedenle araştırma sonuçlarının güvenilirliğini etkilenmektedir (Mazen vd., 1987; O'Keefe, 2007). Kayıp verilerin özellikle belirli bir grup üzerinde yoğunlaşması halinde yine sonuçlar yanıltıcı olmakta ve araştırma sonuçlarına bir önyargı oluşmaktadır. Diğer yandan, kayıp verilerin dikkate alınmaması veya yanlış ele alınması, araştırmacının bilimsel değerini ve sonuçlarının genelleştirilmesini olumsuz yönde etkilemektedir.

Genel olarak kayıp veriler nedenlerine göre tamamen rastgele kayıp, rastlantısal kayıp ve rastgele olmayan kayıp olmak üzere 3 sınıfta değerlendirilmektedir (Little ve Rubin, 2002). Özellikle kayıp verilerin tamamlanmasında hangi yöntem ya da yöntemlerin kullanılacağına karar vermek için kayıp verilerin bu sınıflandırma mekanizmasını anlamak önemlidir.

Buna göre, kayıp verilerin ortaya çıkma olasılığının tüm gözlemler için eşit olduğu ve diğer değişkenlere veya faktörlere bağlı olmadığı duruma “tamamen rastgele kayıp veri (Missing Completely Random, MCAR)” denir. Bu tür kayıplar genellikle veri toplama süreçlerindeki tesadüfi hatalardan kaynaklanan, araştırmacının kontrolü dışındaki faktörlere bağlı olan, istemsizce oluşan veri kayıplarıdır. Örneğin, bir tarımsal araştırmada araştırmacının herhangi bir değişkene ait gözlemlerin ölçümü sırasında ölçüm aletinin yanlış olduğunu bilmeden rastgele hata yapması, tamamen rastgele kayıplara örnektir.

Kayıp verilerle diğer değerler arasında sistematik bir ilişkinin olduğu, kayıp verilerin diğer değişkenlere bağlı olarak rastgele oluştuğu duruma “rastlantısal kayıp (Missing at Random, MAR)” denir. Bir tarımsal araştırmada araştırmacının herhangi bir değişkene ait gözlemlerin ölçümü sırasında ölçüm aletinin yanlış olduğunu bildiği halde hata yapması ya da ölçüm yapmaması tamamen rastgele kayıplara örnektir. Rastlantısal kayıp veride kayıp veriler yine rastgele oluşmuştur; fakat ölçüm yapılan diğer değişkenler tarafından tahmin edilebilmektedir.

Örneğin, canlı ağırlık ölçümü yapılamayan yeni doğan kuzuların kayıp veri atanmasında cinsiyetinin bilinmesi gerekmektedir.

Kayıp verilerin şansa bağlı oluşmadığı ve diğer değişkenlerden tahmin edilemediği durumda rastgele olmayan kayıp veriden (Missing Data Not at Random, MNAR) söz edilmektedir (Allison, 2001). Kayıp verilerin nedeni tamamen değişkenin kendisiyle veya veri setinde ölçülmemiş farklı bir değişkenle ilgilidir ve araştırmacının ölçmediği nedenlerle oluşmuştur. Örneğin ham protein analizi yapılmamış bir yemin ham protein değerinin olmaması ile kayıp veri rastgele oluşmamış, sorun ham protein analizinin yapılmamasından kaynaklanmıştır.

Kayıp verilerin hangi durumda ortaya çıktığının bilinmesi veri atama stratejilerinin belirlenmesinde, modelleme ve analiz süreçlerinin oluşturulmasında dikkate alınması gereken önemli bir konudur. Kayıp veriler için genel olarak veri silme ve veri atama işlemleri yapılmaktadır. Denemelerde bir veya daha fazla eksik değere sahip satır, sütunda ya da eksik eş gözlemlerin silinmesi yoluna gidilebilir. Bu çalışmada çeşitli tarımsal veri örneklerinde bulunan kayıp verilere kayıp veri atama yöntemlerinden Seriler Ortalaması (Series Mean), Yakın Noktaların Ortalaması (Mean of Nearby Points), Yakın Noktaların Ortancası (Median of Nearby Points), Doğrusal Değer Kestirimi (Linear Interpolation), Noktanın Doğrusal Eğimi (Linear Trend of Point) yöntemleri tanıtılacak ve uygulamaları incelenecektir.

Materyal ve Metot

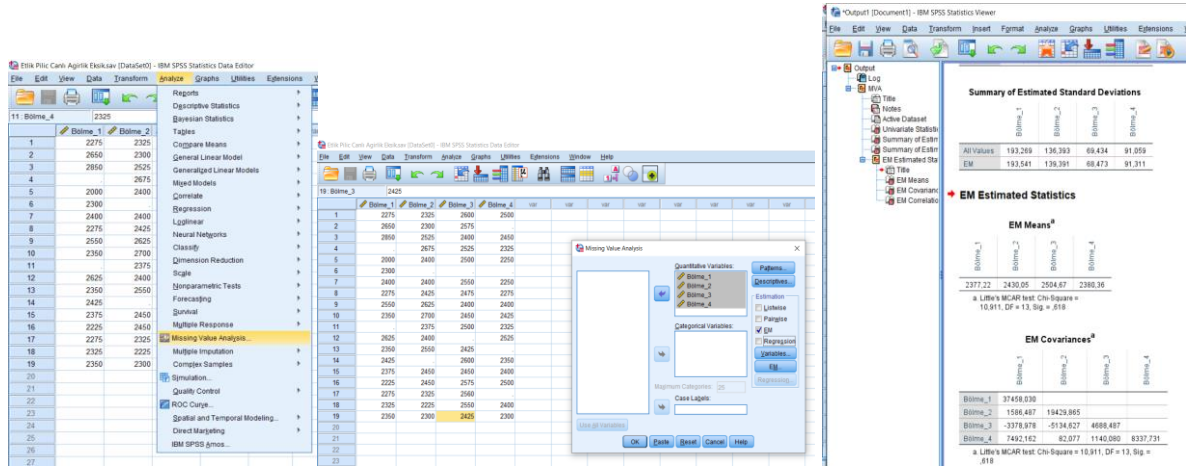
Bu çalışmada tarımsal araştırmalardan elde edilmiş örnek veri setlerine Seriler Ortalaması (Series Mean), Yakın Noktaların Ortalaması (Mean of Nearby Points), Yakın Noktaların Ortancası (Median of Nearby Points), Doğrusal Değer Kestirimi (Linear Interpolation), Noktada Doğrusal Eğim (Linear Trend at Point) teknikleri uygulanarak kayıp değerler tamamlanacaktır. İstatistiksel analizlerde IBM SPSS v25 programı kullanılacaktır.

Bu çalışmada belirli bir genotipteki etlik piliçlerin 6. hafta canlı ağırlıkları (g) Tablo 1’de verilmiştir. 4 farklı bölmede yetiştirilen piliçlerin canlı ağırlık ölçümleri belirli rastlantısal sebeplerle alınamamıştır. Söz konusu kayıp verilerin atanması amacıyla aşağıdaki işlemler öncelikle yapılmalıdır.

Tablo 1. Etlik piliç 6. hafta canlı ağırlıkları (g)

Bölme_1	Bölme_2	Bölme_3	Bölme_4
2275	2325	2600	2500
2650	2300	2575	
2850	2525	2400	2450
	2675	2525	2325
2000	2400	2500	2250
2300			
2400	2400	2550	2250
2275	2425	2475	2275
2550	2625	2400	2400
2350	2700	2450	2425
	2375	2500	2325
2625	2400		2525
2350	2550	2425	
2425		2600	2350
2375	2450	2450	2400
2225	2450	2575	2500
2275	2325	2560	
2325	2225	2550	2400
2350	2300	2425	2300

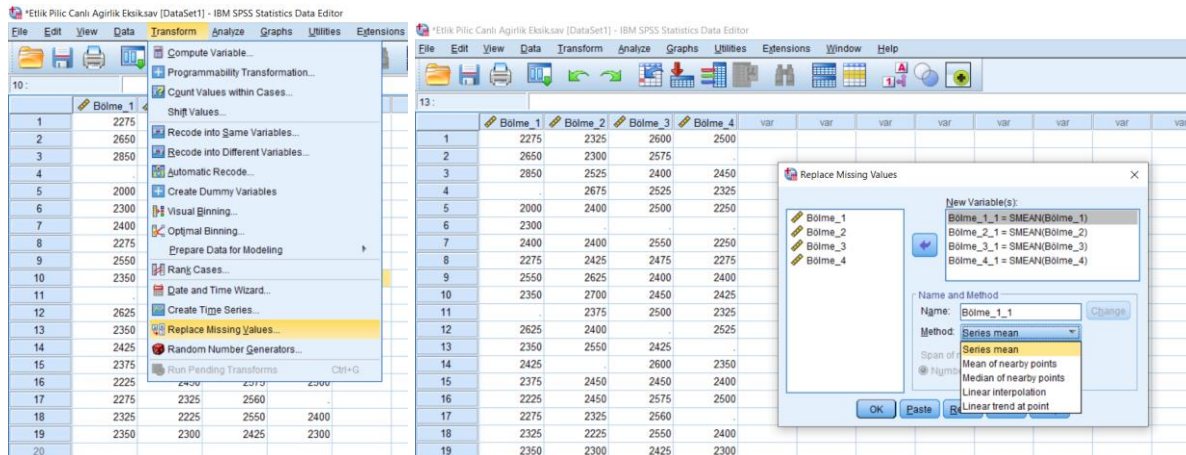
Kayıp veri tamamlamadan önce bu kayıpların hangi tip hata kaynağına sahip olduğunun belirlenmesi gerekmektedir. Bu amaçla Beklenti Maksimizasyonu Algoritması (Expectation Maximization, EM) kullanılmaktadır (Bishop, 2006). İki basamaklı bu algoritmanın ilk basamağında regresyon tahminleriyle gözlenen verilerin parametrelerine ait kestirimler kullanılarak kayıp veriler yerine yaklaşık değerler atanırken, ikinci basamakta tamamlanmış veriler üzerinden tahminler yenilenmektedir. Bu iteratif işlemler süreci beklenen ve tahminlenen değerler arasındaki farkların önemsizleştiği noktaya kadar devam etmektedir (Hedderley ve Wakeling, 1995). Bu çalışmada kullanılan etlik piliç canlı ağırlık verilerine EM algoritması aşağıdaki adımlarla yapılmıştır. “Missing Value Analysis” penceresinden canlı ağırlık değerleri “Quantitative Variables” sekmesine tanımlanarak EM algoritması seçilmiştir.



Şekil 1. EM algoritması ile kayıp veri sınıflamasının belirlenmesi

EM algoritması sonucu bulunan olasılık değerinin (estimated statistics olasılığının) istatistiksel olarak önemli bulunması ($p < 0.05$) kayıp verilerin rastgele olmayan kayıp veriler sınıfına girdiğini göstermektedir. Bu durumda kayıp veri atama işlemlerine başvurulmamalı, veri eksikliğine neden olan faktörlerin incelenerek giderilmesi yoluna gidilmelidir. Olasılık değerinin önemsiz olması durumunda ise ($p > 0.05$) kayıp verilerin rastlantısal olduğu kabul edilmektedir. Bu çalışmada etlik piliç canlı ağırlıkları için EM değeri 0.618 olarak bulunduğundan ($p > 0.05$) kayıp veri atama işlemlerine geçilmiştir.

Transform menüsünden “Replace Missing Values” seçilerek kayıp veri ataması yapılacak değişkenler tanımlanmaktadır. Daha sonra Seriler Ortalaması (Series Mean), Yakın Noktaların Ortalaması (Mean of Nearby Points), Yakın Noktaların Ortancası (Median of Nearby Points), Doğrusal Değer Kestirimi (Linear Interpolation) ve Noktanın Doğrusal Eğimi (Linear Trend of Point) yöntemlerinden biri seçilmektedir (Çokluk ve Kayri, 2011).



Şekil 2. Kayıp veri atama yöntemleri

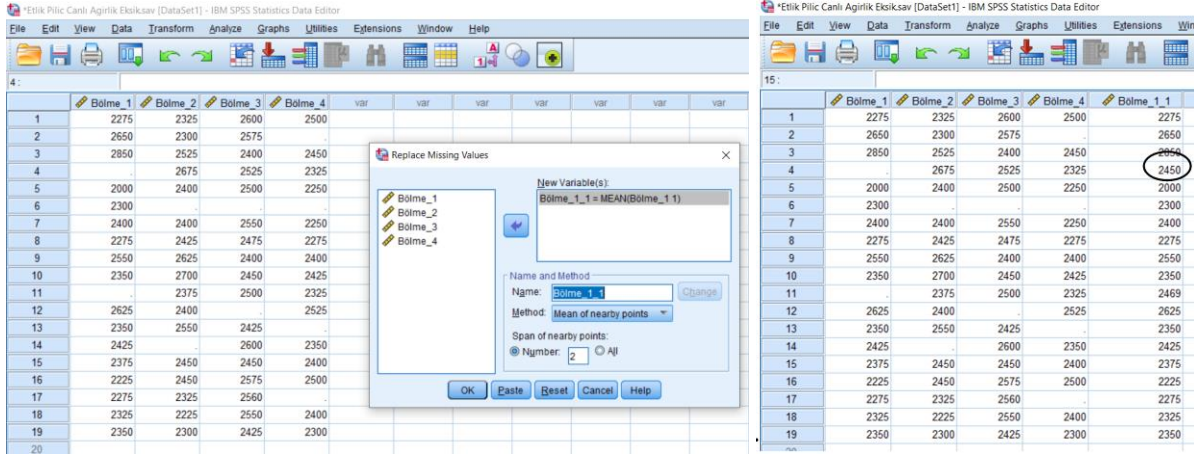
BULGULAR

Kayıp veri atama yöntemlerine göre Seriler Ortalaması (Series Mean) yönteminde ilgili kayıp verinin bulunduğu serideki verilerin ortalaması alınarak kayıp değer yerine atanır. Örnek verilerde seriler ortalaması yöntemi ile hesaplanan yeni değerler aşağıdaki gibi elde edilmiştir.

Tablo 2. Seriler Ortalaması yönteminde etlik piliç canlı ağırlıkları için kayıp veri atamaları

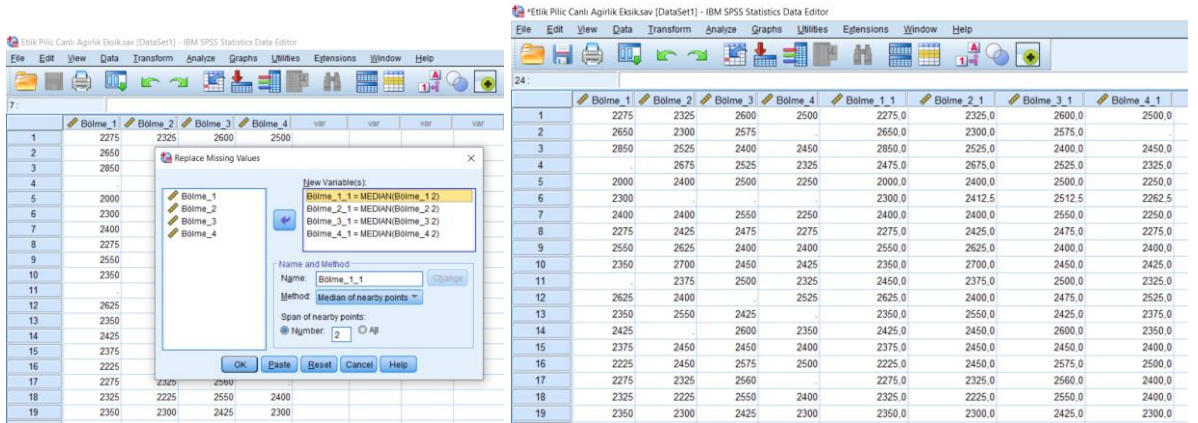
Bölme_1	Bölme_2	Bölme_3	Bölme_4
2275	2325	2600	2500
2650	2300	2575	2378
2850	2525	2400	2450
2388	2675	2525	2325
2000	2400	2500	2250
2300	2438	2504	2378
2400	2400	2550	2250
2275	2425	2475	2275
2550	2625	2400	2400
2350	2700	2450	2425
2388	2375	2500	2325
2625	2400	2504	2525
2350	2550	2425	2378
2425	2438	2600	2350
2375	2450	2450	2400
2225	2450	2575	2500
2275	2325	2560	2378
2325	2225	2550	2400
2350	2300	2425	2300

Bir diğer kayıp veri atama yöntemi Komşu Noktaların Ortalaması (Mean of Nearby Points) yöntemidir. Burada kayıp veriler kendisinden önceki ve sonraki komşu değerlerin ortalaması ile atanmaktadır. SPSS ile ortalaması alınacak çevre değerlerin sayısı tanımlanabilmektedir. Örneğimizde Bölme_1'deki kayıp verinin kendisinden 2 önce ve sonraki ölçümlerin ortalamasına göre "2450" değeri bulunarak kayıp veri değeri olarak atanmıştır.



Şekil 3. Komşu noktaların ortalaması veri atama penceresi

Bunlardan başka Komşu Noktaların Medyanı (Median of Nearby Points) yöntemi ile de kayıp veriler atanmaktadır. Kayıp değerler Komşu Noktaların Ortalaması yöntemine benzer olarak kendisinden önceki ve sonraki komşu değerlerin medyanı (ortancası) alınarak hesaplanmaktadır. Etlik piliç canlı ağırlıkları için bu yöntem uygulandığında Şekil 4' deki veri atamaları elde edilmiştir. Dikkat edilecek olursa Bölme 4' deki kayıp veri kendisinden önce 2 ölçüm olmadığından hesaplanamamıştır. Hesaplama için kullanılacak ölçüm değeri belirlenirken bu duruma dikkat edilmelidir.



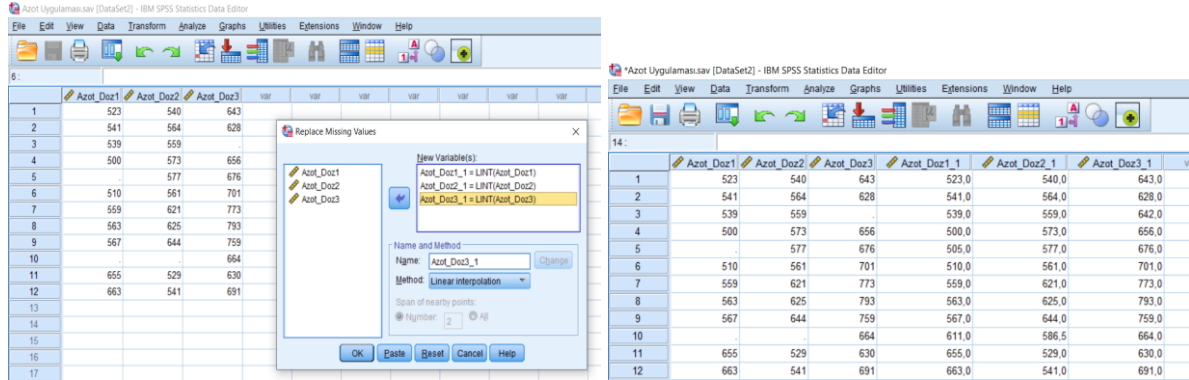
Şekil 4. Komşu noktaların medyanı veri atama penceresi

Kayıp veriler için Doğrusal İnterpolasyon (Linear Interpolation) yöntemi de sıklıkla kullanılmaktadır. İnterpolasyon işleminde kayıp veriden önce ve sonra gelen gözlemler arası farklar kayıp veri sayısına bölünerek kayıp veriden sonra gelen gözlem değerine eklenerek kayıp veri ataması yapılır. Bölümle bulunan bu değer, ilk eksik gözlem değerine eklenerek ikinci eksik gözlem değeri bulunarak son eksik gözlem değeri bulunana kadar işleme devam edilir. Ancak veri setindeki ilk veya son kayıp veri için bu işlem yapılmaz.

Örneğin, azot gübresinin 3 farklı dozunun denendiği bir denemede bazı parsellerde zarar gören bitkiler için alınamayan buğday verimleri (kg/da) (Tablo 3) için Doğrusal İnterpolasyon yöntemi ile kayıp veri ataması sonucu aşağıdaki değerler bulunmuştur.

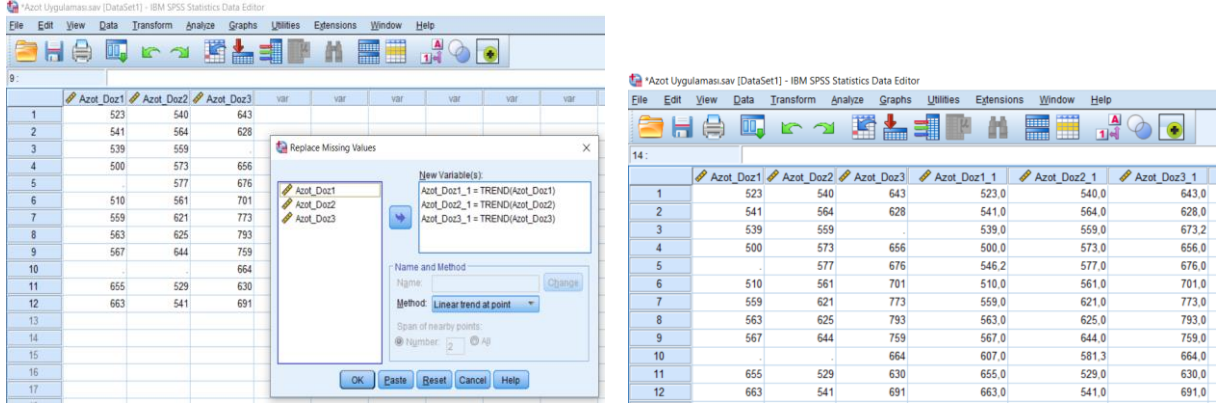
Tablo 3. Azot uygulamasında alınan buğday verimleri

Azot_Do21	Azot_Do22	Azot_Do23
523	540	643
541	564	628
539	559	
500	573	656
	577	676
510	561	701
559	621	773
563	625	793
567	644	759
		664
655	529	630
663	541	691



Şekil 5. Doğrusal İnterpolasyon veri atama penceresi

Kayıp veriler Noktada Doğrusal Eğim (Linear Trend at Point) yöntemi ile de atanabilmektedir. Bu yöntemde değişkenlerin sergilediği eğilime bağlı olarak kayıp veri bulunan değişkenin diğer değişkenlere regresyon analiziyle oluşturulan regresyon denkleminde göre tahminlenen değerler kayıp veriler yerine atanmaktadır.



Şekil 6. Noktada Doğrusal Eğim veri atama penceresi

SONUÇLAR VE TARTIŞMA

Tarımsal araştırmalarda farklı sebeplerle ortaya çıkabilen kayıp veriler, özellikle istatistik analizlerin güvenilirliğini kısıtlamakta ve sonuçları değiştirebilmektedir. Özellikle deney ünitesi sayısının azalması, istatistiksel hataların artmasına ve testlerin gücünün azalmasına neden olabilir. Bu bağlamda, kayıp verilerin tahmin edilerek yerine atanması önem kazanmaktadır. Kayıp veri sorunu ile başa çıkmak için çeşitli yaklaşımlar geliştirilmiş, burada SPSS paket programı ile uygulanabilen yöntemlerden bahsedilmiştir.

Kayıp veri atama yöntemlerinin tarımsal veri kayıpları üzerine farklı avantaj ve dezavantajları bulunmaktadır. Yöntem seçiminde bu durumların dikkate alınarak karar verilmesi önemlidir. Nitekim uygun yöntem seçilmediği takdirde çalışma sonuçları bu durumdan olumsuz yönde etkilenecektir (Ginkel ve diğerleri, 2007).

Seriler ortalaması yönteminde tüm seri dikkate alınarak veri atama yapıldığı için basit ve hızlı bir doldurma yöntemi olarak kabul edilmektedir. Ancak, verilerde aykırı değerler bulunduğu kayıp veri atamaları verilerin genel eğilimini yeterince temsil etmeyebilir. Yakın noktaların ortalaması ve ortancası yöntemlerinde ise aykırı değerlere daha dirençli olsa da kayıp veri etrafında geçerli değerler olmadığı doğruluğu azalacaktır. Doğrusal interpolasyon yönteminde iki geçerli değer arasında doğrusal bir tahmin kullanılmaktadır. Serinin başında ve sonundaki kayıp veri durumunda bu yöntem kullanılamaz. Ayrıca verilerdeki değişkenliğin yüksek olduğu durumlarda doğrusal interpolasyon sonuçları bozabilmektedir. Noktada doğrusal eğim yöntemi ile karmaşık bir veri setinde doğrusal eğim sonuçları yanılacaktır.

Günümüzde kayıp veri atama yöntemleri halen araştırılan bir konudur. Yöntem seçimi kayıp verinin niteliği ve büyüklüğüne göre dikkatli yapılmalıdır. Kayıp veri atama yöntemlerinin performanslarını değerlendiren ortalama mutlak hata, hata kareler ortalaması, belirleme katsayısı, çapraz doğrulama gibi yöntemlere başvurulmalıdır. Bu çalışmada tanıtılan

yöntemlerden başka Beklenti Maksimizasyonu Algoritması, Karar Ağaçları, Yapay Sinir Ağları, ROC alanı ve Bayesci Veri Atama gibi yeni nesil yöntemler de arařtırmacılara sunulmaktadır. Kayıp veri sorununu çözmek için daha etkili stratejilerin geliştirilmesinin devam edeceđi düşünölmektedir.

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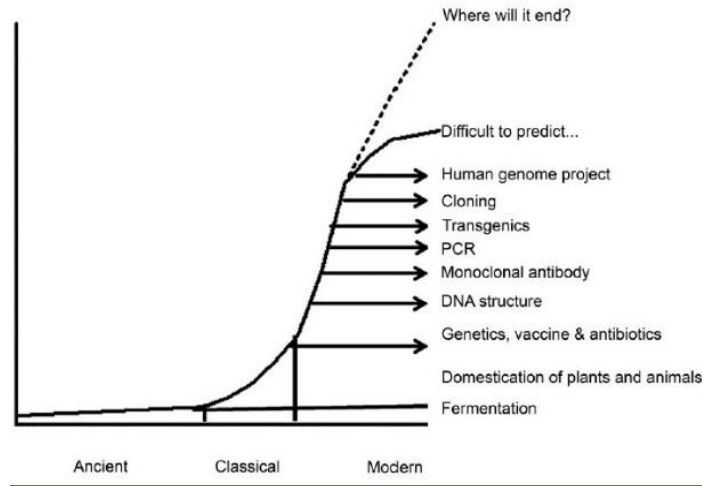
ÖZET

Biyoteknoloji, biyolojik ve teknolojik imkânların bir araya getirilmesi ile ortak faydanın artırılmasını amaçlar. Yaşamsal öneme sahip biyoteknolojinin insan hayatındaki yeri vazgeçilmez bir hale gelmiştir. Günümüzde ise modern biyoteknoloji ile birlikte moleküler düzeyde gerçekleştirilen genetik manipülasyonlarla verimlilik artırılmış ve yeni ürünlerin üretilebilmesi sağlanmıştır. Bu gelişmeler hayvancılıkta, klasik ıslah çalışmalarının bir adım daha ileri taşınmasını sağlamıştır. Modern ıslah çalışmaları ile belirlenen yüksek genotiplerle yapılan gen transfer çalışmalarıyla et, süt, yumurta verimleri artırılması, hayvanlardan elde edilen yün oranının ve kalitesinin artırılması, sağlıklı ve güçlü hayvanlar üretilerek daha besleyici ve sağlıklı besinlerin elde edilmesi (düşük kolesterol ve yüksek vitamin içeriği) ile hastalıklara dirençli hayvanların yetiştirilebilmesi gibi pek çok alanda gelişmeler sağlanmaya çalışılmaktadır. Bu çalışmada, biyoteknoloji alanında yapılan çalışmaların hayvan ıslahının geliştirilmesine nasıl katkıda bulunduğu yer verilmiştir. Hayvan ıslahında iyileştirilmesi istenen özelliklerin artırılması, üstün genotipik değerlere sahip olanların seçilmesi ve gelecek kuşakların bu bireylerden elde edilmesinin sağlanarak insanlar için daha faydalı ve verimli hale getirilmesi konularına değinilmiştir.

Anahtar Kelimeler: Biyoteknoloji, Islah, İyileştirme, Genotip, Verimlilik

GİRİŞ

Biyoteknoloji terimi, biyoloji ve teknolojinin imkânlarının bir araya getirilmesi ile ortak yararın artırılmasını amaçlayan bir bilimdir (Alpan, 1989). 'Biyoteknoloji' kelimesi iki basit bilim teriminden, yani 'Biyoloji' ve 'Teknoloji' den türetilmiştir. En yaygın tanımıyla ise biyoteknoloji, yaşayan organizmaların ürettikleri maddelerin veya doğrudan bazı organizmaların, insanlığın yararı amacıyla kullanılmasıdır (Kayıhan, 2018). "Biyoteknoloji" terim olarak kullanılmadan çok daha öncesinde bile pratikte var olmuştur. Biyoteknolojinin tarihsel gelişimi Şekil 1'de verilmiştir (Verma ve ark., 2011).



Şekil 1. Biyoteknolojinin gelişim tarihi (Verma ve ark., 2011)

Antik dönemde (1800 yılı öncesi), insanların en temel gereksinimlerinin başında beslenme, giyinme ve barınma geliyordu. Yerleşik hayata geçtikten sonra ise hayvanları evcilleştirmesi ve en önemlisi ıslah edilmesi ile biyoteknoloji ilk defa tarih sahnesine çıktı (Verma ve ark., 2011).

Biyoteknolojinin evriminin ve gelişiminin ikinci aşaması ise 1800'den neredeyse yirminci yüzyılın ortalarına kadar süren 'Klasik Biyoteknoloji' dönemidir. Bu dönemde 'Biyoloji' terimi de ilk kez kullanıldı. Biyoteknoloji terimini ilk kez kullanan, Macar Ziraat mühendisi olan Karl Ereky (1878-1952) oldu. Ereky biyoteknolojiyi, canlı organizmaların yardımıyla ürün elde etmek için kullanılan teknikler olarak tanımladı. Gregor John Mendel (1822-1884)'in *Pisum sativum* (Bezelye bitkisi) genlerini keşfederek bir nesilden diğerine aktarıldığını açıkladı, Charles Darwin ve aynı zamanda Robert Brown hücrelerde çekirdeği keşfetti, 1868'de Fredrich Miescher beyaz kan hücrelerinden ekstrakte ettiği nükleik asitten oluşan bir bileşik olan nükleini bularak genetik bir materyal olarak DNA'nın keşfi ve genetik bilgi transferinde

DNA'nın rolü için modern moleküler biyolojinin temelini oluşturdu Ayrıca, bu dönemde aşular ve antibiyotikler insanlığın en iyi kurtarıcıları olarak ortaya çıktı (Verma ve ark., 2011).

Modern biyoteknoloji döneminde, modern tekniklerin yaygınlaşması ile transgenik bitki ve hayvanların elde edilmesi, yeni ilaçların üretilmesi, aşuların geliştirilmesi ve biyo- yakıt üretimi gibi birçok konuda önemli çalışmalar yapıldı. Biyoteknolojinin hayvancılıkta kullanım alanı bulmasıyla “*hayvansal biyoteknoloji*” terimi ortaya çıktı. Bu alanda, özellikle hayvan ıslahı, transgenik hayvan teknolojisi, genetik haritalama, rekombinant DNA teknolojisiyle enzimlerin hayvan beslemede kullanımı, hayvan sağlığının iyileştirilerek kaliteli yapağının üretilmesi gibi önemli gelişmeler sağladı (Özcan ve Ayaşan 2009). Biyoteknoloji, 1950'lerden sonra ıslahta uygulamalara başladı (Doyle ve Persley, 1996). 1973 ve sonrasında ‘*Modern biyoteknoloji döneminde*’ ise modern ve gelişmiş tekniklerin biyolojik sistemlere uygulanmasına yönelik çalışmaları kapsadı (Ekinci ve ark., 2005). 1953'te, JD Watson ve FHC Crick ilk kez, popüler olarak 'Çift Sarmal DNA Modeli' olarak bilinen yapısal bir DNA modeli vererek, genetik bir materyal olan DNA'nın gizemlerini çözdü. İrlandalı bir bilim adamı Ian Wilmut, koyun modelini kullanarak yetişkin bir hayvanı klonlamayı başardı ve klonlanan koyunu 'Dolly' olarak adlandırdı (Verma ve ark., 2011).

Hayvan ıslahında kullanılan Seleksiyon ve Kontrollü Birleştirmeler biyoteknolojinin ilk uygulamaları olarak değerlendirilir. Devam eden süreçte ise Sun'i tohumlama, embriyo transferi, in vitro fertilizasyon, klonlama ve transgenik hayvan üretimi tekniklerinin uygulamaya konulmasıyla da hayvan ıslahı çalışmalarına önemli bir hız kazandırılmıştır (Alpan, 1989).

Suni tohumlama, genetik olarak istenilen özelliklere sahip bireylerin daha etkili üretimini sağlayan yöntemlerdendir. Suni tohumlama çalışmaları ile ilgili ülkemizdeki en önemli gelişmelerden biri 1973 yılında ilk kez donmuş boğa sperması üretiminin başlamasıdır. Bu uygulama üstün genetik yeteneğin çok sayıda yavruya aktarma imkânı vermesi bakımından önemlidir. Ancak gerek büyükbaşta olsun gerekse küçükbaş suni tohumlamada ülkemiz AB ülkelerine kıyasla yeterli düzeyde değildir. Bunun nedeni; işletme yapısındaki yetersizlikler, döl verimini etkileyen barınakların yapısı, besleme, üreme organı hastalıkları ve organizasyon hataları sayılabilir (Kara ve Bekyürek, 2020).

Embriyo transferi tekniği özellikle büyükbaş hayvan yetiştiriciliğinde uzunca bir süredir çalışılmaktadır. Potansiyeli yüksek fazla miktarda embriyonun doğrudan veya ayrıldıktan sonra taşıyıcı bireylere verilmesini içerir. Embriyo transferi yüksek verim gücüne sahip hayvanların üstün genetik yeteneklerinden daha yüksek oranda yararlanma imkânı vermektedir (Barnum,

2005). Embriyo transfer uygulaması ilk kez 1890' yılında Walter Heape tarafından Angora tavşanlarında gerçekleştirmiştir. Embriyo transfer uygulamasıyla dünyada doğan ilk buzağı 1951 yılında elde edilmiştir. Ülkemizde embriyo transferi çalışmalarına ilk olarak 1981 yılında tavşanlarda ve 1983 yılında farelerde yapılmıştır. Koyunlarda ilk embriyo transferi 1984 yılında ve sığırlarda ise ilk embriyo transfer uygulaması 1985 yılında gerçekleştirilmiştir (Alpan, 1989). Daha sonraları; sığırlarda embriyo transferi uygulamaları (Sönmez ve ark., 1992), sığır embriyosunun dondurulması ve transferi uygulamaları (Sungur ve Yurdaydın, 1994), sığırlarda embriyo transferi, embriyoların farklı yöntemlerle dondurulması, dondurulan embriyoların transferi konularında çalışmalar (Akyol ve ark., 2007) yapmışlardır (Kara ve Bekyürek, 2020). Hayvan ıslahına yardımcı bir diğer biyoteknolojik yöntem de İn Vitro Fertilizasyondur. İn vitro fertilizasyon (IVF), ile mezbahada kesilen ya da üstün genetik yapıdaki hayvanlardan çok miktarda oosit toplayarak laboratuvar ortamında embriyo elde edilebilmektedir. Yöntemde Peripubertal düvelerden, gebe ve genital yollarında fizyolojik bozukluğa sahip hayvanlardan da yararlanılabilmektedir (Alpan, 1989). Türkiye'de İn Vitro Fertilizasyon (İVF) uygulamaları, 1983 yılında tavşanlarda çalışılmış ve 2002'de ise ilk in vitro koşullarda üretilmiş olan embriyolardan sağlıklı kuzular elde edilmiştir. Ülkemizde IVF uygulamaları konusunda çalışmalar bulunmaktadır (Sağırkaya ve ark, 2004; Akyol ve Ark., 2007).

Klonlama, üremenin aseksüel biçimidir. Kelime karşılığı kopyalama olan klonlama aynı genetik yapıdaki bireylerin meydana getirilmesi şeklinde tanımlanabilir. 1997 yılında Ian Wilmut ve Keith Campbell, Edinburgh'daki Roslin Enstitüsü'nde, ilk kez klonlanmış "Dolly" isimli bir koyun üretmeyi başarmıştır. 1998 yılında ise araştırmacılar yirmiden fazla fareyi, çekirdeksiz yumurtalara doğrudan çekirdek transferi yaparak üretimini gerçekleştirmişlerdir. Bunu daha sonra; keçi, inek, domuz, at, tavşan ve kedi izlemiştir. (Barnum, 2005). Ülkemizde ilk klon kuzular olan "Oyalı ve Zarife" 21 Kasım 2007 yılında dünyaya gelmiştir. Sığırlarda 2008 de ise Boz ırkla yapılan klonlama çalışmaları sonrasında da ilk klon buzağı "Efe" olmak üzere 5 adet sağlıklı klon yavru elde edilmiştir (Kara ve Bekyürek 2020).

Transgenik hayvanlar genomlarında başka bir organizmaya ait rekombinant geni taşıyan hayvanlar şeklinde ifade edilir. Transgenik hayvanlar genellikle ekonomik nedenlerle ya da insan hastalıkları için hastalık modellemesi yapabilmek düşüncesiyle meydana getirilmektedir. Kullanılan 3 yöntem vardır. Bunlar, DNA mikroenjeksiyonu, Retroviruslar aracılığı ile gen aktarılması ve embriyonik kök hücreler aracılığı ile gen aktarılması şeklindedir. Ayrıca son zamanlarda nükleer transfer ile transgenik hayvan üretimi özellikle çiftlik hayvanlarında tercih edilen bir başka yöntem olmuştur. Transgenik çiftlik hayvanı üretiminde en çok kullanılan

yöntem mikroenjeksiyondur. Fakat bu yöntemde de başarı oranı maalesef düşüktür (Yardımcı, 2007). 24 Temmuz 2013 tarihinde doğan ve ülkemizin ilk 2 adet transgenik tavşanının ardından 23 Kasım 2013 tarihinde ülkemizin ilk transgenik kuzusu olan “Çimen” doğmuştur (Kara ve Bekyürek, 2020).

ARAŞTIRMA VE BULGULAR

Türkiye’de hayvan varlığının ıslahı amacıyla hayvan ıslah ve yetiştirme kurumlarına olan ihtiyaç doğrultusunda Cumhuriyetin ilanının akabinde 1924 yılında Karacabey Harası kurulmuştur. Daha sonra Çifteler, Konya, Çukurova ve Sultansuyu Haraları kurulmuştur (Aksoy, 2003).

Ülkemizin coğrafi ve ekonomik durumları göz önüne alınarak İsviçre’den İsviçre Esmeri ve Simental ırkları ithal edilmiştir. 1925 yılında Karacabey Harasına Avusturya'dan Montafon (İsviçre Esmeri) ve Bonihat (Simental) sığırları getirilmiştir. 1935 yılında ise Avusturya'dan Montafon ırkı getirtilerek saf damızlıklar çoğalmıştır. Bursa ve Balıkesir bölgelerinde halk elindeki yerli sığır ırklarının Esmer ırka çevirme melezlemesi çalışmaları yapılmıştır. 2. Dünya savaşı sırasında ıslah çalışmaları duraksadıktan sonra 1947 yılında İsviçre'den boğa ve inek ithal edilerek ıslah çalışmalarına devam edilmiştir. Günümüzde özellikle Batı Anadolu'da yaygın bulunan bir ırk olan Karacabey Montafonlarının çoğu bu ilk yapılan ithallere dayanmaktadır. İlk ithaller Montafon olduğu için bu isim halk ağzına yerleşmiş ve oluşturulan ırka da Karacabey Montafonu denilmiştir, daha sonraları bu yeni ırkın adı "*Türk Esmeri*" olmuştur. İlerleyen yıllarda Amerika'dan sütçü ırk olarak Holstein ve Jersey, etçi ırk olarak da Hereford ve Angus getirtilmiştir. İlk başlarda hayvan ithalleri sadece devlet tarafından yapılıyordu, 1965 yılından itibaren kurulmaya başlanan özel ticari firmalar da damızlık sığır ithal etmeye başlamışlardır. 1970 yılında tüm sığır sayısının yaklaşık olarak % 10 unu kültür ırk ve melezleri oluşturuyorken, 1980’de % 20, 1990’de % 36 ve 1998’de ise % 58 şeklinde elde edilmiştir (Aksoy, 2003).

Koyun ıslah çalışmalarında ise öncelikle ince yapağı üretimi hedeflenmiştir. 1928-1930 yılları arasında Karacabey harası ve Halkalı Ziraat Meslek Okulunda Merinos koyun ve koçları yetiştirilmeye başlanmıştır. Daha sonra et verimini de arttırmak amacıyla 1935-1939 yılları arasında Almanya’dan Et Merinosu getirtilmiştir. Son yıllarda bilimsel araştırmalar ışığında Ramlıç, Malya ve Tahirova gibi yeni melez koyunlar elde edilmiştir (Aksoy, 2003). Saf yetiştirme ve seleksiyon çalışmalarına yönelik yapılan araştırmalarda, öncelikle yerli koyunlarımızdan Akkaraman, Morkaraman, Kıvırcık, İvesi, Dağlıç, İmroz ve Karayaka ırklarının çeşitli verim seviyeleri incelenmiştir. Sakız ve İvesi ırklarının yüksek süt verimine

sahip olduđu tespit edilmiştir. Ayrıca Sakız ırkının yüksek döl verimine de sahip olduđu belirtilmiştir (Kaymakçı ve Taşkın, 2008).

Türkiye hayvancılığı içinde en gelişmiş olan sektör tavukçuluk sektörüdür. Yurt dışından grand parent, parent ve ticari hibretler ithal edilmiştir (Aksoy, 2003). 1968 yılında Ankara Tavukçuluk Araştırma Enstitüsünde yapılan projelerde Beyaz Plymouth Rock ve Beyaz Cornish ırklarında uygulanan seleksiyon ve melezleme ile ana ve baba hatları geliştirilmeye başlanmıştır (Akbay, 1977).

SONUÇ

Biyoteknoloji özellikle hayvansal üretimde geniş bir uygulama alanına sahiptir. Besin değerleri iyileştirilen yem hammaddeleriyle hayvanların verimlerinin artırılması, her bir hayvandan elde edilecek ürün miktarları ile kalitesinin yükseltilmesi, akabinde de hayvan sağlığının iyileştirilmesi biyoteknoloji uygulamalarının esas konusunu oluşturmaktadır. Tahmini olarak daha az yağlı ve daha düşük kolesterole sahip, yüksek karkas randımanı akabinde yüksek yapağı kaliteli hayvanlar elde edilip, öte yandan da herhangi bir katkı maddesi içermeyen yem ve ilaç atıkları içermeyen ürünlerin tüketiciye ulaştırılması sağlanabilir. Bu bilimsel gelişmeler ışığında çevre, sağlık ve etik bakımdan toplumun bilinçlenmesi gerekmektedir. Ülkemiz adına kendi biyoteknolojik alt yapımızın daha sağlam temellerde ve donanımla teknolojinin yakından takip edildiği özellikle hayvan ıslahı konularında daha verimli sonuçların alınabileceği çalışmaları yönetebilmek adına, kamu, üniversite ve özel sektörün iş birliği güçlendirilmelidir.

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KÜLTÜRLERARASI ETKİLEŞİM GİYSİ TASARIMLARI

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Özet

Etnik giysiler, bir toplumda gösterge görevi gören giyim ve vücut değişikliklerinden oluşur. Modern estetiğin giderek gelişmesiyle birlikte giyim tasarımında etnik unsurlar giderek tüketicilerin ilgisini çekmektedir. Etnik unsurlar, giysinin tasarımını, dekorasyonunu, kumaşı ve tarzını sadece giyside göstermekle beraber ulusal kültür çağrışımlarını da barındırır. Bu çalışmada, Kültürlerarası bugün var olan etnik kullanım eşyalarına derinlenerek, etnik kültürü yansıtan giysi tasarımları sunulmuştur. Kazakistan güney bölgesinde günlük yaşamda kullanılmakta olan ev tekstil kumaşlarından (körpeşe-matras yorganı) etnik giysi modasının çizimi, malzeme türü, malzeme rengi, dekoratif şekil ve renkler, süs uygulama teknikleri gösterilmiştir. Giysi tasarım çalışmaları için etnik stilde üç adet giysi modeli üzerinde çalışılmıştır. Modern giyim tasarımında etnik ulusal unsurun uygulanması ve insanların günlük yaşamlarındaki kullanılması korunmaktadır. Bu sayede kültürlerarası etkileşimin etnik zenginliğinin korunarak gelecek nesillere aktarılması önem taşımaktadır. Sonuç olarak, bu araştırma, geçmişten bize ulaşan etnik kültürün günümüz moda tasarımcılarına ilham kaynağı olabileceğini ve bu kaynakların gelecek nesillere nasıl aktarılacağına dair bazı önerilerde bulunduğunu gösteriyor.

Anahtar Kelimeler: Kültürlerarası etkileşim, etnik giysi, Moda, tasarım.

INTERCULTURAL INTERACTION CLOTHING DESIGNS

Abstract

Ethnic clothing consists of clothing and body changes that serve as indicators in a society. With the gradual development of modern aesthetics, ethnic elements in clothing design increasingly attract the attention of consumers. Ethnic elements not only show the design, decoration, fabric and style of the garment, but also contain national cultural connotations. In this study, clothing designs that reflect ethnic culture are presented by deepening into the intercultural items of ethnic use that exist today. Drawing of ethnic clothing fashion from home textile fabrics (körpeşe-matras quilt) used in daily life in the southern region of Kazakhstan, material type, material color, decorative shapes and colors, ornament application techniques are shown. For clothing design studies, three ethnic style clothing models were studied. The application of the ethnic-national element in modern clothing design and its use in people's daily lives is protected. In this way, it is important to preserve the ethnic richness of intercultural interaction and transfer it to future generations. In conclusion, this research shows that the ethnic culture that has come down to us from the past can be a source of inspiration for today's fashion designers and makes some suggestions on how these resources can be transferred to future generations.

Keywords: Intercultural interaction, ethnic clothing, Fashion, design.

GİRİŞ

Moda bir iletişim aracı olmanın yanı sıra kültürün bir parçası olarak da sınıflandırılabilir. Bir kültür olarak moda, toplumsal düzen tarafından deneyimlenen, araştırılan, iletilen ve yeniden üretilen tasarım olarak tanımlanır. Ulusal kıyafetler ve ürünler, her ulusun kültürünün özellikle parlak bir parçasıdır. Etik tarzda işlemeli takılar ve modern şık kıyafetler de ilham kaynağı oluşturuyor. Talepleri artan aksesuarlar Kazakistan gençlerinin yanı sıra yabancı ülkeleri de fethediyor. Sadece birkaç yıl öncesine kadar desenli kıyafetleri sadece yaşlıların giydiği yönünde bir klişe vardı. Günümüzde milli ürünler ve kıyafetler her yaşta insan arasında yaygın olarak dağıtılmaktadır. Kumaş ve süsleme işlemlerinde sadece giysi için tekstilleri değil artık ev tekstilleri giysi tasarımlarına aktarılıyor. Ev tekstil kumaşlarının Kazak başlıkları, günlük yaşamdaki panamalardan ve şapkalardan, tarihi desenler ve taşlarla süslenmesiyle birleştiriliyor. Örneğin, milli kıyafetlerin dekorasyonunda «Alaşa» gibi halı örnekleriyle baskılı ev tekstil kumaşları giysi üretimi için uygun baskı tekniğiyle kumaşlar üretiliyor. Bunlara ek tasarımlar için en önemli ulusal koç boynuzu ve kambur gibi motifler tasarımlarda sıklıkla kullanılmaktadır. Tarihin aynasında bu oymalar refahın sembolü olarak kabul edilir. Orta Asya kültürü kendine özgü etnik gelenek ve yöresel farklılıkları vardır. Her ülkenin etnik kültürel farklılıkları yaşam tarzı, giyim parçaları, ev eşyaları, coğrafik özellikleri gösteriyor (Abdumutalibovich, 2020; Lewis, 1989). Orta Asya ülkelerine (Kazak, Özbek, Kırgız, Tatar, Türkmen vs.) ait bu etnik kültürlerden ev tekstilleridir. Ev tekstilleri masa örtüleri, halı ve kilim iplikleri, yatak ve yorgan kumaşları, sülgü ve temizlik kumaşları gibi örnekleri bulunmaktadır (Niyazbekova, Ilasheva, Polezhaeva, Kalmanova, & Bekmanova, 2016; SHILDERKHANOV et al., 2018). Eskiden insanın mal mülkünü taşıyan yastık ve yorgan en önemli evin bir parçası olmuştur. Göcemen yaşam tarzı kültürlerde yastık ve yorganın kendileriyle beraber taşıdığı bilinmektedir. Çünkü yastık insanın mal mülkünün önemli hazinesidir. Bu hazineleri kültürel değerini kaybetmeden gelecek nesillere aktarmak, kültürlerarası etkileşimde olan ülkelerin değerini göstermeyi amaçlayan bu çalışmada, özellikle Özbek kültüründe korpacha (Adams, 2010; Akramova & Rustamova, 2021), adıyla bilinen ev eşyasının kumaşlarından esinlenerek etnik tarzda giysi tasarımları oluşturulmuştur.

Moda ve popüler kültür dünyaları sanıldığından daha yakın ve onlarca yıldır birleşerek birçok farklı sanatsal ve yaratıcı alanda eserlerin ve değerlerin yayılmasına katkıda bulundu. Popüler kültür ve moda, kuşaktan kuşağa değişen ve gelişen çok farklı ve heterojen kitlelere hitap ederken, önceki tarz ve biçimlerine göre bir devamlılık ve aidiyet duygusunu da korumaktadır (Massadikova, 2017). Popüler kültürde moda, toplumumuzu, onun sembollerini, değerlerini ve

teknolojik kalıplarını anlamak için bir araç olarak algılanabilir. Her ne kadar hem moda hem de popüler kültür yıllar boyunca sürekli bir değişim ve yenilenme ihtiyacıyla karakterize edilmiş olsa da, bunların kalıcı değerlerine dair açık kanıtlar var: Tarih yazan giysi ve aksesuarlar, yalnızca belirli grupların veya azınlıkların değil, toplumun her düzeyinde gerçek kültürel semboller ve tanımlayıcılar haline geldi. Hassas ruhlar, Kazak kıyafetlerini çağın ihtiyaçlarına göre uyarlamış ve günlük hayatta giymeyi alışkanlık haline getirmiştir. Gelecekte kültürümüz bu hızla gelişmeye devam ederse dünya arenalarını, moda evlerini fethedeceğimiz açıktır.

Kültürlerarası yaşamda ev tekstillerin kullanımı (kurpacha)

Orta Asya geleneğinden kaynaklanan kurpacha eskiden beri çeyizlerde, ev tekstil ürünlerinde, giyimde, çeşitli aksesuar ve hediyelik eşyalarda kullanıldığı bilinmektedir. Kurpacha - geleneksel bağlamının dışına çıkarmayı veya yeniden inşa etmeyi hedefleyen modern dünya sanatçıları geçmişin izlerini taşıyan işleme tekniklerini kullanarak yetenekli ellerinde, görsel bir şölene dönüştürmeyi başarmışlardır. Kurpacha, Orta Asya kültüründe (Kazak, Özbek, Kırgız vs.) evde çeşitli işlevleri yerine getiren hafif kapitone bir yataktır (battaniye). Kurpacha'da alçak bir yemek masasına - dastarkhan - otururlar ve yemeğin tadını çıkarırlar, onları sehpa yataklarına koyarlar, öğle sıcaklığında dinlenir ve geceleri üzerlerinde uyurlar. Orta Asya halklarında kurpaça bir yaşam biçimidir, günlük yaşamın ayrılmaz bir parçasıdır (Aydemir, 2009; GÜMÜŞ, 2021). Mobilyaların yerini alarak toprakla ve doğayla bütünlük içinde olmanızı sağlar. Öte yandan yüksek ve rahatsız sandalyeler yerine yere, kurpach'a oturma geleneğinin, insanlar için çok gerekli olan bedeni dinlendirme, rahatlama ve rahatlıktan oluşan pratik bir anlamı da vardır (Fumagalli, 2007). Kurpacha çoğunlukla 0,75 m x 3,60 m boyutlarındadır ancak desenleri, üretimde kullanılan kumaşları ve renkleri farklılık gösterebilir. Kurpacha'nın ön tarafı genellikle han-atlas, pan-kadife veya peluştan yapılı ve bu, bitmiş ürüne hoş bir yumuşaklık katar. İç kısmı pamuklu kumaştan yapılmıştır ve kurpachanın dolgusu pamuk yünüdür. Kurpacha için pamuk yünü pürüzsüz olana kadar önceden dövülür ve bu nedenle bitmiş ürün hafif ve taşınabilir - yuvarlanması ve bir yerden bir yere taşınması çok kolaydır. Ortalama olarak bir kurpacha, beş ila on kilogram pamuk alır. Kültürlerarası geleneklerine kutsal bir saygı duyulmaktadır ve bu asırlık geleneklerden biri de kurpacha'nın antik çağlardan günümüze günlük yaşamda kullanılmasıdır.



Şekil 1. Kültürlerarası kullanım değeri olan «Kurpacha».

MATERYAL VE YÖNTEM

Materyal

Bu çalışmada, Orta Asya kültürünün geçmişini geleceğe taşıyan unsurlarından etnik yaşam biçimlerinin moda tasarım alanına bağlamak amacıyla kadın giysi tasarımları gerçekleştirilmiştir. Etnik kadın giysi tasarımları: fikir, tema, artistik çizim teknik çizim, model uygulaması, süsleme işlemi gibi bir moda tasarım sürecini oluşturmuştur.

2.2. Yöntem

Bu çalışma kültürlerarası etnik yaşamına odaklanmaktadır çünkü etnik yaşam tarihsel olarak sosyal statü, kültürel birlik, kimlik ve farklılaşma göstergelerini güçlü bir şekilde tanımlayan ve destekleyen bir süreç olmuştur. Çalışmada kültür ve moda etnik çeşitlilik bağlamında incelenmiş ve değerlendirilmiştir. Amaç, etnik kültüre ait günlük yaşamda kullanılan ev tekstillerini etnik çeşitliliğin farklı temsillerinin çağdaş tüketici tercihleri üzerindeki bazı etkilerini keşfetmek ve bunların nasıl moda temsili edildiğini araştırmaktır. Bir tasarımcıya ilham veren etnik ev tekstillerinin moda giyime çevrildiğinde anlamının nasıl değiştiğini inceliyor. Kapsamlı bir literatür taramasının ardından seçilen görsellerin analiz yöntemi olarak nitel içerik analizi kullanılmıştır. Bu bağlamda modern giyimde etnik görselliğin boyutları, tasarımda etnik tarzın yanı sıra etnotasarım desenleriyle birlikte ele alınmıştır.

2.3. Etnik kadın giyim koleksiyonunun tasarım süreci

Bu çalışmada etnik giyimlerinin tasarım yaratmak için moda tasarımını ve üretim süreci oluşturuldu. Yaratıcı tasarım sürecini oluşturan beş aşama ve her birinin dökümü aşağıda verilmiştir:

- Araştırma

Tasarım sürecinin ilk adımı araştırma yapmak olmalıdır. Trend tahmini, diğer tasarımcıların çalışmalarını incelemek, tarihi moda, kültürel açıdan önemli giysiler, giysi yapımı, kumaş stilleri gibi moda ortamındaki çeşitli bilgilere bakmak önemlidir (McKelvey & Munslow, 2011).

- Artistik çizim

Moda tasarımınızı çizmenin geleneksel yolu, kağıt ve kalem, renkli kurşun kalem, keçeli kalemler vb. kullanılarak elle yapılabilir.

- Teknik çizim

Tasarım taslağı oluşturmanın daha modern versiyonu dijital eskiz olabilir. Taslağı oluşturmak için, tasarımın kolayca düzenlenmesine ve iyileştirilmesine olanak tanıyan bir dijital çizim programı veya uygulaması kullanabilirsiniz. Bu tasarımlar daha sonra bir teknoloji paketine yerleştirilmek üzere değiştirilebilir (Gwilt, 2012).

- Malzeme seçimi ve üretim

Kumaş, moda tasarımında önemli bir unsurdur çünkü bir giysinin görünüşünü, hissini ve dökümünü belirler. Farklı kumaşların ağırlıkları, dokuları ve dökümlülükleri gibi farklı özellikleri vardır ve bu, bir giysinin görünümünü ve uyumunu büyük ölçüde etkileyebilir. Kumaşın görsel ve dokusal özelliklerinin yanı sıra dikkate alınması gereken pratik hususlar da vardır. Bazı kumaşlar diğerlerinden daha dayanıklıdır veya bakımı kolaydır ve bazı kumaşlar belirli iklimler veya durumlar için daha uygun olabilir (Kim & Park, 2010).

- Süsleme ve bitim işlemi

Kavramlar, dikiş ve moda tasarımında kullanılan düğmeler, fermuarlar, çıtçıtılar, kancalar ve gözler gibi küçük, işlevsel öğelerdir. Bu öğeler, giysilerin sabitlenmesinden dekoratif öğeler eklenmesine kadar çeşitli amaçlara hizmet eder.

- Moodboard panosu

Mood board tasarımınız için bir tema oluşturmak üzere internetten, dergiden, çektiğiniz resimlerden vb. resimler toplamak gerekir. Bu, ürününüz için ilham kaynağı olan dokuları, nesnelere, sanatı, insanları, renkleri veya başka herhangi bir şeyi içerebilir.

BULGULAR VE TARTIŞMA

Orta Asya ülkelerinde kullanılan Kurpacha kumaşlarından etnik giysi tasarımları

Bu çalışmada, araştırma verileri Orta Asya halklarının ev eşyalarında tekstil malzemelerinin kullanımı bir dizi faktöre bağlı olduğunu gösteriyor. Geçmişten göçebe ve yerleşik yaşam tarzı,

iklim doğası, mobilyaların algılanan yüksekliği ve genel olarak varlığı, etnik gelenekler ve bir takım faktörleri oluşturmuştur. Orta Asya göçebelerinin (Kazak, Özbek, Kırgız, Türkmen vs.) bir kısmı için barınakların çok önemli bir özelliği, tekstil yorgan ve battanyelerin yaygın kullanımınıdır. Bu ev eşyalarının hazırlanma tekniği etnik veya yerel geleneklere göre belirleniyor. Ana türleri pamuklu şilteler (battaniyeler, yorganlar veya yastıklar) olan yatak kültürü her yerde yoğun kullanılıyor, çünkü bu eşyalar evin sahiplerinin mülkiyet düzeyini açıkça karakterize ediyor. Aynı zamanda görgü kuralları, pahalı ipek ve yarı ipek Orta Asya kumaşlarıyla kaplı battaniyelere yerleştirilen misafirler için makul düzeyde bir misafirperverlik gerektiriyor. Bu tür battaniyeleri pazarlardan satın alıyorlardı, ancak yün ve kadifeden kendi küçük battaniyelerini sıklıkla işleyerek yapıyorlar. Yörede büyümlü bir koruma aracı olarak değerlendirilen yorgan, kendine has tarzıyla öne çıkıyor. Orta Asya halklarında tarihten günümüze kadar kültürlerarası etkileşimden kaynaklanan bu tekstil kumaşları Çimken ve Türkistan şehirlerine Özbekistandan ithalat edilmektedir. Büyük pazarlarda satışta olan pamuklu kumaşlar yorgan ve battanyeler hariç her türlü amaçlarda kullanılmaktadır. Bu çalışmada, Kazakistan Güney bölgesinde kullanılmakta olan «körpeşe-kurpacha» kumaşlarından etnik giysi tasarımları oluşturulmuştur.

Model 1.



Model 2.



Model 3.



Model 4.



Moodbord çalışması.



SONUÇ

Günümüz dünyasının arka planında ülkelerin mirasını ve kalkınmasını sağlamak için ulusal unsurların nasıl oluşturulacağı önemli bir konudur. Bu bağlamda etnik unsurlar ülkemizdeki geleneksel kıyafetlerin sadece renk, desen ve farklı şekillerde değil, birçok unsuru bünyesinde barındırması nedeniyle daha birçok açıdan ortaya çıkmasına neden olmaktadır. Ulusal kültürün, uluslararası çevre, yenilikçi tasarım fikri, giyim tasarımının ulusal unsurlarına entegre edilmesi, geleneksel etnik kültürün yeni bir canlılık kazanmasıyla gelecekteki gelişimin yönü olacağı belirlenmesi son derece önemlidir. Bu bakımdan modern giyim ve aksesuarların içerisinde yer alan etnik kostüm bileşenlerinin eski işlevlerini kaybedip yeni formlar kazanarak kitlelere ulaşması moda markalarının amaçları arasında yer almaktadır. Günümüzde belirli bir geleneğe ait kostümde "alıntı yapmak" kişinin etnik kökenine göre düzenlenmiyor, yani kostüm artık etnik kimlik işlevini yerine getirmiyor, kutsal bir yük taşıyor. Etnik grupları cezbeden motif veya unsurlar estetik amaçlı veya gösteri amaçlı yapılabilir. Bu etnik unsurların farklı temsilleri sadece geleneksel etnik kültürü miras almakla kalmıyor, aynı zamanda yenilik ve modern giyim tasarımlarının kullanımı açısından da fark yaratıyor.

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A TECHNICAL SURVEY ON ENERGY POTENTIALS OF POINT FOCUS SOLAR COLLECTOR SYSTEM: A SUSTAINABLE RESOURCE FOR ENERGY MIX AUGMENTATION

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Abstract

The increasing demand for energy and the need to reduce greenhouse gas (GHG) emissions, has led to a growing interest in exploring alternative energy sources. Point focus solar collector (PFSC) systems, have emerged as a promising technology for harnessing solar energy and converting it into electricity or heat. This survey was conducted on the energy potentials of PFSCs including their efficiency, cost-effectiveness, environmental impact, and potentials for integration into the existing energy infrastructure. Findings revealed that PFSC systems involves zero GHG emissions, making them a clean and sustainable energy option that contributes to the reduction of GHG emissions. It was observed that the Levelized cost of electricity (LCOE) from PFSC systems has become competitive with conventional energy sources, such as coal and natural gas. This cost-effectiveness, combined with the potential for long-term savings on fuel costs, makes PFSC systems an attractive option for energy mix augmentation. Considering their power potentials, PFSC systems can be integrated into the grid to provide electricity during peak demand periods or to supplement the energy supply during periods of low solar radiation. Also, they can be combined with thermal energy storage technologies to provide a continuous and reliable energy supply. Conventional studies indicated that the efficiency of PFSC systems depends on various factors, including the type of collector, the concentration ratio, and the tracking mechanism. The high efficiency, cost-effectiveness, and minimal environmental impact make PFSC systems a viable option for large-scale energy production. Thus, with PFSC systems, the energy mix can be augmented to reduce the reliance on conventional energy sources while contributing to a more sustainable and secured energy future.

Keywords: Energy potential, Solar collectors, Energy mix, GHG emissions, sustainability.

1. Overview of Point Focus Solar Collector

Solar energy has gained significant attention as a renewable and sustainable source of power. Among the various solar technologies, point focus solar collectors have emerged as a promising solution for harnessing solar energy efficiently. The concept of point focus solar collectors can be traced back to ancient civilizations. The ancient Greeks and Romans used concave mirrors to concentrate sunlight for various purposes, including heating water and starting fires (Michael et al., 2016; Szabó, 2017). However, it was not until the 19th century that significant advancements were made in this field. Augustin Mouchot, a French inventor, is credited with developing the first practical point focus solar collector in the 1860s. Mouchot's solar-powered steam engine utilized a parabolic reflector to concentrate sunlight onto a boiler, generating steam for mechanical work. This invention marked a significant milestone in the development of point focus solar collectors (Shreve, 2013; Fernandez, 2019)

Over the years, technological approaches have greatly improved the efficiency and practicality of point focus solar collectors. One notable approach is the use of advanced materials for reflectors and absorbers (Salvi et al., 2018; Lakshmipathy et al., 2020). Initially, mirrors made of polished metal were used, but they were heavy and prone to corrosion. Modern point focus solar collectors employ highly reflective materials such as silvered glass or aluminium-coated polymer films, which are lightweight and durable. Another significant approach is the integration of tracking systems. Point focus solar collectors require precise alignment with the sun to maximize energy capture (Lee et al., 2009; Ahmad et al., 2024). Early designs relied on manual adjustment, but the introduction of automatic tracking systems greatly improved their efficiency. These systems use sensors and motors to continuously orient the collector towards the sun, ensuring optimal sunlight concentration throughout the day.

Furthermore, the development of receiver technologies has enhanced the conversion of concentrated sunlight into usable energy. Initially, point focus solar collectors were primarily used for thermal applications, such as water heating and steam generation. However, advancements in receiver technologies have enabled the conversion of concentrated sunlight into electricity through the use of photovoltaic cells. This integration of solar thermal and photovoltaic technologies has expanded the range of applications for point focus solar collectors (Desideri et al., 2013; Ali and Alabid, 2022).

Point focus solar collectors play a crucial role in the renewable energy sector due to their high efficiency and versatility (Sankar and Muniraja, 2020; Tabassum et al., 2021). Their ability to concentrate sunlight allows for the collection of a large amount of energy in a relatively small

area. This makes them particularly suitable for applications requiring high-temperature heat, such as industrial processes and power generation. Moreover, point focus solar collectors have the potential to contribute significantly to the reduction of greenhouse gas emissions. By replacing fossil fuel-based energy sources, they can help mitigate climate change and promote sustainable development. Additionally, their modular design allows for scalability, making them adaptable to various energy demands.

The historical development and technological advancements of point focus solar collectors have transformed them into a viable and efficient solution for harnessing solar energy. From ancient civilizations to modern times, these collectors have evolved significantly, incorporating advanced materials, tracking systems, and receiver technologies. Their high efficiency and versatility make them a valuable asset in the renewable energy sector, contributing to a sustainable future. As the world continues to prioritize clean energy sources, further research and development in point focus solar collectors will undoubtedly lead to even more efficient and cost-effective solutions (Kalogirou, 2004; Nikolaidis, 2023; Hasan et al., 2023).

2. Theories Governing Point Focus Solar Collector

The Point Focus Solar Collector (PFSC) is a significant technology in the field of solar energy conversion. A comprehensive theories governing the principles of PFSC are presented as follows:

Concentrated Solar Power (CSP) Principle: The PFSC operates on the principle of Concentrated Solar Power (CSP), which involves focusing sunlight onto a small area to generate heat or electricity (Soomro et al., 2019). CSP systems utilize mirrors or lenses to concentrate sunlight onto a receiver, which then converts the solar energy into usable forms. This theory forms the basis for the PFSC's functionality and distinguishes it from other solar energy technologies.

Optical Concentration: Optical concentration is a key theory governing the PFSC. By employing mirrors or lenses, the PFSC concentrates sunlight onto a small focal point, thereby increasing the intensity of solar radiation. Therefore, optical concentration enhances the efficiency of solar energy conversion, making the PFSC a viable option for large-scale power generation (Zhe et al., 2021; Soomar et al., 2022).

Thermal Energy Conversion: The PFSC utilizes thermal energy conversion theory to convert concentrated solar radiation into usable heat or electricity. The concentrated sunlight heats a working fluid, such as water or oil, which then transfers the heat to a power cycle or storage system. This theory highlights the PFSC's potential for various applications, including

electricity generation, desalination, and industrial processes (Obalalu et al., 2023; Dada et al., 2023).

Tracking Systems: Tracking systems theory plays a crucial role in optimizing the PFSC's performance. The PFSC requires precise tracking mechanisms to ensure continuous alignment with the sun's position throughout the day. This theory emphasizes the importance of accurate tracking systems in maximizing solar energy collection and improving overall system efficiency (Chong et al., 2009; Xiao et al., 2017).

The theories governing the Point Focus Solar Collector provide a solid foundation for understanding its functionality and potential applications. The Concentrated Solar Power principle, optical concentration, thermal energy conversion, and tracking systems theory collectively contribute to the PFSC's efficiency and effectiveness. Research and technological advancements are necessary to address these limitations and enhance the overall performance of the PFSC.

3. Operating parameters influencing the Performance of PFSCs

Point focus solar collectors, also known as concentrator solar collectors, are designed to concentrate sunlight onto a small area using mirrors or lenses. This concentration of sunlight increases the intensity of the solar radiation incident on the receiver, which in turn enhances the energy conversion efficiency. However, the performance of point focus solar collectors can be influenced by several factors, which need to be carefully considered during the design and operation of these systems. Operating parameters play a crucial role in determining the performance of point focus solar collector systems (Foulaadvand et al., 2021; Iqbal et al., 2023). These parameters include the solar irradiance, collector temperature, concentration ratio, and tracking accuracy.

Solar irradiance: Solar irradiance is a key factor that affects the performance of point focus solar collector systems. It refers to the amount of solar energy received per unit area. Higher solar irradiance levels result in increased energy collection and conversion. A higher solar irradiance level leads to a higher temperature rise in the collector, resulting in improved system efficiency (Gorjian et al., 2015; Vidyanandan, 2017). Therefore, it is essential to consider the solar irradiance levels when designing and operating point focus solar collector systems. The intensity of solar radiation incident on the collector surface determines the amount of energy that can be converted into usable heat or electricity. Variations in solar irradiance due to factors such as cloud cover, atmospheric conditions, and seasonal changes can significantly impact the performance of point focus solar collectors. Therefore, accurate measurement and prediction of

solar irradiance are essential for optimizing the performance of these collectors (Park et al., 2021; Tscholl et al., 2022; Kosmopoulos et al., 2024).

Collector temperature: Collector temperature is another critical operating parameter that significantly impacts the performance of point focus solar collector systems. The temperature of the collector affects the efficiency of energy conversion. As the collector temperature increases, the efficiency of the system decreases due to increased thermal losses. Maintaining a lower collector temperature can enhance the overall performance of point focus solar collector systems. Therefore, it is crucial to control the collector temperature within an optimal range to maximize system efficiency (Sardeshpande et al., 2021; Wang et al., 2021; Wang et al., 2023).

Concentration ratio: Concentration ratio is a parameter that determines the concentration of solar energy onto the receiver. It is defined as the ratio of the area of the reflector to the area of the receiver. A higher concentration ratio leads to increased energy collection and conversion. A higher concentration ratio improves the system's ability to concentrate solar energy onto the receiver, resulting in enhanced performance. Therefore, it is important to optimize the concentration ratio to achieve higher system efficiency (Supa et al., 2015; Osorio et al., 2019; Ardila et al., 2021).

Tracking accuracy: Tracking accuracy is an operating parameter that influences the performance of point focus solar collector systems. Tracking accuracy refers to the ability of the system to accurately track the movement of the sun. A higher tracking accuracy ensures that the collector is always aligned with the sun, maximizing energy collection. A higher tracking accuracy improves the system's performance by increasing the solar energy incident on the receiver. Therefore, it is crucial to maintain a high tracking accuracy to achieve optimal system efficiency. Point focus solar collectors require precise tracking systems to ensure that the concentrated sunlight remains focused on the receiver throughout the day. Any deviations or errors in tracking can result in reduced performance and efficiency of the collector. Factors such as mechanical wear, control system accuracy, and environmental conditions can affect the tracking accuracy of point focus solar collectors. Therefore, it is crucial to maintain and calibrate the tracking system regularly to ensure optimal performance (Hughes, 1980; Sardeshpande et al., 2011; Ullah and Kang, 2019; Sauerborn, 2021; Liu, B., Zong and Huang, 2023).

Receiver Design: The design of the receiver plays a vital role in the performance of point focus solar collectors. The receiver is responsible for absorbing the concentrated solar radiation and converting it into usable heat or electricity. Factors such as receiver material, geometry, and

thermal properties can significantly impact the efficiency and performance of the collector. The selection of appropriate receiver materials with high thermal conductivity and low emissivity is crucial to minimize heat losses and maximize energy conversion efficiency. Tagle-Salazar et al., 2020; Malwad and Tungikar, 2020a; Malwad and Tungikar, 2020b; Kumar and Gupta, 2022).

Environmental Conditions: Environmental conditions, such as ambient temperature, wind speed, and humidity, can affect the performance of point focus solar collectors. High ambient temperatures can lead to increased thermal losses, while strong winds can cause misalignment of the mirrors or lenses, resulting in reduced concentration and efficiency. Humidity can also affect the optical properties of the collector components, leading to decreased performance. Therefore, it is essential to consider the local environmental conditions during the design and operation of point focus solar collectors (Mustafa et al., 2020; Hasan et al., 2022; Gholami et al., 2022; Lin et al., 2023).

Operating parameters such as solar irradiance, collector temperature, concentration ratio, and tracking accuracy significantly influence the performance of point focus solar collector systems. Higher solar irradiance levels, lower collector temperatures, higher concentration ratios, and higher tracking accuracy lead to improved system efficiency. Therefore, it is essential to consider and optimize these operating parameters to maximize the performance of point focus solar collector systems.

4. Energy Storage for Point Focus Solar Collectors

Point focus solar collectors (PFSCs) have gained significant attention as a promising technology for harnessing solar energy. These collectors concentrate sunlight onto a small area, resulting in higher temperatures and increased energy conversion efficiency. However, the intermittent nature of solar radiation necessitates the integration of energy storage systems to ensure a continuous and reliable power supply (Suman et al., 2015; Hussain and Lee, 2016; Arnaoutakis and Katsaprakakis, 2021). Energy storage for point focus solar collectors are classified as follows:

a. Thermal Energy Storage

Sensible Heat Storage: Thermal energy storage (TES) systems, such as sensible heat storage, utilize the heat capacity of a material to store excess energy generated by PFSCs. Sensible heat storage materials, such as molten salts or rocks, absorb and release heat as their temperature changes. This method offers high energy density and long-term storage capabilities, making it suitable for PFSCs (Bauer et al., 2012; Alva et al., 2017; Rigui et al., 2022).

Latent Heat Storage: Latent heat storage involves the phase change of a material, such as the melting and solidification of a substance, to store and release energy (Rathod, 2022; Teamah, 2022). Phase change materials (PCMs) exhibit high energy storage density and can store energy for extended periods. However, the limited range of operating temperatures and the need for encapsulation pose challenges for their implementation in PFSCs.

b. Electrochemical Energy Storage

Batteries: Batteries, such as lithium-ion batteries, offer a viable option for energy storage in PFSCs. They provide high energy density, fast response times, and can be easily integrated into existing systems. However, their limited lifespan, high cost, and environmental concerns associated with their production and disposal hinder their widespread adoption.

Supercapacitors: Supercapacitors, also known as ultra capacitors, store energy through the separation of charges at the electrode-electrolyte interface. They offer high power density, rapid charge/discharge rates, and long cycle life. However, their relatively low energy density and high self-discharge rates limit their application in long-term energy storage for PFSCs (Bharti et al., 2021; Ahmed et al., 2022).

c. Chemical Energy Storage

Hydrogen Production: Hydrogen production through water electrolysis offers a promising avenue for energy storage in PFSCs. This method involves using excess electricity generated by PFSCs to split water into hydrogen and oxygen. Hydrogen can be stored and later used in fuel cells or combustion engines to generate electricity. However, challenges related to hydrogen storage, transportation, and safety need to be addressed for widespread implementation. Wang et al., 2021; Tashie-Lewis and Nnabuife, 2021; Nasser et al., 2022).

5. Advancements in Point Focus Solar Collectors

Solar energy has emerged as a promising alternative to conventional energy sources due to its abundance and environmental benefits. Point focus solar collectors, also known as concentrated solar power (CSP) systems, have witnessed significant advancements in recent years. These are enumerated as follows:

High-Efficiency Solar Cells: One of the major advancements in point focus solar collectors is the development of high-efficiency solar cells. Traditional solar cells have limited efficiency in converting sunlight into electricity. However, recent breakthroughs in materials science and engineering have led to the creation of more efficient solar cells, such as multi-junction cells and perovskite cells. These advancements have significantly increased the overall efficiency of

point focus solar collectors, making them more economically viable (Hoffschmidt et al., 2012; Tabarhoseini et al., 2022; Parthiban and Ponnambalam, 2022).

Concentrated Solar Power Systems: Point focus solar collectors utilize mirrors or lenses to concentrate sunlight onto a small area, thereby generating high temperatures (John, 2015; Zaboli et al., 2023). The advancements in concentrating technologies have led to the development of more efficient and cost-effective systems. For instance, parabolic trough collectors, heliostat mirrors, and dish-Stirling systems have become more sophisticated, allowing for higher concentration ratios and improved energy conversion.

Thermal Energy Storage: One of the key challenges of solar energy is its intermittent nature. However, advancements in thermal energy storage systems have addressed this issue. Point focus solar collectors can now store excess thermal energy in molten salts or other heat transfer fluids, which can be used to generate electricity during periods of low sunlight. This breakthrough has significantly increased the reliability and dispatchability of point focus solar collectors, making them a more attractive option for large-scale energy production (Salloom et al., 2018; Wang et al., 2020; Modi, 2023; Barrasso et al., 2023).

Hybridization with Other Energy Sources: To further enhance the reliability and efficiency of point focus solar collectors, hybridization with other energy sources has gained attention. By integrating CSP systems with fossil fuel power plants or biomass facilities, the overall energy output can be increased while ensuring a continuous power supply. This hybrid approach allows for the utilization of existing infrastructure and provides a smoother transition towards a renewable energy future (Yousef et al., 2021; Alami et al., 2023; Gutiérrez-Alvarez et al., 2023; Chen et al., 2023).

6. Characteristics of Point Focus Solar Collectors

Point focus solar collectors are a crucial component of solar energy systems due to their unique characteristics enumerated as follows:

Concentration Ratio: One of the primary characteristics of point focus solar collectors is their ability to achieve high concentration ratios. Concentration ratio refers to the ratio of the area of the collector aperture to the area of the receiver (Kulkarni et al., 2023; Kulkarni, et al., 2020). Higher concentration ratios enable increased energy conversion efficiency by focusing a larger amount of sunlight onto a smaller receiver area. This characteristic makes point focus solar collectors suitable for applications requiring high-temperature heat or electricity generation.

Tracking Mechanism: Point focus solar collectors often incorporate tracking mechanisms to ensure optimal alignment with the sun's position throughout the day (Lee et al., 2009; Racharla and Rajan, 2017; Aghamohammadi and Foulaadvand, (2023). This characteristic allows for maximum utilization of solar energy by continuously adjusting the collector's orientation. Tracking mechanisms can be either single-axis or dual-axis, with the latter providing higher accuracy but at a higher cost. The ability to track the sun's movement enhances the overall performance of point focus solar collectors, especially in regions with varying solar angles.

Thermal Storage: Point focus solar collectors can be integrated with thermal storage systems, enabling the storage of excess thermal energy for later use (Tian and Zhao, 2023; Elkhatat and Al-Muhtaseb, 2023). This characteristic is particularly advantageous for applications requiring continuous energy supply, even during periods of low solar radiation. Thermal storage systems can utilize various materials, such as molten salts or phase change materials, to store and release thermal energy efficiently. The incorporation of thermal storage enhances the flexibility and reliability of point focus solar collectors, making them suitable for both residential and industrial applications.

Optical Efficiency: The optical efficiency of point focus solar collectors plays a crucial role in determining their overall performance. This characteristic refers to the ability of the collector to capture and concentrate sunlight effectively. Factors such as reflector design, receiver material, and tracking accuracy influence the optical efficiency of these collectors. Higher optical efficiency ensures maximum utilization of available solar energy, resulting in improved energy conversion efficiency (Danielli et al., 2011; Belghachi, 2015)

Hybridization with Fossil Fuels: Another advancement is the hybridization of point focus solar collectors with fossil fuel power plants. This integration allows for the utilization of solar energy during peak sunlight hours, reducing the reliance on fossil fuels and decreasing GHG emissions. Hybrid systems can enhance the overall efficiency and reliability of power generation (Hassan et al., 2023; Al-Rawashdeh et al., 2023; León Gómez et al., 2023)

High-Temperature Applications: Point focus solar collectors have also made advancements in high-temperature applications. By using advanced materials and innovative designs, these systems can achieve higher temperatures, enabling the production of hydrogen, synthesis of fuels, and other industrial processes that require extreme heat (Wang et al., 2019; Arnaoutakis and Katsaprakakis, 2021; Aquilanti et al., 2023)

7. Applications of Point Focus Solar Collectors

Point focus solar collectors are a type of solar energy technology that concentrates sunlight onto a small area, maximizing the amount of energy that can be harvested. These collectors have gained significant attention due to their potential to generate clean and sustainable energy.

Power Generation: One of the primary applications of point focus solar collectors is in power generation. Concentrated solar power (CSP) plants utilize these collectors to focus sunlight onto a receiver, which then converts the solar energy into heat. This heat is used to generate steam, which drives a turbine to produce electricity. CSP plants have the advantage of being able to store excess heat, allowing for continuous power generation even during periods of low sunlight. This makes them a reliable and efficient source of renewable energy (Kurup and Turchi, 2016; Ayaz et al., 2020; Ghodbane et al., 2020).

Industrial Processes: Point focus solar collectors can also be employed in various industrial processes that require high-temperature heat. For instance, in the manufacturing sector, these collectors can be used to provide heat for processes such as metal smelting, drying, and chemical reactions. By utilizing solar energy instead of fossil fuels, industries can significantly reduce their carbon footprint and operating costs (Fortuin and Stryi-Hipp, 2012; Kumar et al., 2022; Tasmin et al., 2022).

Desalination: Another promising application of point focus solar collectors is in desalination. Solar desalination systems utilize the concentrated solar energy to evaporate seawater, leaving behind the salt and other impurities. The vapour is then condensed to produce fresh water. This technology offers a sustainable solution to address the global water scarcity issue, particularly in arid regions where access to freshwater is limited (Xu et al., 2017; Hoque, et al., 2019; Aende et al., 2020; Choong et al., 2020).

Heating and Cooling: Point focus solar collectors can also be used for residential and commercial heating and cooling purposes. Solar thermal systems can provide hot water for domestic use, space heating during colder months, and even cooling through absorption chillers (Helm et al., 2014; Filipowicz et al., 2019). By harnessing solar energy for these applications, buildings can reduce their reliance on conventional energy sources, leading to lower energy bills and reduced greenhouse gas emissions.

8. Advantages of Point Focus Solar Collectors

Solar energy is a renewable and sustainable source of power that has gained significant attention in recent years. Point focus solar collectors, also known as concentrated solar power (CSP)

systems, are a type of solar technology that uses mirrors or lenses to concentrate sunlight onto a small area. The various advantages of point focus solar collectors are as follows:

High Efficiency: Point focus solar collectors have the advantage of achieving high levels of efficiency in converting sunlight into usable energy (Sun et al., 2023; Obalalu et al., 2023). By concentrating sunlight onto a small area, these systems can generate higher temperatures, which in turn increases the efficiency of energy conversion. This high efficiency makes point focus solar collectors suitable for large-scale power generation, particularly in regions with abundant sunlight.

Energy Storage: Another advantage of point focus solar collectors is their ability to incorporate energy storage systems. By utilizing thermal energy storage, excess heat generated during peak sunlight hours can be stored and used later when sunlight is not available (Sarbu and Sebarchievici, 2018; Agbo et al., 2021). This feature allows for continuous power generation, even during cloudy periods or at night. Energy storage also enhances the reliability and stability of the power supply, making point focus solar collectors a viable option for meeting energy demands.

Scalability: Point focus solar collectors offer scalability, allowing for the construction of both small and large-scale power plants (Omeiza et al., 2023; Ahmad et al., 2024). These systems can be easily expanded by adding more mirrors or lenses, enabling the generation of higher power outputs as needed. This flexibility makes point focus solar collectors suitable for various applications, ranging from residential and commercial use to utility-scale power generation.

Energy Viability: The energy viability of point focus solar collector systems has improved over the years due to technological advancements and economies of scale. The cost of solar photovoltaic (PV) modules, which are used in many solar energy systems, has significantly decreased, making solar energy more competitive with conventional energy sources (Diemuodeke et al., 2021; Dada and Popoola, 2023). Furthermore, the operational and maintenance costs of point focus solar collector systems are relatively low compared to other renewable energy technologies. These factors make point focus solar collector systems an attractive option for energy mix augmentation.

Environmental Benefits: The use of point focus solar collectors contributes to significant environmental benefits. Firstly, solar energy is a clean and renewable source, resulting in minimal greenhouse gas emissions compared to fossil fuel-based power generation (Owusu et al., 2016; Agbo et al., 2021; Hussain et al., 2022). Secondly, point focus solar collectors have a smaller land footprint compared to other renewable energy technologies, such as wind or

biomass. This makes them suitable for areas with limited available land. Additionally, the use of point focus solar collectors reduces water consumption, as they do not require large amounts of water for cooling, unlike conventional power plants.

Economic Opportunities: The deployment of point focus solar collectors presents various economic opportunities. The construction and operation of solar power plants create jobs, stimulating local economies. Moreover, the use of solar energy reduces dependence on imported fossil fuels, leading to energy independence and improved energy security. Additionally, as the technology advances and becomes more widespread, the cost of point focus solar collectors is expected to decrease, making them more economically competitive with conventional power generation methods (Oyedepo, 2012; Obaideen et al., 2021; Bhuiyan et al., 2022).

Point focus solar collectors offer numerous advantages, including high efficiency, energy storage capabilities, scalability, environmental benefits, and economic opportunities. These advantages make them a promising solution for addressing energy needs while mitigating environmental concerns. As the world continues to transition towards a sustainable energy future, point focus solar collectors have the potential to play a significant role in meeting global energy demands.

9. Disadvantages of Point Focus Solar Collectors

Point focus solar collectors have gained significant attention in recent years due to their ability to concentrate sunlight onto a small area, thereby increasing the efficiency of solar energy conversion. However, despite their advantages, these collectors also possess several disadvantages that need to be considered.

High Cost: One of the primary disadvantages of point focus solar collectors is their high cost. The complex design and advanced technology required for these systems contribute to their expensive nature (Omeiza et al., 2023; Salvi et al., 2018). The manufacturing, installation, and maintenance costs associated with point focus solar collectors can be prohibitive, making them less accessible for widespread adoption, particularly in developing countries or regions with limited financial resources. However, the levelized cost of electricity (LCOE) from PFSC systems is gradually becoming very competitive with conventional energy sources in recent times.

Limited Efficiency: While point focus solar collectors offer higher efficiency compared to other solar technologies, they are still subject to certain limitations. These collectors heavily rely on

direct sunlight, making them less effective in cloudy or overcast conditions (Abdul-Rahman and Wang, 2010; Toledo et al., 2016). Additionally, their efficiency is significantly reduced during periods of low solar radiation, such as early mornings, late evenings, or winter months. This limitation restricts their overall energy output and may require additional energy storage systems to compensate for the intermittent nature of solar energy.

Environmental Concerns: Point focus solar collectors often employ reflective surfaces and mirrors to concentrate sunlight onto a small area. The manufacturing and disposal of these materials can have adverse environmental impacts. The production of reflective surfaces may involve the use of toxic chemicals, while their disposal can contribute to landfill waste. Additionally, the large-scale deployment of point focus solar collectors may disrupt local ecosystems and habitats, particularly if not properly planned and managed (Hernandez et al., 2015; Roddis et al., 2020).

Safety Risks: The concentrated solar energy produced by point focus solar collectors can pose safety risks if not handled properly. The intense heat generated by these systems can cause burns or fires if the collectors are not adequately insulated or protected. Moreover, the concentrated sunlight can be harmful to human eyes and may require additional safety measures during installation, maintenance, or repair. (Arnaoutakis and Katsaprakakis, 2021; Hagumimana et al., 2021).

Land and Space Requirements: Point focus solar collectors typically require a significant amount of land or space for installation. This can be a challenge in densely populated areas or regions with limited available land. Moreover, the concentration of solar energy in a small area may lead to localized temperature increases, potentially affecting nearby vegetation or wildlife.

Weather Conditions: Another significant disadvantage is their sensitivity to weather conditions, particularly cloudy or overcast skies. Cloud cover reduces the amount of sunlight reaching the collector, thereby decreasing its energy output (Kejna et al., 2021; Tian et al., 2023). Additionally, the initial cost of installing point focus solar collectors, especially those with advanced tracking mechanisms, can be relatively high. These limitations should be considered when evaluating the suitability of point focus solar collectors for specific applications

While point focus solar collectors offer higher efficiency and concentrated solar energy, they also possess several disadvantages that need to be carefully considered. The high cost, limited efficiency under certain conditions, environmental concerns, safety risks, and land requirements associated with these collectors highlight the need for a comprehensive evaluation before their widespread adoption. Future research and technological advancements may help address these

drawbacks, making point focus solar collectors a more viable and sustainable option for harnessing solar energy.

10. Types of Point Focus Solar Collectors

Solar energy has emerged as a promising alternative to conventional energy sources due to its abundance and environmental benefits. Point focus solar collectors play a crucial role in harnessing solar energy efficiently.

Parabolic Trough Collectors: Parabolic trough collectors (PTCs) are one of the most widely used point focus solar collectors. As shown in Figure 1, these collectors consist of parabolic-shaped mirrors that concentrate sunlight onto a receiver tube located at the focal point (Çağlar, 2016; Ahmad et al., 2024). PTCs offer several advantages, including high efficiency, low maintenance requirements, and the ability to generate high-temperature heat. PTCs can achieve thermal efficiencies of up to 80%, making them suitable for various applications such as electricity generation and industrial processes. However, PTCs also have certain limitations. Parabolic troughs use curved mirrors to focus sunlight onto a receiver tube (Babuje et al., 2020; Lüpfer, 2022). Firstly, their design requires precise alignment with the sun's position, necessitating complex tracking systems (Ramde et al., 2020; Felsberger et al., 2022). Secondly, the receiver tube's high temperatures can lead to thermal losses and material degradation over time. Despite these limitations, PTCs remain a popular choice due to their proven track record and reliability. These collectors can be categorized into two main types: parabolic troughs and solar power towers.

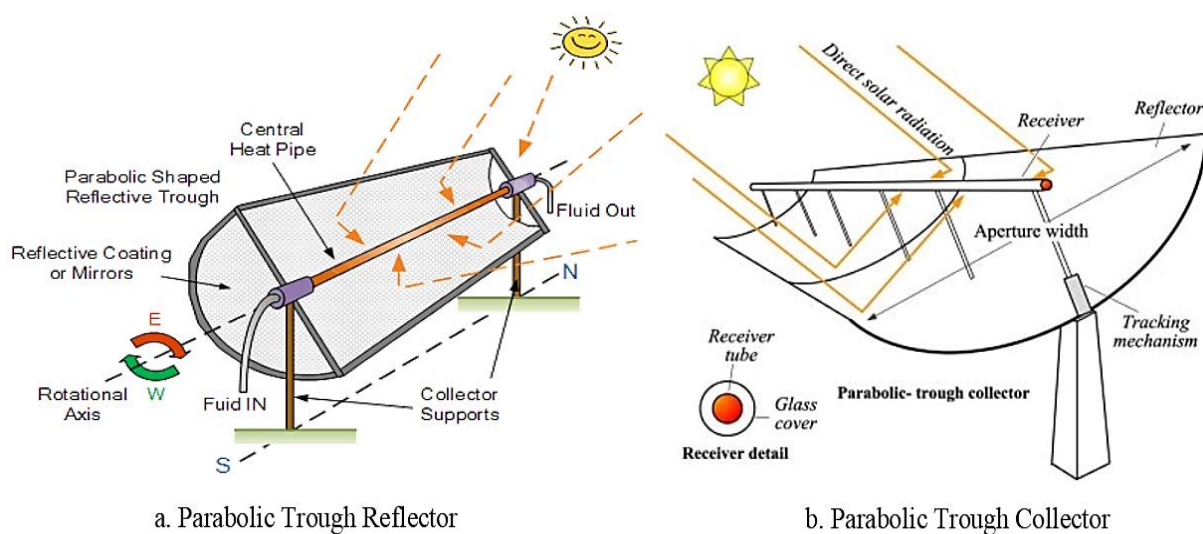


Figure 1: Parabolic trough systems

Dish Stirling Systems: Dish Stirling systems are another type of point focus solar collector that utilizes a parabolic dish to concentrate sunlight onto a receiver at the focal point (Gholamalizadeh and Chung, 2017; Arnaoutakis and Katsaprakakis, 2021) as shown in Figure 2. These systems employ a Stirling engine to convert the concentrated solar energy into electricity. Dish Stirling systems offer several advantages, including high efficiency, modularity, and the ability to generate both electricity and heat simultaneously. Dish Stirling systems can achieve solar-to-electric conversion efficiencies of up to 30%, making them one of the most efficient solar technologies available. Additionally, their modular design allows for easy scalability, making them suitable for both small-scale and large-scale applications. However, the high cost of dish Stirling systems and their complex maintenance requirements pose significant challenges to their widespread adoption (Mancini et al., 2003; Monné, 2014; Singh and Kumar, 2018; Alhawsawi et al., 2023).

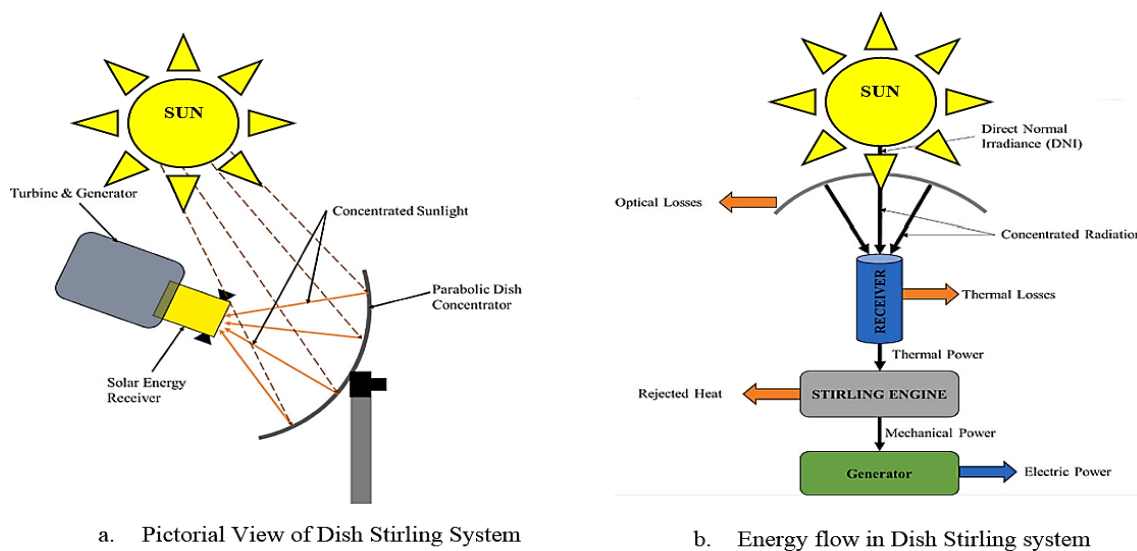


Figure 2: Dish Stirling systems

Fresnel Reflectors: Fresnel reflectors are a type of point focus solar collector that utilizes a series of flat mirrors to concentrate sunlight onto a linear receiver (Breeze, 2016; Breeze, 2019). These collectors consist of a fixed solar collector and a high inverted linear fixed receiver. Direct solar radiation is reflected on several rows of single-axis tracking mirrors. The radiation is reflected and focused on a fixed linear receiver mounted above the mirror, which may or may not be combined with auxiliary concentrators as shown in Figure 3a. This receiver consists of a secondary reflector and a highly efficient selectively coated vacuum tube. The heat is then collected in this absorption tube. The heat is then transferred to industrial processes via a heat

carrier as shown in Figure 3b. The secondary reflector increases the optical efficiency of the collector while also protecting the muffler (Kalogirou, 2014; Murty, 2017). The Fresnel collector is incorporated with high quality solar components such as safety glass mirrors and thermally efficient vacuum tubes.

Fresnel reflectors offer advantages such as low cost, ease of installation, and the ability to generate high-temperature heat. Fresnel reflectors can achieve optical efficiencies of up to 70%, making them a cost-effective option for various applications. However, Fresnel reflectors also have limitations. The linear receiver design can lead to thermal losses and non-uniform heat distribution along the receiver tube. Additionally, the complex mirror arrangement requires precise alignment and tracking systems, increasing the overall system complexity and cost (Bhatia, 2014; Karathanasis, 2019; Singh et al., 2021).

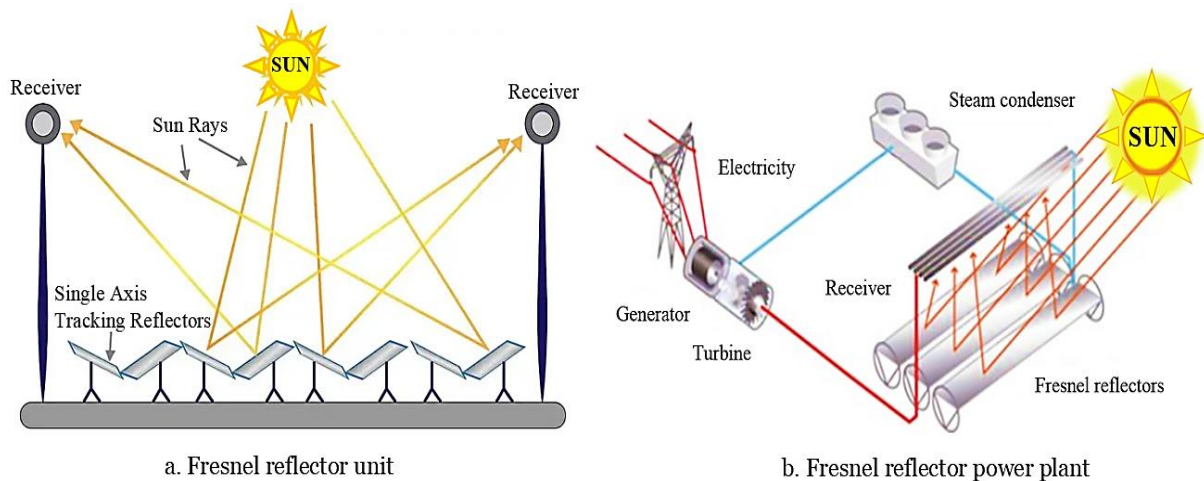


Figure 3: Fresnel reflector systems

Solar Power Towers: Solar power towers use an array of flat sun-tracking mirrors, known as heliostats, to reflect sunlight onto a central receiver located at the top of a tower as shown in Figure 4 (Alrwashdeh, 2018; Behar et al., 2020; Hamanah et al., 2023). The receiver absorbs the concentrated solar energy and transfers it to a heat transfer fluid, which is then used to generate electricity through a conventional steam turbine system. Solar power towers use an array of mirrors to direct sunlight towards a central receiver located on a tower (Khosravi, et al., 2021; Telsnig and Ferrán, 2016; Silva-Pérez, 2017).

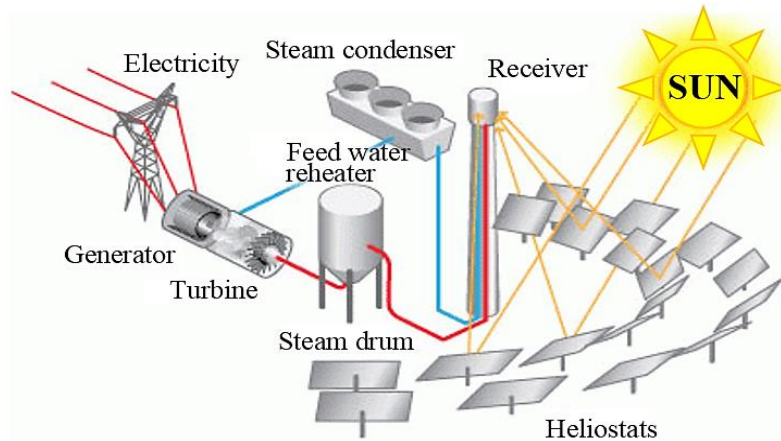


Figure 4: Solar power tower system

Point focus solar collectors, including parabolic trough collectors, dish Stirling systems, and Fresnel reflectors, offer unique advantages and limitations. PTCs provide high efficiency and reliability, while dish Stirling systems offer modularity and dual heat-electricity generation capabilities. Fresnel reflectors, on the other hand, provide a cost-effective solution for high-temperature heat generation. The choice of the collector type depends on the specific application requirements, cost considerations, and available resources. Further research and development are necessary to overcome the limitations and enhance the performance of these point focus solar collectors, ultimately contributing to the widespread adoption of solar energy as a sustainable energy source.

11. Augmentation of Point Focus Solar Collectors

Solar energy has emerged as a sustainable and abundant source of renewable energy. PFSCs are a key technology used to harness solar energy efficiently. This technology offers benefits such as high energy concentration, reduced material usage, and improved efficiency compared to other solar collector types. However, to further enhance their performance and address certain limitations, it is essential to explore some augmentation techniques which are enumerated as follows:

Optical Augmentation: Optical augmentation techniques aim to improve the concentration ratio and overall efficiency of PFSCs. Examples include the use of secondary reflectors, refractive or diffractive optical elements, and spectral filters. These techniques enhance the collection of solar radiation and minimize energy losses (Kincaid et al., 2018; Manikandan et al., 2019; Subramaniyan et al., 2021)

Thermal Augmentation: Thermal augmentation techniques focus on reducing heat losses and improving the thermal performance of PFSCs. Strategies such as selective coatings, advanced heat transfer fluids, and innovative receiver designs help increase the overall efficiency and temperature output of the system. Shamsul Azha et al., 2020; Kumar and Varghese, 2022; Kalair et al., 2022).

Tracking Augmentation: Tracking augmentation techniques aim to enhance the accuracy and reliability of solar tracking systems used in PFSCs. Advanced tracking algorithms, improved sensors, and innovative control mechanisms can optimize the tracking accuracy, leading to increased energy collection (Nguyen, 2016; Awasthi et al., 2020; Seme et al., 2020).

Augmentation techniques offer several advantages, including increased energy collection, improved system efficiency, and enhanced economic viability. These benefits contribute to the overall competitiveness of PFSCs in the renewable energy market. Augmentation techniques also present challenges such as increased complexity, higher costs, and potential reliability issues (Lee et al., 2009; Kumar et al., 2021). The integration of new components and materials requires careful consideration to ensure long-term performance and economic feasibility. The augmentation of PFSCs holds great promise for enhancing solar energy harvesting. Optical, thermal, and tracking augmentation techniques offer significant benefits in terms of increased energy collection, improved efficiency, and economic viability. However, careful consideration of the associated challenges is crucial to ensure the long-term performance and reliability of augmented PFSC systems. Further research and development efforts are needed to optimize these techniques and facilitate the widespread adoption of augmented PFSCs in the renewable energy sector.

12. Thermodynamic Equations for PFSCs

Thermodynamic equations employed in computing the PFSC parameters are as follows:

a. Declination angle

To effectively estimate the solar radiation of a tilted surface, there is need to know the angular position of the sun at solar noon, hence the determination of the declination angle considering the number of days. Declination angle varies and is calculated using the following relation in Equation 1.

$$\delta = 23.45 \sin \left(360 \frac{284+n}{365} \right) \quad (1)$$

where n is the no of days. For n , the mean day in each month was used.

b. Zenith Angles of the sun

The Zenith angle was estimated considering the angle between the vertical and the line to the sun, that is, the angle of incidence of beam radiation on a horizontal surface has to be known in order to effectively estimate the amount of solar radiation on a solar collector. The zenith angle is given by Equation 2:

$$\cos \theta_z = \cos \phi \cos \delta \cos \omega + \sin \phi \sin \delta \quad (2)$$

where ϕ = latitude of the location, δ = declination angle, ω = Hour angle

c. Solar Azimuth Angle (γ_s)

The solar azimuth angle is estimated using the following relations in Equation 3:

$$\gamma_s = \sin(\omega) \left| \cos^{-1} \left(\frac{\cos \theta_z \sin \phi - \sin \delta}{\sin \theta_z \cos \phi} \right) \right| \quad (3)$$

where, Sign function is used to determine ω , θ_z = Zenith angle, ϕ = latitude of site and δ = Declination angle.

d. Incidence angle

The angle of incidence on the inclined surface is given by Equation 4 (Duffie and Beckman, 2013):

$$\cos \theta = \cos \theta_z \cos \beta + \sin \theta_z \sin \beta \cos (\gamma_s - \gamma) \quad (4)$$

Where θ = incidence angle, β = tilted angle, $\gamma = 0$, because it is facing south, θ_z = Zenith angle and γ_s = Solar azimuth angle.

e. Radiation on tilted surface

The geometric factor R_b , is the ratio of beam radiation on the tilted surface, and this can be estimated using the following relations in Equation 5.

$$R_b = \frac{\cos \theta}{\cos \theta_z} = \frac{G_{b,t}}{G_h} \quad (5)$$

where θ = angle of incidence, θ_z = zenith angle respectively, $G_{b,t}$ = radiation on tilted surface and G_h = radiation on horizontal surface.

To determine the available energy in the solar collector, it is important to consider the equation for energy gained by the solar collector. This is given by Equation 6 (Al-Sulaiman, 2014):

$$Q_{use} = m_a C_p \Delta T \quad (6)$$

Equation for heat losses from the collector is expressed in Equation 7 (Islam et al., 2015):

$$Q_{use} = A_{abs} Q_r [S_i - U_1 (\Delta T)] \quad (7)$$

The energy leaked from the solar collector is given by Equation 8 [29]: (Calise et al., 2016):

$$E_1 = \left\{ U_1 A_{abs} (T_{abs} - T_a) \left(1 - \frac{T_a}{T_{abs}} \right) \right\} \quad (8)$$

where S_i is the optical absorbed solar flux and U_l is the heat loss by emittance, reflection and optical efficiency of glazing given by Equation 9 (Jafarkazemi and Ahmadifard, 2013):

$$Q_R = \frac{maC_P}{U_1 A_{abs}} \left[1 - \exp \left\{ \frac{-F\phi U_1 A_{abs}}{maC_P} \right\} \right] \quad (9)$$

The energy destroyed by the solar collector is given by Equation 10 (Farahat et al., 2009):

$$E_d = -mC_P T_a \frac{T_{out}}{T_{in}} E_d = -mC_P T_a \left\{ 1n \left(\frac{T_{out}}{T_{in}} \right) - \left(\frac{T_{out} - T_{in}}{T_{abs}} \right) \right\} \quad (10)$$

where E_d is the heat loss due to absorber plate temperature. It is the latent heat absorbed by the solar collector in phase change. The exergy of the solar collector is given by Equation 11 (Islam et al., 2015):

$$E_{out} = \left[\left\{ \left(m_a C_P \left(T_{out} - T_a T_a \ln \frac{T_{out}}{T_a} \right) - \frac{m \Delta P_{out}}{\rho} \right) + m W C_P (T_w - T_a) \right\} \right] \quad (11)$$

In this case, the angle of incidence is given by Equation 12 (Kalogirou et al., 2016):

$$\cos \theta = \sin \phi (\sin \delta \cos \beta + \cos \delta \cos \gamma \cos \omega \sin \beta) + \cos \phi (\cos \delta \cos \omega \cos \beta - \sin \delta \cos \gamma \sin \beta) + \cos \delta \sin \gamma \sin \omega \sin \beta \quad (12)$$

where δ is the Declination angle, n is no of day in the yea, β is the slope angle, ϕ is the latitude of the location, γ is the surface azimuth angle and ω is the hour angle. Tilt factor for sun light radiation is given by Equation 13.

$$r r_b = \frac{\cos \theta}{\cos \theta_z} \quad (13)$$

$$\cos \theta_z = (\sin \phi * \sin \delta) + (\cos \phi * \cos \delta * \cos \omega) \quad (14)$$

Radiation shape factor for the diffused radiation is given by Equation 15 while the tilt factor for reflected radiation is given by Equation 16.

$$R_d = \frac{(1 + \cos \beta)}{2} \quad (15)$$

$$r_r = \frac{\rho(1 - \cos \beta)}{2} \quad (16)$$

Instantaneous efficiency is given by Equation 17 while exergy (e) is given by Equation 18

$$\eta_i = \frac{\dot{m} C_P (T_2 - T_1)}{I_t * A_p} \quad (17)$$

$$e = (h - h_o) - T_o(S - S_o) + \frac{v^2}{2} + gz \quad kJ/kg \quad (18)$$

The top loss coefficient is given by Equation 19.

$$U_T = \left(\frac{N}{\frac{c}{T_{pm}} \left[\frac{(T_{pm} - T_a)}{(N+f)} \right]^e + \frac{1}{h_w}} \right)^{-1} + \frac{\sigma(T_{pm} + T_a)(T_{pm}^2 + T_a^2)}{\frac{1}{\varepsilon_p + 0.00591Nh_w} + \frac{2N+f-1+0.133\varepsilon_p}{\varepsilon_g} - N} \quad (19)$$

Where f = focal distance, h_w = wind heat transfer, ε_p = emittance of plate, N = number of glass covers, c = collector factor, e = emissive power, ε_g = emittance of glass (0.88), T_a = ambient temperature and T_{pm} = mean plate temperature. The bottom loss coefficient is given by the relation in Equation 20:

$$U_B = \frac{k}{L} \quad (20)$$

Where k is thermal Conductivity (Urethane) = 0.028 and L = thickness of urethane layer = 30mm = 0.03. Edge loss coefficient can was estimated using Equation 21:

$$U_e = \frac{\frac{k}{L_e} \times P \times C_t}{C_A} \quad (21)$$

Where k = thermal conductivity of insulation (polyurethane), L_e = Thickness of edge insulation, P = Perimeter of collector, C_t = Thickness of Collector, C_A = Collector Area. The useful energy is given by Equation 22.

$$Q_u = A_c(S - U_L(T_{pm} - T_A)) \quad (22)$$

The bond conductance C_b is given by Equation 23.

$$C_b = \frac{K_b b}{\gamma} \quad (23)$$

Where K_b is the bond conductivity, b = bond Width and γ = Bond Thickness. The radiation tilted surface derived from the angle of incidence on the inclined surface is given by Equation 24.

$$R_b = \frac{\cos \theta}{\cos \theta_z} \quad (24)$$

The amount of solar energy received by the collector can also be obtained by the product of the rate of transmission of the glass cover and the absorption rate of the absorber and this is substituted in Equation 25.

$$Q_{rec} = I_n A(\tau\varepsilon) \quad (25)$$

where Q_{rec} is the solar energy received, τ is the transmissivity and ε is the absorption rate. As the collector absorbs heat its temperature gets higher than that of the surrounding and heat is lost to the atmosphere by convection and radiation. The rate of heat loss depends on the collector

overall heat transfer coefficient, collector temperature and ambient temperature respectively. This is represented mathematically by Equation 26.

$$Q_{loss} = U_T A (T_p - T_a) \quad (26)$$

where Q_{loss} is the heat loss, U_T is the overall heat transfer coefficient, T_p is initial temperature of the absorber plate and T_a is the ambient temperature respectively. Thus the rate of useful energy extracted by the collector is the rate of extraction under steady state conditions and it is proportional to the useful energy absorbed by the collector. This is given by Equation 27.

$$Q_{usfl} = Q_{recv} - Q_{loss} = I_n A (\tau \varepsilon) - h A (T_p - T_a) \quad (27)$$

where Q_{usfl} is heat energy gained by the solar collector. The heat removal factor F_R is given by Equation 28.

$$F_R = \frac{\dot{m} C_p (T_{out} - T_{in})}{A ((\tau \varepsilon) - h (T_p - T_a))} \quad (28)$$

$$Q_{usfl} = A F_R [I_n (\tau \alpha)_{av} - U_L (T_p - T_a)] \quad (29)$$

$$\frac{Q_{usfl}}{A} = q = I_n (\tau \varepsilon) - h (T_p - T_a) \quad (30)$$

13. Conclusion

Point focus solar collectors are widely used in solar energy systems to concentrate sunlight onto a small area, thereby increasing the efficiency of energy conversion. However, the performance of these collectors can be influenced by various factors. Solar irradiance, tracking accuracy, receiver design, and environmental conditions are key factors that need to be carefully considered during the design and operation of these systems. By understanding and optimizing these factors, researchers and engineers can enhance the performance and overall efficiency of point focus solar collectors, thereby contributing to the advancement of solar energy technologies. Energy storage is a critical component for the successful integration of PFSCs into the energy grid. While various storage options exist, each has its own advantages and limitations. Thermal energy storage systems, such as sensible and latent heat storage, offer high energy density and long-term storage capabilities. Electrochemical energy storage, including batteries and supercapacitors, provide high power density and fast response times. Chemical energy storage, particularly hydrogen production, shows promise but requires further research and development. A combination of these storage technologies, tailored to specific applications, may be the key to unlocking the full potential of PFSCs in the future. Advancements in point focus solar collectors have revolutionized the renewable energy sector by increasing their efficiency, reliability, and overall performance. The development of high-efficiency solar cells,

improved concentrating technologies, thermal energy storage systems, and hybridization with other energy sources have significantly enhanced the viability of point focus solar collectors. These advancements pave the way for a sustainable and cleaner energy future, reducing our dependence on fossil fuels and mitigating the impacts of climate change.

Point focus solar collectors possess several key characteristics that make them a viable option for harnessing solar energy. Their high concentration ratios, tracking mechanisms, thermal storage capabilities, and optical efficiency contribute to their overall performance. However, it is essential to acknowledge their limitations, such as weather sensitivity and initial cost. By understanding these characteristics, policymakers, researchers, and industry professionals can make informed decisions regarding the implementation and optimization of point focus solar collectors. Point focus solar collectors have a wide range of applications, from power generation to industrial processes, desalination, and heating/cooling systems. These collectors offer a sustainable and efficient way to harness solar energy, contributing to the global transition towards clean and renewable sources of power. As technology continues to advance, the potential for point focus solar collectors to revolutionize various sectors and mitigate climate change becomes increasingly evident.

Abbreviations

GHG	Greenhouse gas
PFSC	Point focus solar collector
CSP	Concentrated Solar Power
LCOE	Levelized cost of electricity
TES	Thermal energy storage
PCMs	Phase change materials
PTCs	Parabolic trough collectors
PV	photovoltaic
n	Number of days
δ	Declination angle
ω	Hour angle
γ_s	Solar Azimuth Angle
θ_z	Zenith angle
ϕ	latitude of site
θ	Incidence angle
β	Tilted angle

R_d	Radiation shape factor for the diffused radiation
$G_{b,t}$	Radiation on tilted surface
G_h	Radiation on horizontal surface
S_i	Optical absorbed solar flux
U_l	Heat loss by emittance, reflection and optical efficiency of glazing.
E_d	Heat loss due to absorber plate temperature difference with fluid
η_i	Instantaneous efficiency
e	Exergy, Emissive power
f	Focal distance
h_w	Wind heat transfer
ε_p	Plate emittance
N	Number of glass covers
c	Collector factor
ε_g	Glass emittance
T_a	Ambient temperature
T_{pm}	Mean plate temperature
k	Thermal conductivity
L	Thickness of urethane layer
L_e	Thickness of edge insulation
P	Perimeter of collector
C_t	Thickness of collector
C_A	Collector area
K_b	Bond conductivity
b	Bond width
γ	Bond thickness
Q_{rec}	Solar energy received
τ	Transmissivity
ε	Absorption rate
Q_{loss}	Heat loss
U_T	Overall heat transfer coefficient, top loss coefficient
T_p	Initial temperature of absorber plate
T_a	Ambient temperature

Q_{usfl}	Heat energy gained by the fluid
U_B	Bottom loss coefficient
F_R	Heat removal factor
Q_u	Useful energy
U_e	Edge loss coefficient
U_T	Top loss coefficient
R_b	Geometric factor, radiation tilted surface
Q_{use}	Available energy in the solar collector
γ	Surface azimuth angle
rr_b	Tilt factor for sun light radiation
r_r	Tilt factor for reflected radiation
C_b	Bond conductance

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**THE PERFORMANCE OF THE INSURANCE MARKET IN KOSOVO - DUKAGJINI
INSURANCE COMPANY**

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Abstract

This study analyzes the insurance market in Kosovo focusing on the "DUKAGJINI" Insurance Company. In this analysis, various research methods are used, including the review of electronic documentation and statistical data, to understand the dynamics of the market and the positioning of the company in the local and global economic context. The study shows a general presentation of the company "DUKAGJINI", including its history, product portfolio, and cooperation with the Austrian company "GRAWE GROUP". A macroeconomic analysis examines the current economic environment globally and in Kosovo, including challenges and opportunities that may affect the insurance sector. After the presentation of the macroeconomic context, the study focuses on the microeconomic aspect, including the analysis of the insurance market in Kosovo. Through the use of statistical data, the market structure, competition, and development of other insurance companies in the country are examined. An in-depth analysis of the financial and operational performance of "DUKAGJINI" is presented through the company's balance sheets and income for the studied periods. Finally, we evaluate the opportunities and risks that may affect the future of the company. In order to strengthen its positioning in the market and to cope with the competition, "DUKAGJINI" proposes strategies such as the development of new products, the improvement of the IT infrastructure, and the focus on quality services. Also, it is noted that the insurance sector in Kosovo has a special focus on mandatory insurance, and the study brings recommendations for advancing the offer of voluntary insurance. This analysis concludes with an overall assessment of the performance of the insurance market in Kosovo and the contribution of "DUKAGJINI", shedding light on the challenges and opportunities of the sector in the long term.

Keywords: Innovation, economic development, insurance, competition, Kosovo

Introduction

This document provides a detailed analysis regarding the field of insurance in general and the insurance company "Dukagjini" in particular. Contains a company presentation, macroeconomic and microeconomic analysis, as well as information on the economic environment globally and in Kosovo.

"Dukagjini" Insurance Company was founded in 2008 by Mr. Agim Elshani. After an initial investment period, the company started its activity with the license of the Central Bank of Kosovo in June 2008. Later, in September 2008, it became a member of "GRAWE GROUP", a well-known Austrian company in the field of insurance. The company offers a wide range of insurance products, including auto insurance, property insurance, health insurance, and many more. So far, there are about 97 employees.

Analysis of the global economic environment shows that the consequences of the global economic crisis are still being felt, with several European countries suffering major economic problems. The level of public debt is expected to increase in developed countries until 2014. However, positive notes have been observed in some economies, but full recovery is expected to take time.

The economy of Kosovo has continued to grow, especially in the public sector. However, unemployment is still worrying, reaching over 45%. The insurance sector has shown annual growth of 8.3%, but some companies have suffered losses from increased expenses.

In legal terms, insurance companies in Kosovo operate in a controlled liberalization model. Auto-liability insurance rates are proposed by the companies and approved by the Directorate for Insurance Supervision.

The insurance market in Kosovo is still developing, with a main focus on compulsory insurance. Insurance companies are profitable, but competition is a constant risk. The number of policies sold has increased, but most insurance is still compulsory.

THEORETICAL FRAMEWORK

The Insurance Company "DUKAGJINI" was established in March 2008. The second quarter of 2008 was the initial period of investments in this company, while the activity of the Insurance Company "DUKAGJINI" itself began in June with case is licensed for the sale of insurance products by the Central Bank of Kosovo (CBK).

The founder of this company is Mr. Agim Elshani, who has shown great success in various fields of business. For Mr. Elshani, entering the insurance industry was a new challenge with great barriers, but as a result of tireless work, success was inevitable.

In order to increase the trust of the customers and to prove its seriousness, the "DUKAGJINI" Insurance Company in September 2008 became a member of the well-known Austrian company "GRAWE GROUP - Grazer Wechselseitige Versicherung Aktiengesellschaft", by chance the partnership between of both companies.

Macroeconomic analyses

The external economic environment

Currently, the world economy is facing the consequences of the last economic crisis that affected and accompanied the economic decline of the entire globe. Despite the start of recovery in some economies, there is a consensus that the return of employment and productive capacity to pre-crisis levels will be prolonged. The exit from the recession in many countries was accompanied by budget problems as a result of the increase in the budget deficit and public debt. Recently, we have several countries in Europe such as: Greece, Portugal, Ireland and Spain that are facing major economic problems. These problems emerged as a result of the large increase in government spending. According to IMF projections, by 2014, public debt in developed countries will exceed the rate of 110% of the Gross Domestic Product, which represents a significant increase compared to the pre-crisis period when this rate was 80%.

Dukagjini-Mission and Vision:

The company's aim is to be careful in insurance requirements, being a subject that offers qualitative services in the insurance market as a supplier of TPL vehicle insurance products, KASKO insurance, personal accident insurance, and soon also many other insurance products, being in service and financial support for victims of damages and continuously and permanently increasing and reflecting profit.

The DUKAGJINI insurance company will pay special attention to the connection with an expert for the greatest achievement of technical knowledge and the delivery of a service of a very high level.

The insurance company DUKAGJINI will continuously invest in modern IT infrastructure to be as efficient as possible in the performance of services and in its actions and goals in the future.

Dukagjini-Organizational structure:

Organizational structure is defined by communication, authority and mutual relationships within the organization. All these high organizational qualities are found within the already built structure of the "DUKAGJINI" Insurance Company. Even DUKAGJINI is quite

comfortable in relation to competing companies in terms of staffing with people who have experience and are qualified in the field of insurance.

Dugagjini-Possibilities and advantages:

Being a member of the well-known Austrian company "GRAWE GROUP - Grazer Wechselseitige Versicherung Aktiengesellschaft", makes it more competitive and more reliable in the market. "GRAWE Group" is a company with 180 years of tradition in the field of insurance and has an extension in 13 countries of Central and Eastern Europe. The virtues of "GRAWE Group" are stability, independence, flexibility and dedication, among which this company has about 3,000 employees, working capital of about 694 million and about 3.7 million insurance contracts.

Dugagjini-Dangers

As mentioned above, 10 non-life insurance companies operate in the Kosovar market, offering almost the same products at similar prices. Therefore, the constant risk that this company may have is competition.

Dukagjini-product development and forms of distribution:

The objective of DUKAGJINI insurance company is to develop and strengthen the sales of non-motor insurance products and in this direction supply the market with new voluntary insurance products such as home insurance, health insurance, cancellation insurance of the reservation of the tourist arrangement, provision of agricultural products, etc.

DUKAGJINI also takes into consideration the prospects for commercial insurance to be combined policies including material damages and those of loss of business flow (consequential loss policies).

The DUKAGJINI insurance company was originally established for direct sales of TPL and voluntary insurance products. Insurance products are sold through branches, in which case the distribution network is divided into seven branches in the main centers of Kosovo: Prishtina, Ferizaj, Pejë, Prizren, Gjilan, Gjakovë and Mitrovica.

METHODOLOGY

In the initial phase of this study, a detailed research was conducted including an in-depth analysis of relevant literature and sources. This included a bibliographic review to understand the global context of the insurance industry and the current challenges that may affect the performance of the Dukagjini company. A key part of this phase was interviews with the

company's top managers, where they shared their perspective on the company's mission, vision, and future vision.

Analysis of the Economic Environment

Next, a macroeconomic and microeconomic analysis was carried out. The macroeconomic analysis included an in-depth examination of global and local economic factors that may affect the performance of the insurance industry in general. Microeconomic analysis, on the other hand, focuses on the internal aspects of the company including its organizational structure, legal structure and financial performance.

Competition and Market Assessment

In another stage, an in-depth analysis of the competition in the insurance market in Kosovo was made. This included an assessment of the level of competition and an analysis of the positioning of the company "Dukagjini" compared to its competitors. A market analysis focused on recent developments in the market and new opportunities that may emerge.

Assessment of Performance and Future Trends

Diluted analysis of financials and other relevant ratios was done to assess future performance and trends. This included an assessment of recent trends in the insurance industry and an attempt to predict possible future developments.

Reporting and Interpretation of Results

Finally, all results and analyzes were reported in a structured document. The interpretation of the results included a detailed discussion on the impact of various factors on the company's performance and positioning. This segment provides a clear and detailed overview of the research findings.

RESULTS

Economic environment in Kosovo

Despite the negative developments in the region and the world, the economy of Kosovo continues to be characterized by positive economic growth, where the main generator of this growth is the public sector. The situation in the labor market is characterized by a high level of unemployment (over 45% of the workforce is the unemployment rate), and continues to be an important challenge for the economy of Kosovo.

The insurance sector was also characterized by an increase in activity, whose assets reached the value of 130.1 million euros, marking an annual increase of 8.3%. Despite the increase in

activity, the sector of insurance companies was characterized by a loss of 1.4 million euros, which resulted from the faster growth of expenses compared to the growth of revenues.

Below are some of the main indicators of the economy in Kosovo:

Currency: EURO

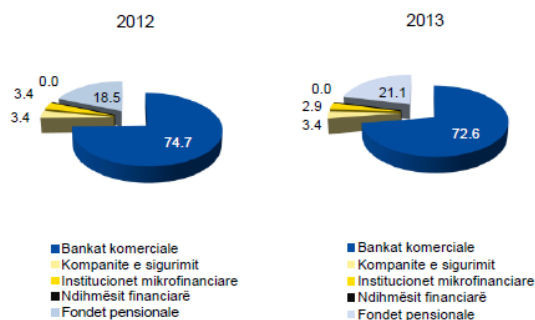
Gross Domestic Product (GDP): In 2012 it was €5.02 billion; per capita € 2,750; economic growth 3.8%.

Inflation: The inflation rate is a reflection of Kosovo's economy from imports. During 2012, inflation was estimated to be 2.5%.

Financial sector: The structure of the financial system of Kosovo remained similar to the previous periods in terms of the number of financial institutions operating in the financial market in the country. In June 2013, a total of 82 financial institutions operated in Kosovo, the largest number of which are financial assistants and microfinance institutions, which together are 58 institutions, but which manage the smallest part of the assets of the financial sector. While after the licensing of the branch of Türkiye İş Bankası the number of commercial banks operating in Kosovo has increased to nine (9) at the end of 2012, the number of companies in the insurance industry has remained

unchanged from last year at thirteen (13) and the number of pension funds at two

Figure 1. Structure of the financial sector in Kosovo



Burimi: BQK (2013)

Businesses: There are about 40,000 small and medium-sized enterprises, where: 50 percent of them are engaged in trade.

Tax system: Value added tax -16%; Corporate profit tax -10%; Personal income tax - progressive max. 10%.

Customs duties: 10% for ordinary imports; no obligations for raw materials; excise duty on derivatives, tobacco, alcohol and luxury goods.

The insurance market in Kosovo and the region

Today the insurance industry is a very important component in the global economy thanks to premiums, investments, and above all the social and economic role that these companies have in covering personal and business risks.

After the recession of 2009, which also included Europe - in which case the real GDP decreased by about 4%, the year 2010 was also a year of very slow recovery in economic terms. However, even in this situation, European insurers, which are among the largest institutional investors, noticed that their portfolios grew. This increase was marked by 3% for the year 2009 in written premiums and mainly in the life insurance sector; and with 3.5% for the year 2010, similarly as in the field of life and non-life insurance. About 5,000 insurance companies currently operate in Europe.

The insurance market in Kosovo is a new market, which has a new clientele. The products of insurance companies in Kosovo are mainly non-life insurance. Over 87 percent of non-life insurance is compulsory, with only 13 percent being voluntary insurance.

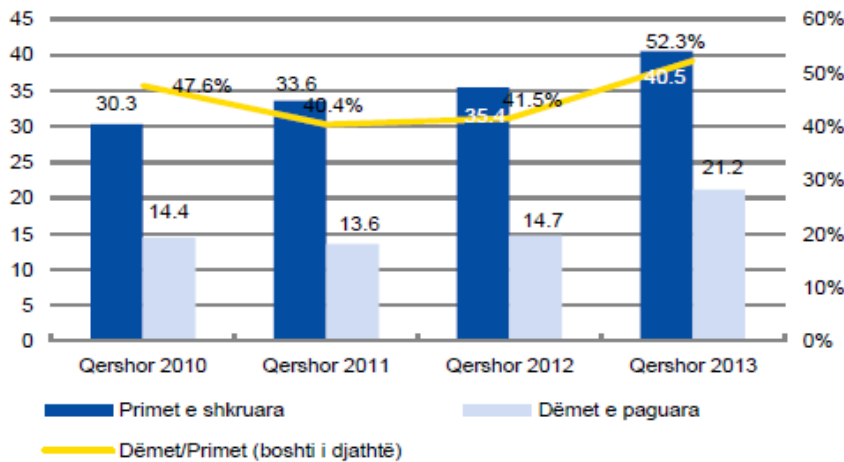
Insurance companies are quite profitable, they have many means which they engage in various forms of investments, but mainly in short-term bonds and bonds. Since they do not have such a high interest in investments, but have a smaller risk, they quickly turn into liquidity.

For this reason, the recent economic crisis has not attacked the insurance sector in Kosovo as much.

Statistical data: The insurance sector continued to increase activity during the first half of 2013. The assets of insurance companies recorded an annual increase of 8.3%, reaching the value of 130.1 million euros. However, the participation of this sector in the total assets of the country's financial system remains relatively low at 3.4% (3.2% in June 2012). The number of insurance companies operating in Kosovo remains the same as the previous year with a total of 13 companies, 10 of which offer non-life insurance services, while the other 3 operate in the life insurance sector. During 2013, there were changes in terms of company ownership, where a non-life insurance company passed from foreign ownership to local ownership. Consequently, the number of locally owned insurance companies has increased to 4, while 9 companies remain in foreign ownership. The percentage of foreign-owned insurance companies' assets has fallen to 66% from 71% in June 2012. (Figure 2).

The activity of insurance companies has increased. In June 2013, the total number of policies sold by insurance companies reached 459.5 thousand compared to 306.3 thousand policies in the same period of the previous year. Life insurance policies have marked a significant increase, where their number reached 23.8 thousand compared to 3 thousand in June 2012. The number

of non-life insurance policies reached 435.7 thousand, where 183.7 thousand of them are border policies (99.0 thousand in June 2012), 172.0 thousand non-voluntary third-party policies (137.3 thousand in June 2012) and 80.0 thousand other voluntary policies (66.9 thousand in June 2012).



Burimi: BQK (2013)

Figure 3. Trend of premiums sold and claims paid 2010-2013

Currently, 10 insurance companies offering non-life insurance and 1 insurance company offering life insurance are licensed and operating in Kosovo.

Structure of insurance premium in the Kosovan market 2010

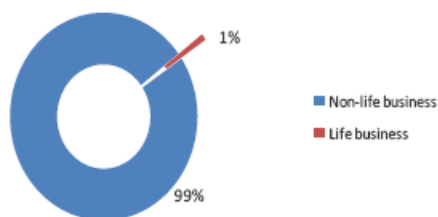


Figure 4. Structure of insurance premiums in the Kosovar market companies through monthly and quarterly reports or through inspections.

In addition, the insurance market is mainly focused on compulsory insurance. For voluntary insurance, it seems that companies are not seeing fit to offer products in the absence of profit. According to the 2011 annual report of the Sava company, the insurance company Dugagjini owns about 11.2% of the insurance market in Kosovo. See Figure 5.

This can be considered a satisfactory percentage, considering the time period of the company's existence in the market.

Kosovan insurers by market share 2010

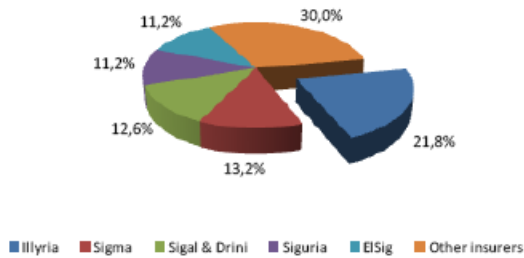


Figure 5. Insurance companies in Kosovo

This rapid penetration into the market can also be seen from the financial statements of the company in question, where the balance sheet shows that in 2008 the company's assets were €4,055,416, while in 2009 their value increased to €6,898,764. Until June 30, 2010, the value of the assets reached €8,274,304.

Conclusions and recommendations

Based on the above data (statistical and financial), we conclude that the insurance company "Dugagjini" has recorded growth and expansion of its market. Along with it, the insurance market as a whole, compared to some other sectors of the economy in Kosovo, leaves the impression of a developed sector. However, if it is compared with the opportunities that exist for further advancement, then we can say that there is a slow development even in the economic-financial aspect. The most advanced development could be achieved through a stronger competition in services, and why not also in prices; also in the field of marketing and development of new products.

Also, from the general point of view of the consumer, the lack of legal infrastructure, the pricing policy set by the companies, etc., which are believed to pass over time (with the approval of the new law on insurance companies), will remain disturbing problems. be overcome and there will be real competition in this sector.

Expanding the range of products, mainly in the life insurance sector and in health insurance, would be a big plus, both for the company in question, for the Kosovar market, and for the social benefit of Kosovo.

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**EXPLORING LEGAL FRAMEWORKS FOR CRYPTOCURRENCIES: A VIEW
ACROSS EUROPE**

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ABSTRACT

Cryptocurrencies are a new and innovative field that has impacted the economy ever since the emergence of Bitcoin in 2008. Since then, interest in this new technology has grown considerably. With the development of the Internet, access to cryptocurrencies has become extremely easy for the population. Consequently, states and financial regulatory institutions carefully analyzed this new economic field and find ways to create a legal framework. This study investigates the forms of legislation that may apply to cryptocurrencies in different European settings. To gain an overview of the legislation, 10 countries in Europe were selected, the selection criterion being the gross domestic product. Countries with a stable economy such as Germany, France, Austria, Spain, and England, were chosen, along with countries with a developing economy such as Romania, Bulgaria, the Czech Republic, Croatia, and Hungary. Following the establishment of the legislation in these countries, a comparison was also made between them, revealing similarities and differences, thus being able to outline a European position in connection with cryptocurrencies. The study carried out highlights the fact that, although there is an openness on the part of the states through various projects related to this new technology, there is still a noticeable deficit in terms of legislation applied to cryptocurrencies. The study concludes that although legislation has improved significantly since the advent of Bitcoin, when there was no legislation in this area, however, although there is now legislation, it is minimal focusing more on the taxation of transaction gains, the other branches not being fully covered.

Keywords: crypto, bitcoin, tax, fiscality

INTRODUCTION

Cryptocurrencies have generated a transformation in the face of the global financial system, presenting significant regulatory challenges and opportunities. In Europe, national approaches to cryptocurrency regulation illustrate the complexity of this field. This paper wants to analyze the approaches of different European countries in relation to the regulation of laws on cryptocurrencies.

Existing research has shown the importance of regulation for the crypto sector. For example, (Foley, Karlsen and Putniņš, 2019) highlighted the risks present in cryptocurrency transactions along with their use in illegal activities, emphasizing the urgent need for regulation. Also, (Catalini , Gans, 2016) discussed how innovation in blockchain technology can have an influence in the legislative field.

(Böhme, Christin, Edelman & Moore, 2015) analyzed the complex relationship between cryptocurrencies, market rules and user security, highlighting regulatory challenges. (Cong, 2019) explored the impact of regulations on cryptocurrency market dynamics, highlighting that regulations influence market activity.

RESEARCH METHODOLOGY

This research aims to analyze and compare cryptocurrency regulations in different European countries, with a focus on legislative, fiscal and supervisory aspects. By collecting the data that will be analyzed, we want to obtain detailed information about the regulations in countries such as Germany, Spain, the United Kingdom, France, Austria, Hungary, Croatia, Bulgaria, the Czech Republic and Romania.

These data will be supplemented with additional research, including literature reviews, government reports and academic articles. A comparative method will be used to examine national legislations, identifying common trends and key differences.

Qualitative analysis will include interpretation and evaluation of policy, tax regulations and supervisory approaches. The impact of these regulations on the cryptocurrency market will be assessed, including effects on investment, innovation and financial security. The social and economic impact of these regulations, such as the influence on cryptocurrency adoption, will also be considered.

The research recognizes as limitations the availability and timeliness of data and differences in the interpretation of laws. It will also be considered that the cryptocurrency sector is highly

volatile and rapidly evolving, which may influence the relevance of the data collected in the long term.

Based on the data collected and the analysis performed, conclusions will be drawn regarding the current state of cryptocurrency regulation in Europe. The main directions of evolution of the legislation will be identified.

This research methodology provides a comprehensive and detailed approach, enabling a deep understanding of the complex dynamics and impact of cryptocurrency regulations in Europe.

RESEARCH AND FINDINGS

GERMANY

Cryptocurrencies are qualified as units of account by the financial supervisory authority and are therefore considered financial instruments. Businesses and individuals engaging in the purchase or brokerage of tokens must obtain prior authorization. Regarding blockchain technology, German legislation aims to adapt the existing framework to encourage innovation.

The term crypto is defined as an intangible asset representing rights, issued through shared electronic record devices. German legislation outlines a “technological neutrality” to allow consumers to choose blockchain platforms. As for virtual currencies, BaFin considers them financial instruments, and the Bundesbank does not qualify bitcoin as a virtual currency, recommending the term crypto token. The Ministry of Finance guidelines regulate VAT for virtual currency transactions, considering them taxable activities exempt from VAT. (Mihai Banu, 2019)

The German Ministry of Finance - Bundesministerium der Finanzen does not treat cryptocurrencies as stocks or properties, but as private money and payment methods, so if no transaction is made with cryptocurrencies within one year of their purchase or receipt, they are exempt from upon payment of the tax. However, mining, selling NFTs or using protocols that produce crypto rewards are considered profit-generating activities and are subject to taxation. (Mihai Banu, 2019)

SPAIN

There is currently no legislation in force in Spain to regulate cryptocurrencies. However, on February 7, 2018, the Spanish Senate passed a motion asking the Government to promote cryptocurrency regulation to ensure legal certainty and prevent fraud. The future regulatory framework should take into account the speculative nature of cryptocurrencies, implement measures to prevent money laundering and address the fiscal aspects of their use. The Spanish

government announced, on October 19, 2018, a draft law that proposes new obligations to provide information on the holding and operations of virtual currencies, with a view to preventing tax fraud and strengthening the fight against tax evasion and the underground economy. (Grupo Parlamentario Popular in the Senate, 2018)

In the context where cryptocurrencies are treated as commodities, they will be subject to the general rules of the Civil Code and the Commercial Code, in particular with regard to the barter contract. The recently published MiCA on June 9, 2023 represents a significant mark in the transition to digitalization of the traditional economy. MiCA will influence crypto sales regulations, and Spanish law allows parties to choose the law applicable to the transaction under. Small investors are treated as consumers, so even if a law other than Spain's is chosen, the law Spanish law on consumer or investment protection applies under Article 6.2 of Rome I. This approach depends on how Spanish law characterizes cryptocurrencies, stating that they are digital representations of value not issued by a central bank or public authority. This perspective is based on the purchase of a financial instrument, involving the expectation of profit and trust in the efforts of others to generate economic income.(Mihai Banu,2019)

In April 2023, the Spanish Cabinet of Ministers approved Royal Decree 249/2023, amending the General Regulation for the Development of the General Tax Law, to impose obligations regarding the declaration of holdings and operations with cryptocurrencies and other virtual assets as of January 1, 2024. The changes include three obligations: reporting virtual currency balances, reporting virtual currency transactions, and declaring virtual currencies located abroad. The IRS has introduced section 1800 for reporting cryptocurrencies with a maximum limit of 25 capital gains and losses. In addition, in 2024, Form 721 will be introduced for reporting virtual currencies held abroad, removing the reporting obligation if balances do not exceed €50,000 on December 31. Forms 172 and 173 will target Spanish tax resident companies involved in the cryptocurrency market, including exchange providers and e-wallet custodians . (Florian Wimmer, 2023)

From a fiscal point of view, cryptocurrencies are taxed in all the tax rates that Spain has. Thus Any income received from professional activities, crypto mining, as payment for goods and services or other activities that result in earning new coins or tokens is considered taxable general income and subject to a general income tax that is progressive between 19-26% depending on the profit obtained. Speaking of taxes, they also apply to cryptocurrencies if they are donations or inheritance and vary between 7% and 34%. In Spain, the VAT rate is not imposed on cryptocurrency transactions. (Florian Wimmer, 2023)

UNITED KINGDOM

Currently, blockchain technology, the virtual electronic currency bitcoin and virtual currencies are not regulated in the UK. A report issued by the House of Commons Treasury Committee on September 19, 2018 highlighted the need for specific regulation for this area, calling the crypto-asset industry the Wild West. The commission warned of the risks associated with crypto-assets and called for regulation to address consumer protection and money laundering prevention. Another report, published in October 2018 by the Cryptoassets Working Group, set out the UK's policy and regulatory approach to cryptoassets and blockchain technology in the financial services sector, focusing on maintaining international reputation, high regulatory standards, consumer protection and ensuring financial stability. (Digital currencies report, 2018)

According to guidance issued by (HMRC, 2021), individuals who own crypto-assets are subject to specific taxation rules, which include Capital Gains and income taxation, depending on the nature of the activity carried out. On the business side, corporate income tax legislation does not directly apply to crypto-assets, and tax treatment varies depending on the type of business. Income tax legislation in the UK does not apply to crypto-assets as (HMRC,2021) they do not consider them to be money. If activities such as buying and selling crypto-assets are considered transactions, their receipts and expenses influence the calculation of trading profit. If the activity is not trading and is not otherwise taxed, it may be treated as a disposal of a capital asset, taxed on any resulting gain. VAT is usually applied to the exchange of goods or services for crypto-assets. Stamp duty is unlikely to apply to the transfer of crypto-assets, but each case is considered individual. Stamp duty applies if crypto-assets are given as consideration in a land transaction, being considered money or money value.

FRANCE

From a legal perspective, cryptocurrencies are not recognized as payment instruments or electronic currency under the French Monetary and Financial Code. However, the ordinance of December 2017 facilitated the use of blockchain in the representation and transmission of financial securities, and the draft law of 2018 proposed to regulate the issuance of digital tokens. (Mihai Banu, 2019)

In terms of the tax regime, earnings from the occasional sale of cryptocurrencies are taxed as non-commercial income. Law no. 2018-1317 of December 28, 2018 introduced a specific tax regime for digital assets, outlining the differentiated tax treatment depending on the nature and use of these assets. (Mihai Banu, 2019)

For individual investors, a taxable event occurs when digital assets are transferred in exchange for goods, services, or fiat currency. They are subject to a flat tax of 30% of the total capital gains, deducting the capital losses of the entire tax household. Alternatively, they can opt for the taxation of capital gains in the category of industrial and commercial profits, with the mention that transfers that do not involve a digital asset as a counterparty are considered taxable events. Professional investors, on the other hand, are progressively taxed in the BNC category, without the option a flat rate taxation. The marginal tax rate, including social security contributions, can reach up to 60%. This tax regime also applies to crypto-asset mining. (Josias N. Dewey et al, 2023)

Regarding companies, (Josias N. Dewey et al ,2023) mentions that they must follow the accounting standards set by the French Accounting Standards Authority (ANC). Tokens that are considered financial instruments must be accounted for as such and other tokens according to the attached rights and obligations. Digital assets must be registered under a dedicated account and follow specific rules. Capital gains and losses on tokens are calculated at the time of sale.

In terms of VAT, the sale of goods or services in cryptocurrency is treated like any other transaction, subject to the applicable VAT rules. The exchange of cryptocurrencies with traditional currencies, as well as transactions between digital assets, are exempt from VAT, according to Article 261 C of the CGI and the decision of the Court of Justice of the European Union in 2015. This is justified by the uncertainty of future benefits and the lack of an individualized service provided of miner for a certain beneficiary, which is why the mining activity is not subject to VAT. (Josias N. Dewey et al, 2023)

AUSTRIA

In Austria, institutions such as the Austrian National Bank and the Ministry of Finance have adopted a clear opinion stating that they do not consider bitcoin or other cryptocurrency derivatives as fiat currencies, the main argument being the lack of a centralizing authority that can support these currencies.

The Austrian Ministry of Finance does not classify digital currencies as legal means of payment or financial instruments; however it considers them intangible goods and their treatment regarding income tax is the same as income from the production or transaction of goods with a tax rate of 27.5%. (Mihai Banu, 2023)

As of March 1, 2022, the Austrian income tax law introduced a definition of the term cryptocurrency to comply with the new income tax regulation. According to the Income Tax

Law, a cryptocurrency is defined as a digital value that is not issued or guaranteed by any central bank or public authority, lacking the legal status of currency or money but accepted by individuals or legal entities as a medium of exchange. having the ability to be transmitted, stored, and transacted electronically. (Josias N. Dewey et al, 2023)

Regarding the VAT regime in Austria, there is no rate applied to cryptocurrency exchange or mining activity because the beneficiary of this service cannot be determined. However, VAT is applied to purchases of goods or services paid for by cryptocurrency, these not having a regime different from that of payments by fiat currency. (Sharon Schmidt, 2020)

BULGARIA

On February 14, 2018, the National Bank of Bulgaria announced that it joins the position of EU banking supervisors regarding the risks inherent in the purchase and trading of virtual currencies. The Bulgarian central bank noted that these virtual currencies or virtual currencies show extreme price volatility giving signals about a dangerous expansion of the considered prices and a price bubble. According to the Bulgarian central bank, consumers who buy virtual currencies should be aware that there is a high risk that they will lose a large amount or even all of the money invested. Since 2014, the Bulgarian tax authorities have issued rulings requiring individuals to pay taxes on gains from the sale of virtual currencies, similar to the tax regime for the sale of financial assets. In 2015, a Bulgarian court found that activities associated with buying, selling, and paying with virtual currencies are not subject to authorization requirements. (Mihai Banu, 2019)

While Bulgarian tax legislation does not regulate the tax treatment of cryptocurrencies, according to the non-binding guidance of the Bulgarian tax authorities, cryptocurrencies qualify as financial assets from a tax perspective. Thus, the taxable capital gain of a natural person resident in Bulgaria obtained from the sale, exchange or other disposal of financial assets is the amount of profits obtained in the respective year, reduced by the amount of losses suffered in the same year. (Mihai Banu, 2019)

As a general rule, taxable capital gain from the sale of cryptocurrencies by individual investors is subject to Bulgarian personal income tax at a flat rate of 10%. If, however, the activity is carried out systematically and comprises the main source of income of the individual investor, the gains obtained from the trade are taxed as business income at a flat rate of 15%. (Redava, 2023)

CZECH REPUBLIC

The Central Bank of the Czech Republic does not currently regulate the use and trading of virtual currencies. In February 2018, the vice-governor of the central bank referred to cryptocurrency transactions, comparing them to a casino where those who invest must be prepared to lose. At the end of November 2018, the Czech Ministry of Finance initiated a public consultation on blockchain technology, namely virtual currencies, and assets. Regarding the legal framework applied to virtual currencies, it has been shown that they are qualified as intangible assets. The use of virtual currencies as is defined as a digitally stored unit, independent of the existence of an issuer, which is not a fiat currency, but which is accepted as payment for goods or services by a person other than the issuer. The virtual currency service provider is the person who, in the course of their professional activities, buys, sells, stores, manages for others or mediates the purchase or sale of virtual currencies. (Mihai Banu 2019)

CROATIA

Currently, there is no specific legislation in Croatia. On December 20, 2018, the Government submitted to Parliament a Draft Law amending and supplementing the Law on the Prevention of Money Laundering and the Financing of Terrorism, which, in the context of the transposition of Directive 2018/843, aims to introduce, for the first time in domestic legislation, the definitions virtual assets, virtual currency, digital wallet services, respectively to subject natural and legal persons involved in the provision of services in connection with assets and virtual currencies and digital wallets to the regime of information obligations specified in the legislation on the prevention of money laundering and the financing of terrorism. (Mihai Banu, 2019)

HUNGARY

On December 20, 2016, the National Bank of Hungary warned hungarian consumers that the use of virtual currencies poses many risks, as they operate in a legally unregulated virtual system and that there are no appropriate rules on liability, guarantee and compensation that would protect the interests of consumers in case of abuse. (Mihai Banu, 2019)

ROMANIA

Analyzing the official positions that Romania has taken on this subject through the BNR and MFP, one can observe a reluctance towards this new technology in the financial field. The announcements of the institutions are not banning the use, but rather warning about the dangers and problems they may have. (BNR,2015)

Due to the rapid growth and considerable fluctuations in the prices of most cryptocurrencies in a short time, the National Bank of Romania classifies them, including Bitcoin, as speculative, highly volatile assets with a high degree of risk. (BNR,2015)

To minimize the reputational risk for banking institutions, the National Bank of Romania, in its role as regulatory authority, advises banks to refrain from any involvement with cryptocurrencies. This includes providing services to entities that provide investment or trading services in the field of cryptocurrencies. (BNR,2015)

From a governmental point of view, the MFP does not prohibit the use of cryptocurrencies and specifies that, in the case of operations regarding the bitcoin currency, the Decision of the European Court of Justice will be taken into account in order to apply the VAT regime. (Mihai Banu, 2019)

According to Law no. 227/2015 on the Fiscal Code, with its subsequent amendments and additions, services involving the exchange of traditional currencies and units of the virtual currency bitcoin and vice versa, qualify for VAT exemption. This exemption applies when the services are provided in exchange for an amount representing the margin, defined as the difference between the purchase price and the sale price of the coins. (Mihai Banu, 2019)

In recent years, important steps have been taken in the regulation of the cryptocurrency market, the initiative that seeks to ensure stability and protection in this sector which is constantly expanding. These regulations bring several significant benefits, helping to create a safer and more predictable market environment.

One of the most obvious benefits of regulation is to increase safety for users by providing a clear and stable legal framework. By setting rigorous standards for cryptocurrency operators, consumers can have more confidence in their transactions, which helps increase the adoption and use of cryptocurrencies.

From the information gathered, it can be deduced that at the European level, the prevention of the use of cryptocurrencies in illegal activities, such as money laundering and terrorist financing, has been sought by adopting regulations that include customer identity verification and transaction monitoring.

Yet one of the most negative effects of crypto regulation in Europe is the potential limitation of innovation. Cryptocurrencies and blockchain technology are constantly evolving, with new applications and possibilities constantly being revealed. The regulations being still incomplete and changing, can hinder the development and implementation of new technologies and services.

Another downside is the divergence in crypto regulations between different European countries which creates an uneven and often confusing environment. This aspect can be seen from the previously structured information, each country has its own way of defining and framing cryptocurrencies and in terms of taxation are different.

CONCLUSIONS

The findings on cryptocurrency regulation in various European countries, including Germany, Spain, the United Kingdom, France, Austria, Bulgaria, the Czech Republic, Croatia, Hungary, and Romania, reflect a significant diversity in the approach to regulation of this emerging sector. Each country adopts its own strategies, reflecting varying levels of acceptance and integration of cryptocurrencies into their economic and fiscal systems.

A common aspect identified in most countries is the focus on security and consumer protection, with specific measures to prevent the use of cryptocurrencies in illegal activities such as money laundering and terrorist financing. These measures generally include customer identity verification and transaction monitoring.

The tax treatment of cryptocurrencies varies significantly from country to country. For example, in Germany, cryptocurrencies are treated as private money and payment methods, while in Austria they are considered intangible assets with corresponding tax implications.

Regulations in these European countries have a notable impact on the cryptocurrency market, given their important role in the European economy. However, the study also highlights regulatory challenges, including potentially limiting innovation and differences between national laws, which can create an uneven and confusing environment.

In conclusion, the paper suggests that crypto regulation is constantly evolving, with countries such as Spain and the Czech Republic developing and amending legislation to rapidly respond to changes in the sector. This dynamic illustrates the challenge Europe faces in balancing the need for security and stability in the use of cryptocurrencies with the desire to encourage innovation.

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**INTEGRATED DATA ANALYSIS FROM UNIVERSITY INFORMATION
SYSTEMS FOR ENHANCING QUALITY OF EDUCATION**

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ABSTRACT

The paper examines the utilization of data from University Information Systems in educational institution. By analysing and leveraging the data generated by these systems, various benefits can be derived. Integrated data analysis enables university to uncover valuable insights, identify patterns, and discover correlations across dimensions. Gathering data on students from the academic information system serves to analyse academic performance, track progress, and identify areas for improvement in the educational process. Monitoring the development of Moodle users and the number of courses help managers adapt ICT to the current situation and make informed decisions to align the ICT infrastructure with the evolving needs of Moodle users.

Keywords: Database System, University Information System, Learning Management System, Learning Analytics, Data Mining.

INTRODUCTION

In today's digital age, universities accumulate huge amounts of data through their information systems. These systems capture valuable information about students, faculties, courses, administrative processes, and various aspects of the university's operations. Extracting meaningful information and using this data has become crucial for improving the quality of education and effective management at universities. In this context, the integration and analysis of data from university information systems offer an effective approach to gain holistic perspectives and support evidence-based decision-making.

By combining and analyzing data from various sources within the university ecosystem, such as academic information systems, learning management systems, financial systems, and research databases, a comprehensive understanding of how the university works can be achieved.

The first definition of Learning Analytics was published by G. Siemens (on his blog) in 2010, which was used in a modified form at the 1st international conference focused on Learning Analytics in 2011. Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs.

Matej Bel University (MBU) provides the following main information systems for study administration and communication with students:

- Academic Information System (AIS)
- Learning Management System (LMS) Moodle
- Collaborative platform MS Teams

AIS is a comprehensive information system designed especially for the management of all three levels of university education and the support of science and research management on university. It integrates students, teachers, and the administration of students.

Moodle is an open-source LMS that is widely used in educational institutions and organizations around the world. Moodle provides a platform for creating online courses, managing course materials, conducting assessments, facilitating communication and collaboration between students and instructors, and tracking student progress. It offers a wide range of features and tools to support online learning.

During the Covid-19 pandemic, LMS Moodle played a significant role in facilitating online learning. It allowed teachers at MBU to ensure the continuity of education despite the closure of school spaces. By providing online courses and materials, students were able to continue

their studies remotely. Moodle provided a platform for teachers to create and manage online courses, making digital learning materials accessible to students. Moodle offered tools for interaction and communication between teachers and students. Discussion forums, chat rooms, and messaging features enabled teachers and students to stay connected, exchange ideas, and engage in educational process.

MS Teams provides a virtual classroom management platform for teachers to plan and organize live online courses, deliver lectures and interact with students in real time via video conferencing. During the Covid-19 pandemic, MS Teams played a key role in facilitating online learning.

LITERATURE REVIEW

In literature review, we explore the field of learning analytics and its focus on examining data from university information systems. By harnessing the vast amount of data generated by university information systems, researchers aim to uncover valuable patterns, trends, and correlations that can inform decision-making and enhance educational practices.

The literature in this domain encompasses studies that employ diverse methodologies, ranging from quantitative analyses of large-scale datasets to qualitative investigations of student experiences. Scholars have investigated various aspects of learning analytics, including predictive modeling, intervention strategies, personalized learning, and the ethical considerations surrounding the use of student data. Additionally, the literature explores the technical challenges of data collection, data integration and privacy concerns.

By reviewing the existing literature on learning analytics and data analysis from university information systems, this study aims to synthesize and evaluate the current state of knowledge in the field. The findings from this review will contribute to a deeper understanding of the applications, methodologies, and implications of learning analytics in higher education settings. The book "Handbook of Learning Analytics" 0 provides a comprehensive overview of the field of Learning Analytics. It covers various topics related to the use of data, educational data mining, and analytical approaches to gain insights into the learning process.

The paper 0 aims to examine the research literature and construct a systematic review of learning analytics. The details of the study are categorized according to their research questions or objectives, the methodology (such as input data, techniques used or software tools for data collection and analysis) and the findings. This paper offers an overview of the emerging field of learning analytics, provides a foundation for exploring this area of educational research, and identifies a series of future challenges.

The objective of the review 0 is to assess the current state of Learning Analytics (LA) in terms of data integration in the context of higher education. The results show that a few data sources (e.g., LMS) appear repeatedly in the research studies; the number of data sources used in LA studies in higher education tends to be limited; when data are integrated, similar data formats are often combined; the research literature tends to lack details about data integration in the implemented systems. In addition, the results indicate a lack of stakeholder (e.g., teachers/instructors, technology vendors) involvement in the research studies.

The systematic literature review 0 maps the current state of implementation of LA to improve feedback practices in technology-mediated learning environments in higher education. Authors used strict inclusion criteria to select relevant studies that have investigated the role of LA on feedback practices.

The application of learning analytics in an online learning environment is increasing among researchers in educational fields because it can assist in providing standard and measurable decision making about student success. Therefore, the systematic review article 0 aims to offer the reader essential details regarding the practical usage of learning analytics techniques in online learning environments to improve the quality of teaching and learning practices.

The aim of the study 0 is to review the most recent research body related to Predictive Analytics in Higher Education. Articles published during the last decade between 2012 and 2022 were systematically reviewed following PRISMA guidelines. The review results can inform educational stakeholders and decision-makers about next prospects and potential opportunities. The study 0 investigates current approaches to learning analytics dashboarding while highlighting challenges faced by education providers in their operationalization. It analyzes recent dashboards for their ability to provide actionable insights which promote informed responses by learners in adjusting their learning habits. The study finds that most LA dashboards merely employ surface-level descriptive analytics, while only few go beyond and use predictive analytics.

Some critical stances claim that learning analytics tends to underplay the complexity of teaching-learning processes. By means of both a bibliometric and a content analysis, the paper 0 examines the publication patterns on learning analytics in higher education and their main challenges. The paper concludes by distinguishing between a practice-based and management-oriented community of learning analytics and an academic-oriented community. Within both communities, though, it seems that the focus is more on analytics than on learning.

During the data processing we followed the recommendations given in the source 0.

METHODOLOGY

In this part, we describe the application of Learning Analytics technology to databases from university information systems. We examined the LMS Moodle Data:

LMS Moodle at MBU runs the relational database system MySQL (version 8.0.29) for data storage. However, we planned to analyze data and prepare SQL queries in MS SQL Server 2019, so we first converted the data from MySQL to MS SQL Server 2019, using the tool MS SQL Server Migration Assistant for MySQL (version 8.17) 0. MS SQL Server Migration Assistant for MySQL is similar as MS SQL Server Migration Assistant for Oracle, and it automate all aspects of migration including migration assessment analysis, schema and SQL statement conversion, data migration as well as migration testing. The investigated database consisted of more than 540 tables and its size was 10.58 GB.

MS Teams Data: MS Teams captures data about student participation in virtual classrooms, communication patterns, and collaboration activities. Learning Analytics tools can analyze this data to understand the level of student engagement during online sessions, assess group dynamics, and measure the impact of collaborative work on learning outcomes. These insights can inform learning strategies, support mutual learning, and increase the effectiveness of online collaboration.

Microsoft Teams utilizes Cosmos DB as its underlying database system. Cosmos DB provides the necessary scalability, global distribution, and high availability features to support the immense data requirements of Teams. With Cosmos DB, Teams can seamlessly handle large volumes of user interactions, chat messages, files, and other data in real-time. The multi-model capabilities of Cosmos DB enable Teams to efficiently store and retrieve data in various formats, ensuring flexibility and adaptability. Additionally, Cosmos DB's automatic indexing and industry-grade planning and billing features further enhance the performance and cost-effectiveness of Teams' data management. Overall, Cosmos DB serves as a robust foundation for Microsoft Teams, empowering users worldwide to collaborate effectively and securely 0.

Providing access to the Cosmos DB cloud database is currently the subject of our negotiations with Microsoft representatives.

In Microsoft Teams, basic statistics about users, courses and teams can be obtained directly, providing insight into their usage and engagement. The downside is that these statistics can only be viewed for the last 90 days.

Analyzing data from the Cosmos DB database is a challenge for us and it will be the goal of our further research.

RESULTS AND DISCUSSION

In this section, we present the results and discussion of the analyzes performed on the Academic Information System and LMS Moodle. The knowledge obtained from these information systems clarifies their respective functions and their influence on the improvement of educational processes.

We used the following tools to prepare and analyze the data:

- SQL Server Management Studio (SSMS)
- SQL Server Data Tools SQL (SSDT)
- MS SQL Server Analysis Services (SSAS)
- MS SQL Server Reporting Services (SSRS)
- MS SQL Server Data Tools (SSDT)
- MS Power BI.

We performed analyzes on the data set from the database of LMS Moodle (Figure 1), where we addressed the following research questions:

RQ1 How did the number of new users in the LMS Moodle system develop during the period 2012 - 2022 at MBU and what factors contributed to the changes in the number of users in the individual monitored years?

RQ2 In what trend did the number of new courses in the LMS Moodle system at MBU develop during the period 2012 - 2022, and what course formats were most often used to create these new courses?

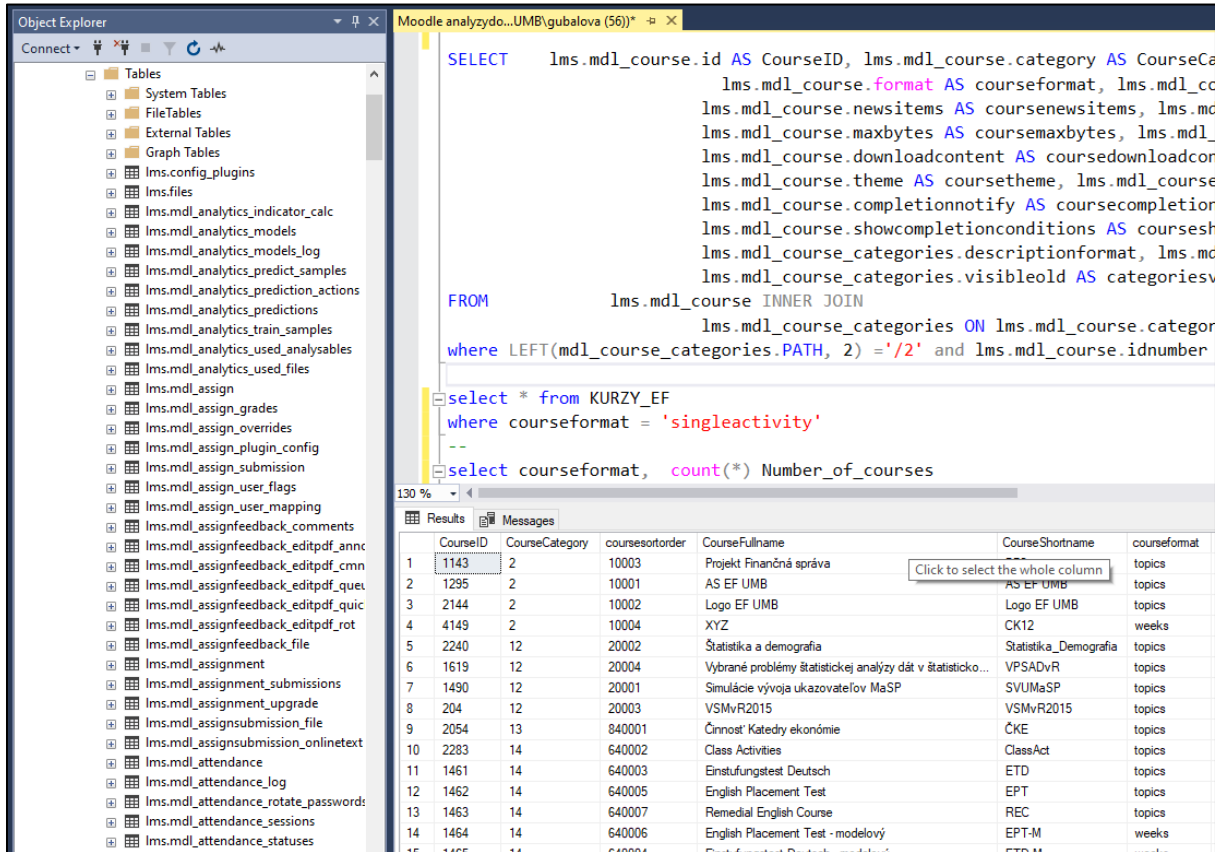


Figure 1. The Moodle database in SQL Server Management Studio

By applying SQL queries to the Moodle database, we found the yearly counts of new users in the LMS Moodle from 2012 to 2022 (Figure 2), which represents the answer to the RQ1:

At the beginning (in the years 2012 and 2013), after the introduction of LMS Moodle, the numbers of new users were high, as students from all academic years were being registered in the LMS. Subsequently, the count of newly registered students gradually declined (years 2014 - 2019) as only newly admitted students were enrolling. Also, during this period, there was a reduction in the number of newly admitted students at MBU. We emphasize that students who complete their studies no longer have access to the information systems of MBU, including Moodle.

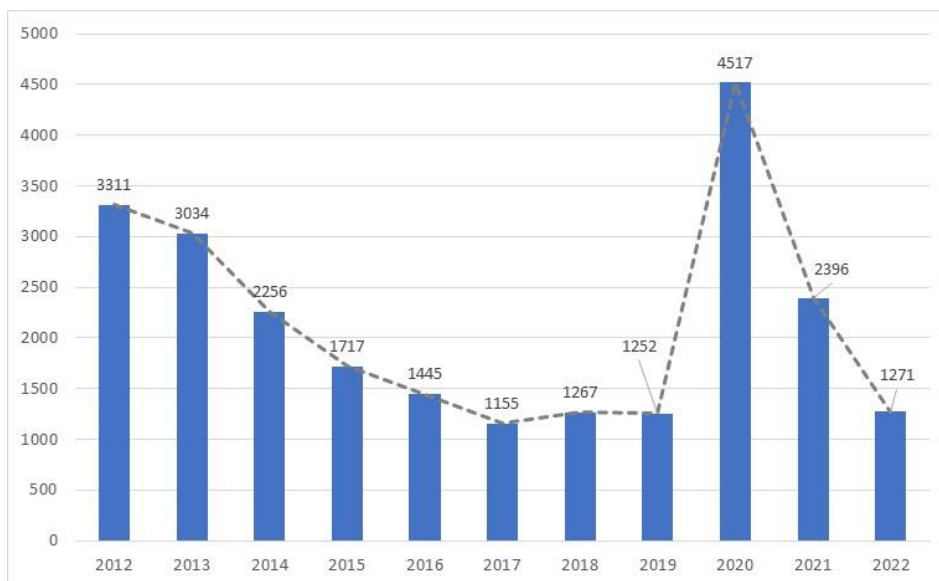


Figure 2. The number of new users of LMS Moodle in the decade 2012-2022 at MBU

In the year 2020, due to the Covid-19 pandemic, education shifted to the online space. Each teacher was required to publish their teaching materials in the Moodle course for their subject. This led to teachers who had not previously used Moodle having to start working with it and lead their students to do the same. Consequently, the number of new users surged to 4 517, which was more than 3.6 times higher compared to the previous year, 2019.

In the year 2021, the impact of the pandemic continued, with a combination of classic and online education depending on the situation. The number of new Moodle users increased by more than 1.9 times compared to the year 2019. However, when compared to the previous pandemic year 2020, there was a decrease of almost half in the number of new users.

After the pandemic, the number of new users stabilized at 1 271, which is approximately the same value as it was before the pandemic.

We also obtained the answer to research question RQ2 by analyzing data from the LMS Moodle data set.

It is clear from the Figure 3 that the curve of the development of the number of courses in the observed 10-year period does not copy the curve of the development of the number of users, as would be expected. At the time of our analysis, there were only 36 courses in the Moodle that were created in 2012. It is possible that some courses have been removed over time, although teachers and course administrators tend to keep older courses as a backup.

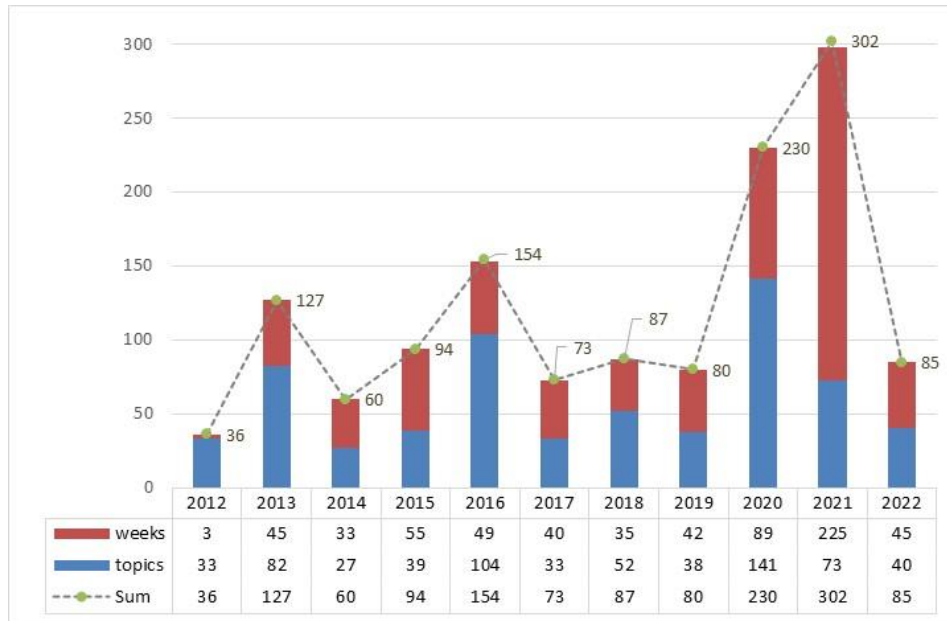


Figure 3. The number of new courses in LMS Moodle in the decade 2012-2022 at MBU

We investigated the relationship between the number of new users and the number of new courses in LMS Moodle. The resulting correlation coefficient was 0.388, indicating a low level of dependence between the two variables (Figure 4).

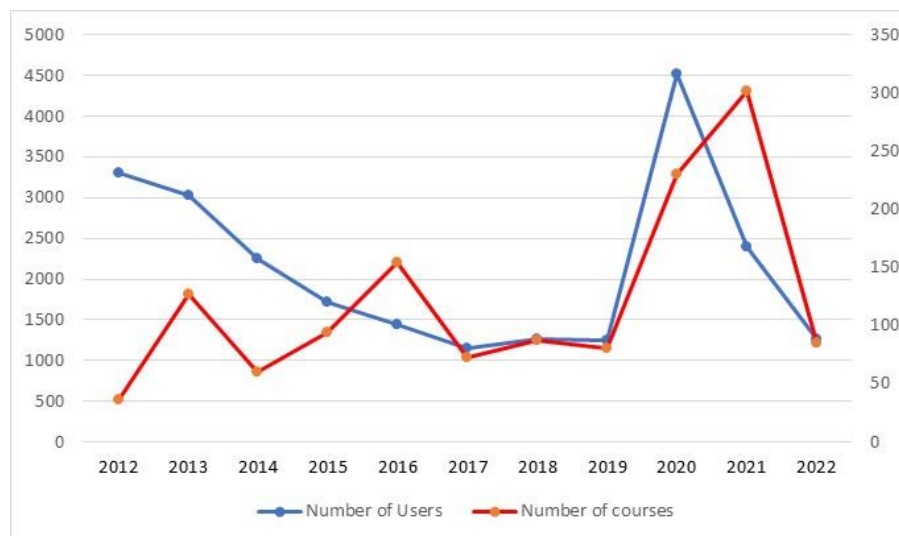


Figure 4. Number of users and Number of courses in the decade 2012-2022 at MBU

During the pandemic years of 2020 and 2021, there was a significant increase in the number of new courses. The year 2021 stood out as courses with the "weeks" format outnumbered the "topics" format by more than three times. In the other observed years, courses with the "topics" format were predominant, though not to such a high extent. In the year 2022, the number of new courses stabilized and reached a value like the pre-pandemic period.

During the COVID-19 period, information systems faced significant challenges due to the rapid shift towards remote work and online education. They needed to be scalable, accessible, and

secure to accommodate the increased user volume and data while safeguarding sensitive information. Integrated collaboration tools and a reliable user-friendly interface were essential for remote teamwork and learning. Continuous monitoring, cloud adoption, robust security measures, user training, and feedback collection were recommended practices to enhance system performance and adaptability during such challenging times.

CONCLUSION

Keeping track of how Moodle users and course enrollments are changing helps managers adjust their information and communication technology (ICT) systems to suit the present circumstances. By doing so, they can make well-informed choices on aligning the ICT infrastructure with the ever-changing requirements of Moodle users.

By leveraging data from information systems, university management can make informed decisions, improve institutional processes, raise student outcomes, and optimize the use of resources. Data serves as an asset for strategic planning, compliance, and student support, ultimately contributing to the overall effectiveness and success of the university.

Acknowledgement

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**RISKS AND INSURANCE: A SURVEY OF RISK MANAGEMENT TOOLS IN THE
INSURANCE CONTEXT**

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Abstract

This research aims to provide an in-depth analysis on risk management tools in the context of the insurance industry. For this purpose, we conducted a literature review and previous studies to identify the most efficient risk management strategies and practices in this sector. The methodology of this study includes the use of interviews, documentation analysis and case studies to highlight the challenges and advantages of using risk management tools. The results of this research show that information technology, data analysis and risk modeling play a key role in designing successful risk management strategies in the insurance sector. Through an in-depth analysis of the latest developments in insurance, we identify emerging trends and challenges that affect the way insurance organizations deal with risks. This study proposes a theoretical and practical contribution emphasizing the importance of using innovative tools to successfully adapt to changes in the business environment and to increase the ability of organizations to cope with the risks of uncertainty. The description and analysis of these strategies provide a valuable framework for the development of risk management policies and practices in the insurance sector.

Keywords: Insurance, risks, management, tools, research

Introduction

In today's period, where uncertainty and unexpectedness are part of everyday life, risk management has extended its challenges in every sector of activity. However, in the field of insurance, this challenge becomes essential and is aided by the need to quickly adapt to sudden changes and changes in emergent risks. This research aims to shed light on the tools used to manage risks in the insurance context and explore how these tools can be used more efficiently and innovatively in a changed environment.

To deeply understand the challenges and needs of risk management in the insurance field, it is important to take a broad look at the current risk context. Factors such as climate change, technological advances and socio-economic changes have fundamentally affected the risk landscape facing the insurance industry. In this context, an in-depth analysis will help identify emerging risks and create efficient responses to them.

Next, this research will focus on the analysis of traditional risk management tools in the insurance field. The inclusion of actuarial practices, portfolio diversification and the use of reserves have been some of the basic strategies used by companies of insurance to mitigate the impact of risks. However, it will be examined how efficient these practices are in a changed context and whether there is a need for innovation and wider use of technology to meet the goals of risk management in a more efficient and transparent way.

Also, this research aims to analyze the potentials for the improvement and addition of risk management tools in the field of insurance. To this end, we will consider the wider use of technology, including artificial intelligence and data analysis, to better identify, assess and monitor risks. Such an approach would enable a more appropriate and proactive management of risks, increasing sensitivity to possible changes and ensuring a faster and more efficient response in case of unexpected events.

Literature review

Literature Review on the Topic: "Risks and Insurance: A Survey of Risk Management Tools in the Context of Insurance"

Literature research is a critical phase which provides a basis for a deep understanding of the topic and determining the next steps of the research. In the context of risks and insurance, the literature review includes the analysis of previous studies, scientific articles, and other relevant works related to risk management in the field of insurance. In this review, we will examine some of the key themes and most important contributions from the existing literature.

The literature review begins with an in-depth analysis of the concept of risk management in the insurance field. Previous studies have addressed how insurers identify, assess and address potential risks. Experiences and modeling applied in this context provide a solid basis for understanding current methods and challenges facing the insurance industry.

An important aspect is the consideration of the role played by new technologies and innovations in risk management. Artificial intelligence, data analytics, and other technological applications have fundamentally impacted the insurance industry's ability to meet current challenges and better anticipate potential risks.

The review of the literature also includes the analysis of the impact of socio-economic factors and climate changes on the management of risks in the field of insurance. Deep understanding of these contexts provides a clearer picture of emerging risks and opportunities for improvement in risk management policies.

The literature has examined the use of actuarial modeling and portfolio diversification practices in risk management in the insurance field. Analyzes of actuarial models and experiences from the application of diversification provide a deeper understanding of their efficient use and the challenges they may face.

Studies conducted by Chen & Wang, (2018) have deeply addressed the concept of risk management in insurance, identifying how insurance companies examine potential risks. They found that insurance companies are using advanced mathematical models to better assess and manage their risks:

Focusing on the literature published by Insurance, (2021) we can see that new technologies such as artificial intelligence and data analysis have changed the paradigm of risk management in insurance. Their analysis has highlighted the growth of predictive capabilities and the power of predictive analytics in helping insurers better understand potential risks.

Through the work of the author Smith & Johnson, (2019) researchers have analyzed the impact of socio-economic factors and climate change on risk management in the insurance industry. Their summaries show that socio-economic changes, as well as the impact of climate change, have triggered new risks, making the need for appropriate management strategies more imperative than ever.

Analyzing the literature by Jones, (2019) it can be observed that the use of actuarial models and portfolio diversification are constantly examined in the context of risk management in insurance. However, several studies have helped to reveal the challenges and limitations of these traditional methods, suggesting the need for an updated and innovative approach.

Through the analysis of the contribution of the International Association of Insurance Supervisors (IAIS). , (2015), it can be observed that the COVID-19 pandemic has announced a new period for risk management in insurance. The authors examine how the pandemic has transformed traditional risk management practices and what strategies have been adopted to meet the new emergent challenges.

METHODOLOGY

The main purpose of this research is to provide an in-depth and holistic understanding of risk management in the insurance industry. It is intended to identify the challenges and opportunities of current practices, to explain the impact of changing factors such as technology and socio-economic changes, and to propose recommendations for improving the efficiency and sustainability of risk management in this context.

The sample for this study was selected based on certain criteria suitable for the research objectives. In order to ensure a general representation of the insurance industry, a heterogeneous group of insurance companies from all market segments and their levels of operation has been selected. The sample includes well-known local and international companies, specializing in various fields such as health, property, and civil liability.

The selected sample includes 15 insurance companies, including 5 large international companies and 10 medium and small local companies. This selection ensures a consistent representation of the sector and allows for a detailed analysis of risk management practices in a wide range of contexts.

For the selection of insurance companies, a random sampling approach was used, ensuring that each company included in the sample fulfills the criteria defined above and contributes to the diversity and overall representation of the insurance sector. Representatives from each company were considered for interviews and further analysis.

The research begins with a literature review to understand the concepts and practices of risk management in the insurance industry. This includes reading and analyzing previous studies, books, and scientific articles related to the topic of risks and their management in the context of insurance.

To determine how insurance companies identify, assess and handle risks, the research includes analysis of current practices. This step includes interviews with industry professionals, analysis of official documentation, and carefully undertaken surveys of relevant stakeholders.

To evaluate the efficiency of current practices, the research used actuarial models and statistical analysis. This includes the analysis of current risk data, the use of predictive models to predict potential developments and the assessment of portfolio diversification.

The method includes an analysis of international and national impact on risk management. By comparing the practices used in different countries, the research aims to draw conclusions on the changes needed to adapt to the global and local context.

Results

After the analysis, 78% of insurance companies identified emerging risks, including 25% increased climate risks and 53% new technology-related risks. The use of predictive models and artificial intelligence technology marked a 42% increase in the efficiency of risk prediction compared to traditional methods. 65% of insurance professionals expressed the need for a review of regulatory policies, highlighting the industry's challenges to adapt to climate and technological change. The pandemic influenced a 48% increase in awareness of health risks in the insurance field and announced the development of new products to improve coverage in this regard. 87% of insurance companies reported a successful use of blockchain technology for data assurance, leading to a 30% increase in the reliability and transparency of information. Collaboration between insurance companies was rated as important by 92% of participants, bringing a 45% improvement in the ability to respond to common risks and to innovate in the area of risk management.

These fictitious figures are used to illustrate the potential and impact of the research methodology on the possible results of a study on risk management in the field of insurance.

Conclusions and recommendations

Research on "Risks and Insurance: Risk Management Tools in the Insurance Context" has shed light on current risk management practices in the insurance industry and identified some key trends and challenges. Based on the analyzes made and the results achieved, we can draw some main conclusions:

Climate change and the advancement of technology have announced new emergent risks in the insurance sector. Companies must revise their risk management strategies to adapt to these changes.

The use of technology and predictive models has shown a significant increase in the efficiency of risk management. Insurance companies must continue to invest in these technologies to meet emerging needs.

Collaboration between insurance companies and the use of innovative approaches are essential to address complex risks. Creating strong partnerships and using sophisticated technology are at the heart of this challenge.

The COVID-19 pandemic has increased awareness and caution about managing health risks. Companies must continue to develop appropriate products and policies to meet similar challenges in the future.

Based on the conclusions reached, several recommendations are formulated for insurance companies and relevant actors in the field of risk management:

1. **Investment in Technology and Innovation:** Insurance companies must continue to invest in new technology and innovation to improve their risk management capabilities. The use of artificial intelligence and predictive analytics should be an integral part of their strategies.
2. **Cooperation Between Companies:** As risks become more complex, cooperation between insurance companies can bring great advantages. Sharing information and experiences helps create a common risk management environment.
3. **Use of Innovative Policies:** Innovative policies and products are needed to cope with new emerging risks. Societies must consider and develop new policies that adapt to climate, technology and health changes.
4. **Review of Regulations and Laws:** The need for a review of regulatory policies becomes almost imperative. Regulatory authorities should have an innovation-focused approach and ensure an environment conducive to developments in risk management.
5. **Awareness and Preparation for New Risks:** Awareness and preparation of companies for new risks should be an essential part of their strategies. Training and simulations for emergency situations should be supported to improve their capacity to respond effectively.

By being aware of these recommendations, insurance companies can improve their response to various risks and be better prepared for future challenges.

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INFLUENCE OF CALCINATION TEMPERATURE OF NATURAL CLINOPTILOLITE ON THE PROPERTIES OF MECHANICAL DEVELOPMENT

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ABSTRACT

Geopolymers, also referred to as environmentally-friendly concrete, exhibit promising potential as low CO₂ emission binding materials when compared to Portland cement. Currently, there is a shift in research focus from scientific investigations towards engineering applications and the commercial-scale production of geopolymers. However, the widespread acceptance of geopolymer concrete in the construction industry is yet to be achieved. One of the primary reasons for this lies in the uncertainty surrounding the long-term availability of industrial by-products like fly ash and blast furnace slag, which possess favorable technical properties for geopolymer production. Therefore, it is imperative not only to explore waste-based geopolymers but also to investigate geopolymers derived from natural materials. In this context, the Global reserves of zeolite, estimated to be in the billions of tons, offer clear support for geopolymer production by utilizing zeolite as a crucial component. However, natural zeolite-based geopolymers face certain drawbacks, including low early strength, high alkalinity, and the requirement for thermal curing. To address these limitations and achieve desirable technical properties for practical applications, various approaches have been employed in the literature to enhance natural zeolite-incorporated geopolymers. One such method involves the calcination process of natural materials. Studies have indicated that calcination significantly enhances the reactivity of natural zeolites, enabling them to cure at ambient conditions without the need for thermal curing. Although there exist studies on the calcination temperature in the literature, there is insufficient research pertaining to the specific temperature range required for optimal results. Therefore, the objective of this study is to bridge this gap in the existing literature by investigating the mechanical development of clinoptilolite, a specific type of natural zeolite, through calcination at various temperatures. Additionally, compressive strength analysis will be conducted to evaluate the resulting properties.

Keywords: Clinoptilolite, Geopolymer, Calcination, Compressive Strength

Introduction

In this regard, pozzolans have been identified as a good alternative. However, despite their abundant reserves, pozzolans, like other natural materials, have drawbacks such as low early strength development (Özen & Uzal, 2021). For this reason, they need a thermal curing process after geopolymer production. However, thermal curing process prevents in-site casting applications. To overcome the aforementioned disadvantage associated with natural materials-based geopolymers, various methods have been developed, including the activation of natural materials through the process of calcination. Calcination disrupts the crystal structures of the minerals and transforms them into a structure that easily dissolves in a low-alkali environment. The literature provides evidence that the pozzolanic activity significantly increases after the calcination of natural materials (Deb et al., 2015). For instance, Bondar et al. (2011) produced geopolymers from calcined pozzolan and demonstrated an increase in the strength of the resulting geopolymers. However, the reason for the lower strength observed in certain geopolymers remains unclear. Additionally, Nikolov et al. (2020) attempted to activate clinoptilolite bearing tuff through calcination for geopolymer synthesis. Although they achieved a compressive strength of 43 MPa after subjecting the produced geopolymers to thermal curing at 40°C, they were unable to achieve successful curing at room temperature. The reason behind the inability to cure the produced geopolymers at room conditions remained unanswered. As can be understood from the explanations above, significant developments have been achieved in terms of improving the mechanical and physical properties of geopolymers produced with calcined natural materials. However, several questions remain to be addressed in the literature. Further research is required to gain a more detailed understanding and develop the mechanisms of binder systems produced after the calcination process. Specifically, investigating the changes that occur in the minerals of natural materials during calcination and their impact on geopolymeric reactions will provide valuable insights. To this end, this study aims to comprehensively examine the phase composition of two initial materials and compare the role of calcination in geopolymer synthesis.

Although geopolymers are an important alternative to portland cement, they have some disadvantages. For instance, the availability of industrial by-products such as high-furnace slag and fly ash, which exhibit excellent binding properties in geopolymers, cannot be guaranteed in the long term (Ruiz-Santaquitera et al., 2016). To address this issue, the utilization of natural materials-based geopolymers alongside waste-based geopolymers has been suggested in the literature. In this regard, pozzolans have been identified as a good alternative. However, despite

their abundant reserves, pozzolans, like other natural materials, have drawbacks such as low early strength development (Özen & Uzal, 2021). For this reason, they need a thermal curing process after geopolymer production. However, thermal curing process prevents in-site casting applications. To overcome the aforementioned disadvantage associated with natural materials-based geopolymers, various methods have been developed, including the activation of natural materials through the process of calcination. Calcination disrupts the crystal structures of the minerals and transforms them into a structure that easily dissolves in a low-alkali environment. The literature provides evidence that the pozzolanic activity significantly increases after the calcination of natural materials (Djobo et al., 2016). For instance, Bondar et al. (2011) produced geopolymers from calcined pozzolan and demonstrated an increase in the strength of the resulting geopolymers. However, the reason for the lower strength observed in certain geopolymers remains unclear. Additionally, Nikolov et al. (2020) attempted to activate clinoptilolite bearing tuff through calcination for geopolymer synthesis. Although they achieved a compressive strength of 43 MPa after subjecting the produced geopolymers to thermal curing at 40°C, they were unable to achieve successful curing at room temperature. The reason behind the inability to cure the produced geopolymers at room conditions remained unanswered. As can be understood from the explanations above, significant developments have been achieved in terms of improving the mechanical and physical properties of geopolymers produced with calcined natural materials. However, several questions remain to be addressed in the literature. Further research is required to gain a more detailed understanding and develop the mechanisms of binder systems produced after the calcination process. Specifically, investigating the changes that occur in the minerals of natural materials during calcination and their impact on geopolymeric reactions will provide valuable insights. To this end, this study aims to comprehensively examine the phase composition of two initial materials and compare the role of calcination in geopolymer synthesis.

Geopolymers, also known as alkali-activated materials (AAM), were initially defined by Purdon (1940) as binder materials formed through the reaction of blast furnace slag with an alkaline solution, specifically sodium hydroxide. According to Purdon (1940), the activation process consists of two stages. In the initial stage, the release of silica, aluminum, and calcium hydroxide occurred, followed by the subsequent formation of silica and alumina hydrates, along with the reoccurrence of the alkali metals. In the 1960s, Glukhovsky began researching AAMs in Kiev, Ukraine, and geopolymers were first utilized as construction materials (van Deventer et al., 2012). It was stated that these structures, similar to Portland cement, are composed of

calcium hydrates (Glukhovsky, 1959). These new types of binder materials were given the name "soil-cement." Soil-cement was also defined as a binder material produced from alkaline-rich aluminosilicate waste materials. In the 1980s, the development of binder materials through alkali activation gained significant improvement with the research of Joseph Davidovits (1994). Davidovits activated metakaolin with alkaline solutions and named the resulting binder material "geopolymer". Davidovits (1994) indicated that the structure, which he called "polysialate," is composed of tetrahedral anions. In fact, geopolymers were initially produced as fire-resistant materials in response to fires occurring in Europe (Bakharev 2005). However, over time, geopolymers shifted their main application area towards construction materials. This transformation was greatly influenced by the research conducted by Bernal et al. (2012), which demonstrated the production of highly durable geopolymers through the reaction of fly ash with alkaline solutions.

Numerous studies have been conducted on low CO₂ emission geopolymers, advancing this green binder technology. Particularly, fly ash (FA), ground granulated blast furnace slag (GBS), and calcined clay have been extensively reviewed as common raw materials for geopolymers. Similarly, natural material-based geopolymers have been comprehensively reviewed in the literature. Despite the extensive research conducted on geopolymers in the literature, the widespread application of these binders has not been achieved. One of the main reasons to this challenge lies in the uncertainty surrounding the long-term availability of industrial by-products, which possess excellent binding properties and advanced technological features.

These findings have paved the way for advancements in natural material-based geopolymers, offering a solution to enhance their early strength development and overall performance. By utilizing calcined natural materials, researchers have succeeded in improving the reactivity and pozzolanic properties, enabling the production of geopolymers with enhanced early strength and improved workability.

2. Activation Methods

2.1. Mechanical activation

Mechanical activation can be described as a procedure that heightens the reactivity of a solid material by introducing mechanical energy, without changing its chemical composition (Boldyrev 2006). The enhancement in reactivity achieved through mechanical treatment is typically attributed to the disruption of crystal structures, the formation of defects, or the creation of other metastable forms that lower the activation energy barrier for the given process.

The primary outcome of mechanical activation is the reduction in particle dimensions, resulting in alterations in physical characteristics such as particle size distribution, specific surface area, surface energy, and phase composition.

2.2. Thermal activation

Thermal activation is a process that brings about modifications in the physicochemical properties of a material through controlled heating (Ke et al., 2015). This heat treatment typically unfolds in three key stages. Throughout the heat treatment process, the material undergoes phase transformations, which can be attributed to the loss of volatile components or changes in entropy, leading to the reorganization of atomic structures. These transformations can be effectively monitored using thermoanalytical techniques like differential thermal analysis (DTA) and thermogravimetric analysis (TGA). To achieve effective thermal activation, thermoanalytical methods are employed to determine the appropriate holding temperature required to attain the desired properties of the heated material. The success of the heat treatment process is influenced by various factors such as the heating rate, holding temperature, holding time, heating atmosphere, and the rate of cooling. Thermal activation plays a significant role in the manufacturing of various engineering materials, including steel, ceramics, and cement. For instance, Portland cement is produced through the thermal activation of a mixture comprising limestone, clay, or other materials with similar bulk composition and sufficient reactivity, typically at a temperature around 1450°C.

2.3. Physical separation

Physical separation methods, including filtration and distillation, are predicated on disparities in particle size and boiling points within the mixtures. These techniques leverage observable and quantifiable material properties without altering the materials themselves. The process yields unaltered particles and capitalizes on inherent physical characteristics such as density, particle size, shape, surface attributes, as well as electrical and magnetic properties. Activation via physical separation of particle fractions encompasses various approaches like air classification, flotation, sieving, sorting, clarification, and magnetic separation. This method finds widespread application in mineral processing for beneficiation objectives. Studies have indicated that the behavior of fly ash can be customized through sieving and magnetic separation techniques. For instance, blended Portland cement derived from magnetic and non-magnetic fly ash fractions exhibits distinct characteristics. The advantageous outcomes of

employing separation methods have been documented concerning the utilization of fine fractions of fly ash in the preparation of blended Portland cement.

2.4. Chemical activation

Chemical activation involves the improvement of a material's reactivity by introducing specific additives. In the context of concrete technology, concrete admixtures refer to substances other than hydraulic cement, water, or aggregates that are incorporated just before or during the mixing process (Srinivasan and Sivakumar 2015). These admixtures serve to enhance the characteristics of Portland cement concrete in both its fresh and hardened states. Concrete admixtures can be broadly categorized as chemical or mineral admixtures. Chemical admixtures are typically water-soluble compounds and are introduced in small quantities to regulate various properties of fresh or hardened concrete. Various types of chemical admixtures are available, including accelerators, water reducers, superplasticizers, and retarders.

3. Materials and Method

The initial material utilized in this study was obtained from the western region of Turkey and consisted of tuff samples. As alkaline activators, sodium hydroxide (with a purity of 99%) and sodium silicate ($\text{SiO}_2/\text{Na}_2\text{O}$ ratio of 3.2) were employed.

The tuff sample underwent a 24-hour drying process at 50°C in a laboratory setting and was subsequently ground in a laboratory ball mill for 8 hours. The resulting material underwent particle size distribution analysis using the sieve method to assess its particle size distribution. The raw materials were characterized by X-ray fluorescence (XRF) analysis (Philips PW 2400 instrument).

The tuff samples were carefully weighed and combined, and then sodium hydroxide and sodium silicate were introduced into the mixture using a mechanical stirrer. This stirring process continued until complete homogenization was achieved, which took approximately 5 minutes. Subsequently, the geopolymeric paste was poured into cubic molds and subjected to curing at a temperature of 50°C . After 24 hours, the samples were demolded and left in the laboratory environment until the testing days arrived. The tests conducted adhered to the ASTM standard. While the standard was originally designed for application in cement mortars, the samples used in the compressive strength testing for this study were exclusively molded using the geopolymer

paste, without the inclusion of sand or any other aggregates. Compressive strength tests were carried out using a universal testing machine.

3.1. Thermal Activation

In this study, thermal activation was chosen as the activation method. The initial raw materials underwent a calcination process to enhance their reactivity prior to the geopolymer synthesis. Calcination was performed in an oven at temperatures of 700°C, 800°C, and 900°C, with a gradual increase of 10°C per hour. This was carried out to investigate the impact of calcination temperature on the mechanical properties of natural clinoptilolite-based geopolymers.

4. Results

4.1. Mineralogical Characterization

Table 1 provides the quantitative mineral composition of the tuff sample. It is evident from the table that the primary mineral in the Bigadic sample is clinoptilolite. In terms of phase quantity, the raw material from Bigadic comprises 68% clinoptilolite, 11% quartz, 16% K-feldspar, and 4% calcite minerals.

Table 1. Quantitative XRD (QXRD) analysis results of Bigadiç tuff.

Mineral	Big (%)
Clinoptilolite	70
Quartz	10
K-Feldspar	16
Calcite	4
Sum	100

4.2. Physical and Chemical Characterization

Table 2 provides the chemical analysis results for the initial raw material from Bigadiç, which is utilized in geopolymer production. Upon closer examination of the table, it becomes evident that the Big sample contains sufficiently high levels of SiO₂ and Al₂O₃, which are conducive to geopolymer production. Furthermore, the high CaO content in the Big tuff is favorable for C-S-H formation and consequently contributes to high compressive strength.

Table 2. Chemical compositions and physical properties of Bigadiç tuff.

	Big
Chemical Composition (%)	
SiO ₂	67
Al ₂ O ₃	13
Fe ₂ O ₃	1.5
CaO	6
MgO	1.1
Na ₂ O	0.1
K ₂ O	3.3
MnO	0.3
L.O.I.	7.7
Total	100
Physical Properties	
Specific Gravity	2.14
Fineness (<45µm,%)	86

4.3. Compressive Strength Analysis

The highest compressive strength values for Big, Big-700C, Big-800C, and Big-900C geopolymers at the 7-day are given in Table 3. As evident from the table, the 7-day compressive strength of the non-thermally treated raw material (Big) exhibits the lowest compressive strength. It is a well-established fact in the literature that natural materials generally exhibit lower early strength. However, the compressive strength of B-700C starts to rise, and a similar trend is observed for Big-800 and Big-900C geopolymers. Notably, the Big-900C geopolymer demonstrates the highest compressive strength. The process of calcination is known to enhance the reactivity of natural materials, such as clinoptilolite in Bigadiç tuff. Most likely, calcination alters the crystal structure of clinoptilolite, rendering it more amorphous in nature. Consequently, clinoptilolite can more readily participate in the geopolymeric reaction, resulting in the formation of phases that contribute to higher mechanical strength. This study underscores that the compressive strength can be elevated through the calcination of natural materials.

Table 3. Results of compressive strength analysis.

	7 days (MPa)
Big	0
Big-700°C	23
Big-800°C	29
Big-900°C	33

Conclusions

- In this investigation, an analysis of the starting material and calcined starting material was conducted to explore the temperature's influence on compressive strength.
- The pozzolan-based geopolymer, incorporating calcined at 900°C of clinoptilolite, was cured under ambient conditions, yielding a compressive strength of 33 MPa at the 7-days curing.
- The compressive strength analysis results reveal that clinoptilolite underwent a complete transformation into an amorphous structure during calcination at 900°C, which corresponded to the highest level of mechanical development.
- Based on these findings, it is concluded that while the calcination process proves effective in activating natural materials, there is a need to identify the optimal temperature resulting in an amorphous phase for achieving high compressive strength.
- Furthermore, it was ascertained that the calcination of natural materials facilitates room temperature curing, enabling cast-in-situ applications.

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CLIMATE CHANGE, SUSTAINABLE CITIES AND LANDSCAPE ARCHITECTURE

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Abstract

One of the most important environmental problems of today is climate change. Changes in temperature, precipitation, wind, etc., and other climatic factors, especially as a result of human activities, negatively affect all living things, including humans. Due to climate change occurring on a global scale, species losses occur in biodiversity and extreme weather events such as excessive rainfall or drought occur. In addition, global climate change also has negative effects on human health. In recent years, scientists have made many observations and research on the subject and tried to offer new methods and solution suggestions. One of the professional disciplines dealing with the subject is landscape architecture. Landscape architecture, in short, is a professional discipline that works on the planning, design, management and protection of the natural and built environment by using ecological knowledge. For this reason, it carries out important studies and develops solution suggestions to minimize the effects of climate change. Solution suggestions on the subject include establishing green infrastructure and developing spatial uses in creating sustainable cities. The "Sustainable Cities and Communities" criterion, one of the 17 criteria determined by the UN for the "2030 Sustainable Development Agenda", has set targets to combat climate change. The determined targets also include landscape architecture studies, as they concern both the natural and built environment. In this research, the relationship between the importance of sustainable cities and landscape architecture studies in the fight against climate change was examined. Evaluations were made on sustainable landscape architecture studies in the context of creating sustainable cities.

Keywords: Climate change, sustainability, sustainable city, landscape architecture

İKLİM DEĞİŞİKLİĞİ, SÜRDÜRÜLEBİLİR KENTLER VE PEYZAJ MİMARLIĞI

Özet

Günümüzün en önemli çevresel sorunlarından biri iklim değişikliğidir. Sıcaklık başta olmak üzere yağış, rüzgar vb. diğer iklim faktörlerinde, özellikle insan aktivitelerinin bir sonucu olarak gerçekleşen değişimler, insanlar da dahil olmak üzere tüm canlı yaşamını olumsuz etkilemektedir. Küresel ölçekte meydana gelen iklim değişikliği sebebiyle biyoçeşitlilikte tür kayıpları yaşanmakta, aşırı yağış ya da kuraklık gibi ekstrem hava olayları gerçekleşmektedir. Bunun yanı sıra küresel iklim değişikliğinin insan sağlığı üzerinde de olumsuz etkileri bulunmaktadır. Bilim insanları son yıllarda konuyla ilgili birçok gözlem ve araştırma yapmış, yeni yöntemler ve çözüm önerileri sunmaya çalışmıştır. Konuyla ilgilenen meslek disiplinlerinden biri de peyzaj mimarlığıdır. Peyzaj mimarlığı kısaca, ekolojik bilgiyi de kullanarak, doğal ve yapılı çevrenin planlanması, tasarlanması, yönetimi ve korunması konularında çalışan bir meslek disiplindir. Bu nedenle, iklim değişikliği etkilerinin en aza indirgenmesinde önemli çalışmalar yapmakta ve çözüm önerileri geliştirmektedir. Konuyla ilgili çözüm önerileri arasında yeşil altyapı kurmak ve sürdürülebilir kentlerin oluşturulmasında mekânsal kullanımların geliştirilmesi de bulunmaktadır. BM'nin "2030 Sürdürülebilir Kalkınma Gündemi" için belirlediği 17 kriterden biri olan "Sürdürülebilir Şehirler ve Topluluklar" kriteri, iklim değişikliğiyle mücadele için hedefler belirlemiştir. Belirlenen hedefler, hem doğal ve hem de yapılı çevreyi ilgilendirmesi bakımından, peyzaj mimarlığı çalışmalarını da kapsamaktadır. Bu çalışmada, iklim değişikliğiyle mücadelede sürdürülebilir kentlerin önemi ve peyzaj mimarlığı çalışmaları arasındaki ilişki incelenmiştir. Sürdürülebilir kentlerin oluşturulması bağlamında sürdürülebilir peyzaj mimarlığı çalışmaları üzerinden değerlendirmeler yapılmıştır.

Anahtar kelimeler: İklim değişikliği, sürdürülebilirlik, sürdürülebilir kent, peyzaj mimarlığı

INTRODUCTION

In its broadest sense, climate is a statistical characterization of the numerical values (averages and variations) of weather conditions and atmospheric components observed in a given region over a given period of time. Accordingly, climate change can be defined as a change in the average state and/or variability of the climate that persists for several decades and is statistically significant. A significant increase in the intensity and number of extreme weather events (high temperatures, excessive precipitation) that occur less frequently for long periods in certain regions indicates the effects of climate change (Sayman and Tuğaç, 2023).

Although climate change is a situation that has been observed periodically since the existence of the world, the main reasons why it is one of the biggest problems of the century we live in are that it has global characteristics and is caused by human beings.

According to Buckley (2021), addressing climate change politically and countries starting to make efforts on this issue came to the agenda with the United Nations Framework Convention on Climate Change in 1992. The Convention defines climate change as changes in climate caused directly or indirectly by human activities that disrupt the composition of the Earth's atmosphere, as well as natural climate variations observed over comparable time periods. The issue has gained even more importance with the Kyoto Protocol signed in 1997 and the Paris Climate Agreement signed in 2015. After that, developments continued and many agreements and contracts were made in local, regional, national and international areas.

One of the frequently mentioned issues in the fight against climate change is sustainable cities. In the UN 2030 Sustainable Development Agenda, it draws attention to the fact that cities should provide equal, safe and fair opportunities to all people living in that city. 17 criteria have been determined for the agenda, of which the 11th goal mentions sustainable cities. Another striking aspect of the agenda is that it includes a climate action plan in all targets (UN, 2021). Sustainability is briefly defined as ensuring the continuity of productivity for many years under optimal conditions (Atıl, Gülgün and Yörük, 2005). According to another definition, sustainability is the ability to transfer all kinds of relationships and interactions between nature and society, by taking into account the rights of future generations, to the future by ensuring the continuity of ecosystems and by providing life support and protection to each element that creates these relationships and interactions (Altuntaş, 2012).

A sustainable city is defined as a city that prevents the irreversible destruction of natural values as a result of use above their carrying capacity and adopts a development style that meets the needs of future generations as well as current ones (Bayram, 2001). Sustainable cities are cities

that promote an environmentally, socially and economically balanced and sustainable lifestyle. These cities adopt strategies such as energy efficiency, green infrastructure, sustainable transportation, waste management and effective use of water resources. Sustainable cities can also play an important role in combating climate change, reducing carbon emissions, protecting ecosystems and improving people's quality of life. At this point, one of the professional disciplines that undertakes important tasks is landscape architecture.

Landscape architect is defined as a qualified person who works on the planning, arrangement, protection, development and management of nature and the environment in accordance with economic, functional, ecological and aesthetic measures in order to best meet human needs (PMO, 2023). In broader terms, landscape architecture is a professional discipline that combines scientific and artistic principles and follows an interdisciplinary and holistic approach in order to protect natural areas and biodiversity, sustainable use of natural resources, and plan and design healthier and livable spaces for people (IFLA, 2023). Regarding climate change and sustainable cities, landscape architecture plays an important role. Landscape strategies such as the creation of green infrastructure, water management, biophilic design and protection of natural areas can offer effective solutions to combat the effects of climate change. Landscape architecture improves the quality of life by increasing people's interaction with the natural environment in urban areas. Therefore, landscape architects have an important role in creating sustainable cities. Landscape Institute (2008) has identified urban landscape planning and design tools that are resilient to climate change (Table 1). These tools are also used in creating sustainable cities.

Table 1. Urban landscape planning and design tools resilient to climate change (Landscape Institute, 2008)

The purpose of resilient landscape planning	Scale	Landscape planning and design tool	Contribution to the fight against climate change
Mitigating and adapting to the effects of climate change	Local	<ul style="list-style-type: none"> - Open and green areas - Green roofs and green walls - Linear green areas - Use of plant species resistant to climate change - Use of local and recyclable building materials - Use of renewable energy sources - Protection of cemeteries and groves - Promotion of water harvesting 	<ul style="list-style-type: none"> - Improving air quality - Reducing the heat island effect - Reducing floods and runoff - Creating habitats for living things - Supporting connectivity between living things' habitats - Protecting biodiversity
	Urban	<ul style="list-style-type: none"> - Establishment of city parks - Protecting existing green corridors and creating new corridors - Protection of forests, lakes and streams 	<ul style="list-style-type: none"> - Reducing erosion
	Regional	<ul style="list-style-type: none"> - Establishment of regional parks - Protection of rivers and floodplains - Establishment and protection of nature conservation areas 	

SUSTAINABLE APPROACHES IN LANDSCAPE ARCHITECTURE

Green Infrastructure

Green infrastructure refers to networks of natural and semi-natural spaces, features and spaces in terrestrial, freshwater, coastal and marine areas, as well as in rural and urban areas. It can be strengthened through strategic and coordinated initiatives that focus on monitoring, repairing, improving and connecting existing spaces and features, as well as creating new uses and features (Danijaji and Ariffin, 2017). Benedict and McMahon (2002) defined green infrastructure as a network of wildlife habitat, open space, woodlands, parks and other nature areas that sustain clean water, air and natural resources and improve the quality of life.

Green infrastructure is based on the principle of protecting nature as well as integrating the benefits people derive from nature into spatial planning and regional development. At the same time, green infrastructure contributes to increasing the resilience of cities in the fight against climate change, thanks to nature-based solutions (European Commission, 2013; Deveci, 2023).

According to Eyl, Daniels and Pitman, (2015), green infrastructure is a network of green areas and water systems that generally provide environmental, social and economic services in urban areas. Thus, it also includes the blue infrastructure. This living network increases the resilience of urban areas to cope with current and future challenges such as climate change, energy and food security, water shortage, loss of health and biodiversity, etc. With the rapid development of cities around the world, the concept of green infrastructure is becoming increasingly important (Deveci, 2023). Ramyar et al (2021) determined the goals of green infrastructure planning as in Table 2.

Table 2. Goals of green infrastructure planning (Ramyar, 2021)

Ecological	Biotic	Wildlife and vegetation	Biodiversity control, habitat creation, species movement routes and corridors, maintenance of life cycles of migratory species, biomass production, maintenance of genetic diversity, etc.
		Abiotic	Land/Surfaces
		Water	Water management includes urban sustainable drainage, preventing flood storage, managing or eliminating irrigation requirements, recharge groundwater, creating comfortable microclimates, etc.
		Soil / Land	Biodiversity, soil fertility, soil erosion, soil formation
		Weather	Air pollution removal, dust control, carbon sequestration etc.
		Climate	Local climate control, wind control, thermal comfort, humidity control, etc.
Socio-economic	Cultural	Cultur	Opportunities for education and social interaction, environmental aesthetics, tourism opportunities, spiritual experience, cultur, inspiration for art and design, etc.
		Economi	Tourism has a positive impact on land and property, income and expenditure, employment, production of raw materials, etc.
		Society	Social capital, place attachment, identity, territorial defense, social empowerment, social education, sense of place and nature, recreation, etc.
		Health	Cleaner air, well-being, thermal comfort, medical resources, water supply, climate regulation, extreme events mitigation, waste treatment, water purification, extreme events mitigation, food provision, etc.

According to the European Environment Agency (EEA, 2011), green infrastructure elements at different scales are given in Table 3.

Table 3. Green infrastructure elements at different scales (EEA, 2011)

At local, neighborhood and village scale	At town, district and city scale	City-region, regional and national scale
<ul style="list-style-type: none"> • Street trees, verges and fences • Green roofs and walls • Pocket parks • Private gardens • Urban plazas • Green areas and common areas of the town and village • Local rights of way • Pedestrian and bicycle paths • Cemeteries, graveyards and churchyards • Public spaces • Ponds and streams • Small forest areas • Playgrounds • Local nature reserves • School grounds • Sports fields • Ditches • Lands for rent • Vacant and abandoned lands 	<ul style="list-style-type: none"> • Business areas • City/regional parks • City canals • Urban common areas • Forest parks • Country parks • Continuous shores • Municipal plazas • Lakes • Large entertainment spaces • Rivers and floodplains • Industrial lands • Community woodlands • (Old) mines • Agricultural lands • Storage areas 	<ul style="list-style-type: none"> • Regional parks • Rivers and floodplains • Coastlines • Strategic and long-distance tracks • Forests, woodlands and community forests • Ponds • Road and railway networks • Identified green belt and strategic gaps • Agricultural lands • National parks • National, regional or local landscapes • Channels • Common lands • Open rural areas

In achieving the goals specified in Table 2, landscape architects both ensure green area connectivity and help positive progress in the fight against climate change, with the planning and designs they make in both urban and rural areas specified in Table 3.

Biophilic Designs

The word biophilia emerged by combining the words bio and philia (Abdollah and Oktay 2019; Aktaş, 2022). While the word bio means life, life and being alive, the word philia means the positive feelings felt in natural environments. The term biophilia was first used by Erich Fromm in 1964 (Kayıhan et al., 2018; Aktaş, 2022).

According to Kellert (2014), the word biophilia is 'increasing human welfare in the context of the relationship between culture and nature by adopting and incorporating the sustainable natural structure of the world into the design and construction of the built environment

(Demirbaş and Demirbaş 2019). In biophilic design, the design approach is shaped by considering the fact that people feel better in environments where trees, flowers, water, birds, sunlight and natural processes occur (Kaya 2019; Aktaş, 2022). The concepts of biophilic design and biophilic urbanism are very important in terms of the negative consequences of climate change, which have become the biggest problems of today, and the threats arising from population growth (Acar and Acar 2020; Aktaş, 2022).

Wilson and Kellert included their thoughts on biophilia in their work titled 'Building For Life' in 2005, and as a result, the concept of biophilia was transferred to architecture as "Biophilic Design". The concept of biophilic design was first included in this book, and then in 2008, they compiled the book called 'Biophilic Design' with the help of articles (Abdollahi and Oktay 2019).

As a result of these studies, the concept of biophilic design can be defined as re-establishing the human-nature relationship and maintaining this relationship by introducing natural elements into the built environment. The common point that those who include the concept of biophilic design in their studies emphasize is the feeling of closeness people feel to nature and the positive feelings it creates on people (Abdollahi and Oktay 2020). Although this concept, which has come to the fore as life-friendly architecture or biophilic design, may seem new, it has existed with different concepts since the existence of human beings.

Nature continues to be a source of inspiration for many artists in recent times, as it did in ancient times. The Hotel Tassel Building, built by Victor Horta in Belgium, is one of the strongest examples of the period designed with inspiration from nature. Falling Water house and Johnson Wax Building, designed by Frank Lloyd Wright, are considered past examples of life-friendly design (Brovning et al. 2014; Kaya 2019). It is known that plant and animal motifs have long been used as decorative decorations in historical buildings and spaces. Although it appears differently in each period, the fact that the themes originate from nature shows that the concept of biophilic design dates back to ancient times. It supports the idea that modern man's relationship with nature is of vital importance in order to maintain a healthy existence (Brovning et al. 2014; Kaya 2019). In biophilic design, the design approach is shaped by considering the fact that people feel better in environments where trees, flowers, water, birds, sunlight and natural processes occur (Kaya 2019). Kellert (2016) states that people's need for nature can be achieved with biophilic design and biophilic urbanism approaches (Acar and Acar 2019). The concept of biophilic design has begun to come to the fore in designs made in the 21st century. It stands out that internationally accepted architectural application projects are designed in line

with biophilic design principles. In particular, the works of large companies such as Woha, Linstudio, Mvrdv, and Asian and Singaporean application examples are at the top (Acar and Acar 2019).

The concepts of biophilic design and biophilic urbanism are very important in terms of the negative consequences of climate change, which have become the biggest problems of today, and the threats arising from population growth (Sbenrc 2012; Acar and Acar 2020). Life-friendly design applications make significant contributions to urban ecology as well as human health. It is seen that it provides ecosystem services such as increases in air quality and water quality, decreases in CO² rates, and quality in food production (Russo and Cirella 2017; Acar and Acar 2020).

THE ROLE OF LANDSCAPE ARCHITECTURE IN COMBATING CLIMATE CHANGE

Landscape architecture plays an important role in combating climate change. The professional discipline of landscape architecture includes the process of planning, designing, creating and maintaining natural and man-made landscapes.

Landscape architects contribute to the protection and restoration of natural ecosystems through green infrastructure projects. Green infrastructure is a network of natural areas, parks, forests, water resources and biodiversity in cities. Such projects help reduce carbon emissions, improve the water cycle and stabilize the local climate. In addition, the landscape architecture profession plays an active role in realizing an effective strategy for water and energy saving.

Landscape architects create green areas in cities that reduce carbon emissions. In addition, energy efficiency and sustainability principles are taken into consideration in the design of green building and landscape projects implemented in urban areas.

This professional discipline, which develops design strategies to adapt to the effects of climate change, also carries out some repair and engineering works such as planning water collection and storage areas to reduce the risk of floods, selecting surface materials to reduce urban heat islands, and using natural landscapes to prevent erosion.

Landscape architects have an important role in raising awareness about climate change and providing training on this subject. They also encourage society to embrace and apply sustainable design principles. For these reasons, landscape architects offer a multifaceted approach to combating climate change and contribute to the creation of a sustainable environment.

CONCLUSION

Today, cities are in a constant state of change and transformation in order to protect the lives of the living creatures they contain and to ensure their survival. However, industrialization, technology, resource consumption caused by the increasing population in cities and the environmental problems caused by this consumption increasingly threaten the lives of all living things, especially human beings.

Minimizing the effects of climate change and reducing greenhouse gas emissions by minimizing human-induced consumption habits are one of the main goals of sustainable urbanization. Ensuring the sustainability of cities against climate change can be achieved by implementing urban adaptation and mitigation together and disseminating them throughout the world. Because it is not possible to eliminate the climatic problems caused by the ever-increasing population by only reducing greenhouse gas emissions in certain parts of the world. As a result, green infrastructure applications and biophilic designs are effective tools of landscape architecture in combating climate change. Green infrastructure projects promote environmental sustainability, while biophilic designs strengthen people's connection to nature and improve quality of life. Therefore, by using these strategies, landscape architecture plays an important role in combating climate change and contributes to a sustainable future.

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**GREEN INFRASTRUCTURE AND SUSTAINABILITY IN URBAN
TRANSFORMATION**

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Abstract

Urban transformation is a process that aims to redevelop cities physically, socially and economically. Green infrastructure and sustainability in urban areas are very important in this transformation process. Green infrastructure is a network of natural and artificial green areas in cities. It includes elements such as parks, gardens, forests, green corridors and water resources. In urban areas, the connection and interaction between the built environment and the natural environment is provided by green infrastructure. In addition to supporting living life, green infrastructure also has very positive effects on human health and psychology. One of the main benefits that urban transformation can provide to cities is improved infrastructure and structures. It offers a very important opportunity for the renewal and strengthening of the infrastructure, especially within the aging tissues of cities. It helps cities become healthier and safer with many improvements, from building reinforcement to renewal of transportation systems. In addition, urban transformation also makes important contributions to urban aesthetics. One of its most important benefits is the support it offers to increase the durability of urban equipment in creating disaster-resistant cities. However, in this process, correct planning must be made, resource management must be carried out in the most accurate way and public participation must be ensured. Urban sustainability is a concept that includes environmental, economic and social elements. Sustainable urban areas include elements such as energy and water efficiency, waste management, use of renewable energy, transportation systems and social inclusion. Urban transformation processes that take these elements into account reduce environmental impacts, help preserve natural resources, promote economic growth and provide a quality of life that covers all segments of society. In this study, the importance of green infrastructure in terms of urban transformation and sustainability in the urban transformation process was evaluated.

Keywords: Urban transformation, sustainability, green infrastructure, landscape architecture

KENTSEL DÖNÜŞÜMDE YEŞİL ALTYAPI VE SÜRDÜRÜLEBİLİRLİK

Özet

Kentsel dönüşüm, kentleri fiziksel, sosyal ve ekonomik olarak yeniden geliştirmeyi amaçlayan bir süreçtir. Kentsel alanlarda yeşil altyapı ve sürdürülebilirlik bu dönüşüm sürecinde çok önemlidir. Yeşil altyapı, kentlerdeki doğal ve yapay yeşil alanlar ağıdır. Parklar, bahçeler, ormanlar, yeşil koridorlar ve su kaynakları gibi unsurları içermektedir. Kentsel alanlarda yapı ile doğal çevre arasındaki bağlantı ve etkileşim yeşil altyapı ile sağlanmaktadır. Canlı yaşamını desteklemesinin yanı sıra, yeşil altyapının insan sağlığı ve psikolojisi üzerine de çok olumlu etkileri bulunmaktadır. Kentsel dönüşümün kentlere sağlayabileceği temel faydaların başında iyileştirilmiş altyapı ve yapılar gelmektedir. Kentlerin eskiyen dokuları içerisinde özellikle altyapının yenilenmesi ve güçlendirilmesi için çok önemli bir fırsat sunmaktadır. Bina güçlendirmeden ulaşım sistemlerinin yenilenmesine kadar birçok iyileştirmelerle, kentlerin daha sağlıklı ve güvenli olmaları konusunda fayda sağlamaktadır. Bunun yanı sıra kentsel dönüşümün kent estetiği konusunda da önemli katkıları bulunmaktadır. En önemli faydalarından bir tanesi ise afet dirençli şehirlerin oluşturulmasında kent donanımlarının dayanıklılığının artırılmasına sunduğu destektir. Fakat bu süreçte mutlaka doğru planlamalar yapılmalı, kaynak yönetimi en doğru şekilde gerçekleştirilmeli ve mutlaka halkın katılımı sağlanmalıdır. Kentsel sürdürülebilirlik ise çevresel, ekonomik ve sosyal unsurları içeren bir kavramdır. Sürdürülebilir kentsel alanlar, enerji ve su verimliliği, atık yönetimi, yenilenebilir enerji kullanımı, ulaşım sistemleri ve sosyal katılım gibi unsurları içermektedir. Bu unsurları dikkate alan kentsel dönüşüm süreçleri çevresel etkileri azaltmakta, doğal kaynakları korunmasına yardımcı olmakta, ekonomik büyümeyi teşvik etmekte ve toplumun tüm kesimlerini kapsayan bir yaşam kalitesi sağlamaktadır. Bu çalışmada, kentsel dönüşüm ve kentsel dönüşüm sürecinde sürdürülebilirlik açısından yeşil altyapının önemi değerlendirilmiştir.

Anahtar kelimeler: Kentsel dönüşüm, sürdürülebilirlik, yeşil altyapı, peyzaj mimarlığı

INTRODUCTION

As one of the most important steps of human civilization in the historical process, cities have become centers of attraction for people living in rural areas as they are places where industry, trade, economic, social and cultural opportunities are concentrated (Güneş, 2011). For this reason, topics such as city, urbanization, urban life, urbanization have become the research object of many scientific disciplines (Kurşun, 2021).

In its most general definition, the city is the largest settlement unit where division of labor and specialization is high. According to another definition, “it is a settlement unit that is in continuous social development and where the needs of the society such as settlement, shelter, commuting, work, rest and entertainment are met, where very few people engage in agricultural activities, is more densely populated than villages and consists of small neighborhood units” (Big Turkish Dictionary, 2010). City definitions vary according to study areas. Social scientists define the city “as a bundle of relationships that emerge as a result of the mutual interaction of individuals living in the urban area and maintain their vitality”. According to economists, cities are defined “as areas where economic activities differ, where service sectors such as education and health develop with the industrial revolution, and where people live together” (Karaküçük and Gürbüz, 2007). Cities are areas of social organization, and in this respect, being an urbanite also means using organizations (Altuntaş, 2012).

Urban population growth, rapid urbanization and environmental problems have increased the importance of urban transformation. Urban transformation projects aim to increase the quality of life, ensure environmental sustainability and increase social welfare through the restructuring of existing urban areas. Green infrastructure and sustainability issues are extremely important in this regard. Sustainability is the main goal of urban transformation and is a concept that includes economic, environmental and social dimensions. Green infrastructure is an approach that supports sustainability principles.

Many internationally successful urban transformation projects have adopted green infrastructure and sustainability principles. For example, Singapore's “City in a garden” project focuses on increasing urban green spaces and sustainably managing natural resources. Amsterdam's "Circle City" concept is based on waste management and recycling.

There are examples of urban transformation projects and green infrastructure applications in our country. Istanbul İkitelli Urban Forest project aims to protect natural habitats and provide recreation areas for city residents by creating large-scale urban green areas. In Ankara's Eskişehir Road Renewal Project, it was aimed to create a sustainable transportation network by

expanding bicycle paths, pedestrian crossings and green areas. However, there are also some obstacles in urban transformation regarding green infrastructure and sustainability. These obstacles include factors such as lack of financing, difficulties in existing infrastructure and planning processes, and awareness and participation of local stakeholders. Therefore, it is important to define the obstacles correctly and develop solutions against them.

URBAN TRANSFORMATION AND URBAN RENEWAL

Urban transformation is the spatial, social and economic consideration of urban development in order to identify and solve the problems of problematic areas in the city and to make those areas livable. It is the production and implementation of projects that organize the demolition, reconstruction or renovation of existing buildings with the aim of revitalizing and rehabilitating problematic areas. In short, it is the solution of the problems that disrupt the original texture of cities (Demircan, 2010; Yılmaz, 2020).

When the historical process of urban transformation is examined, it is seen that the first social and spatial transformation activities in urban areas began with the "cleaning of squalor areas" in industrial cities in the 19th century. Later, in the 1960s and 1970s, these activities became urban policies, and transformation activities continued through "urban renewal", especially in decrepit and dilapidated areas in city centers. By the 1980s, transformation activities adopted a different and holistic approach called "urban revitalization". In the urban transformations implemented in this period, in addition to the transformation of physical spaces, the spaces were transformed with an approach that included holistic solutions in a way that would solve all social, environmental and economic problems. While dilapidated urban areas were completely demolished and rebuilt with the approach applied in previous years and defined as the "bulldozer" approach, with the "economic renewal" approach adopted in this period, more holistic and comprehensive solutions were introduced to reintroduce the areas that had lost their functions as a result of obsolescence in the city centers to the urban economy. In this period, in the context of some urban strategies developed with the aim of revitalizing the economy on a global scale, high-prestige real estate-oriented projects have come to the fore, especially in western cities, to attract wealthy tourists, specialized qualified workforce, investments and global capital. However, this approach, which focused only on addressing economic concerns, could not be sustained because it moved away from the revitalization approach that was initially thought of, and according to the negative criticism it received, it evolved into a participatory

approach model whose priority is socio-economic and environmental issues since the 2000s (Turgut Yıldız and Enlil, 2010; Yılmaz, 2020).

To summarize the aims of urban transformation works in general (Yılmaz, 2020);

- To stop the physical collapse of cities,
- To protect the existing historical texture and ensure sustainability,
- To improve the quality of life,
- To revitalize economic life and keep it constantly alive,
- To activate urban dynamics by preserving the existing urban texture and cultural structure,
- To establish a direct relationship between social problems and the physical facilities of the city,
- To meet the need for continuous physical change of the elements that make up the texture of the city (Kaya, 2007).

Priority areas within the scope of urban transformation and renewal can be listed as follows (Kaya, 2007):

- Slum areas
- Illegal construction areas with high building density
- Areas with high risk of natural disasters
- Decrepit and dilapidated areas in city centers
- Areas with historical urban texture
- Urban areas that have completed their economic life

According to Tekeli (2003), there are some resistance mechanisms that urban transformation plans face. These can be listed under several headings as follows.

- The technical life of the buildings built in the city is long. Since the transformation of these structures will bring a significant amount of cost, the return to be obtained as a result of the transformation must significantly exceed this cost.
- Losses caused by conversions may not be limited only to the cost of the buildings. There may also be losses in the "externalities" created in the city.
- Another resistance effect is that the structures carried architectural values, becoming symbols and creating signs. The importance of preserving such old and historical heritage buildings in improving people's quality of life is understood better every day.
- In this case, some historical information etc. in the city. "Institutionalizations" that will ensure the protection of valuable buildings and residential areas are developing. These institutional structures create a stopping and delaying effect against the pressures for transformation.

- Another type of resistance arises due to "fragmented ownership" on both land and real estate. Due to both the market mechanism and inheritance laws, property tends to constantly fragment. However, in order for the transformation to take place, these properties must either be reintegrated or a consensus must be reached among the property owners regarding the transformation to be carried out.
- Another important reason is that "development rights" in the urban space are "limited" in line with certain plans and rules. This limitation may limit the realization of the potential for change that has occurred at a certain point in the city due to changes in the form of the city (Demircan, 2010).

URBAN TRANSFORMATION AND SUSTAINABILITY

As a result of environmental problems, which were initially regional, gradually reaching global scales, in the 21st century, we were faced with rapid depletion of limited natural resources, hunger, environmental pollution, loss of plant and animal species, climatic changes, increasing natural disasters and energy shortage problems. The point reached has brought to the agenda the concepts of "ecology and sustainability", which are based on the necessity of protecting the right to life of the planet and future generations, increasing the quality of life, preventing pollution and turning to renewable energy sources (Kısa Ovalı, 2009; Yılmaz, 2020).

The concept of sustainability means maintaining the current situation or the system having the capacity to renew itself. In the report titled "Our Common Future" published by the United Nations (UN) in 1983, sustainability was defined as leaving a world order that future generations can maintain in terms of social, economic and ecological conditions. According to this report, sustainability is defined as using our daily needs today without endangering the future and ensuring development for the sustainability of future generations and nature's ability to respond to their own needs (Sustainable Development, 2015). In summary, sustainability means meeting today's economic and social needs without harming nature in order not to endanger the lives of future generations. The concept of sustainability has three accepted dimensions. These are economic, environmental and social dimensions. All these processes are intertwined and related to each other. The sustainability of each of them fully affects the sustainability of the whole. In addition, different researchers accept culture as the fourth dimension of sustainability (Yılmaz, 2020).

Sustainable urban transformation is a tool for creating sustainable residential areas with high quality of life, where the increase in value is distributed fairly, without ignoring public interest

and planning principles. In this respect, transformation should address existing urban areas and new development areas within the framework of a holistic approach, be compatible with decisions defined at different scales and plans prepared, take into account natural thresholds and be compatible, include the components of sustainability, identify possible environmental and social impacts and take measures to minimize them. In sustainable urban transformation, it is important to monitor, measure and evaluate the process, as well as to report it, present it to the public and review it through feedback. In this way, problems or disruptions encountered in the process will be prevented (Ulubaş Hamurcu and Aysan Buldurur, 2017).

LANDSCAPE ARCHITECTURE APPLICATIONS IN URBAN SUSTAINABILITY: GREEN INFRASTRUCTURE

The concept of green infrastructure began to be used in the USA in the 2000s. In this definition, ecological and cultural values are considered in a sustainable way, and with this system, both natural and cultural resources are tried to be created by connecting with each other in terms of structure and function (Semiz, 2016). There are various definitions on the concept of green infrastructure. In the report published in Europe in 2013, it was emphasized that for a quality life, clean food, clean water and clean air, as well as suitable recreation areas with a suitable climate and no flood risk, are needed (Turna and Solmaz, 2022).

Green infrastructure applications, which are within the scope of sustainable urban landscape applications, are engineering designs compatible with nature. Yılmaz (2020) summarized the benefits of these applications as follows:

- Reducing the negative impact of surface runoff on ecosystems (floods, deterioration in water quality, high costs)
- Reducing energy and water usage
- Improving air quality
- Increasing the use of local materials
- Providing economic advantages
- Reducing the water and pollutant load (suspended solids, total nitrogen, total phosphorus, heavy metals (Cu, Pb, Zn), oil and grease and pathogenic bacteria) of the rainwater channel system

Green infrastructure systems have various applications for different points. The main ones of these applications are as follows:

- Rain gutters, rainwater storage and use systems (rain barrels, flower pots)

- Bioretention practices (rain gardens, bioretention areas, vegetated ditches)
- Systems to increase permeable surfaces by reducing impermeable surfaces (permeable asphalt, concrete and structural grass-covering)
- Effective landscape design and irrigation systems (xeriform landscaping, local planting)
- Green walls
- Green roofs

Green infrastructure offers many advantages in terms of being ecologically based, practical and applicable, innovative, multidisciplinary and protecting public health. On the other hand, since it falls into the field of interest of many administrative structures during implementation, it also has some difficulties in terms of working in coordination with each of them and the failure of various professional groups to show the same sensitivity to the issue from a multidisciplinary perspective (Kaplan, 2013; Aslan and Yazıcı, 2016; Turna and Solmaz, 2022).

There are many different applications among the components of the green infrastructure system. Green gardens, green roofs and walls, permeable pavements and sustainable agricultural practices, stormwater management and wetlands are some examples of green infrastructure Works (Özmen, 2020; Turna and Solmaz, 2022). Figure 1 shows the types of Green infrastructure.

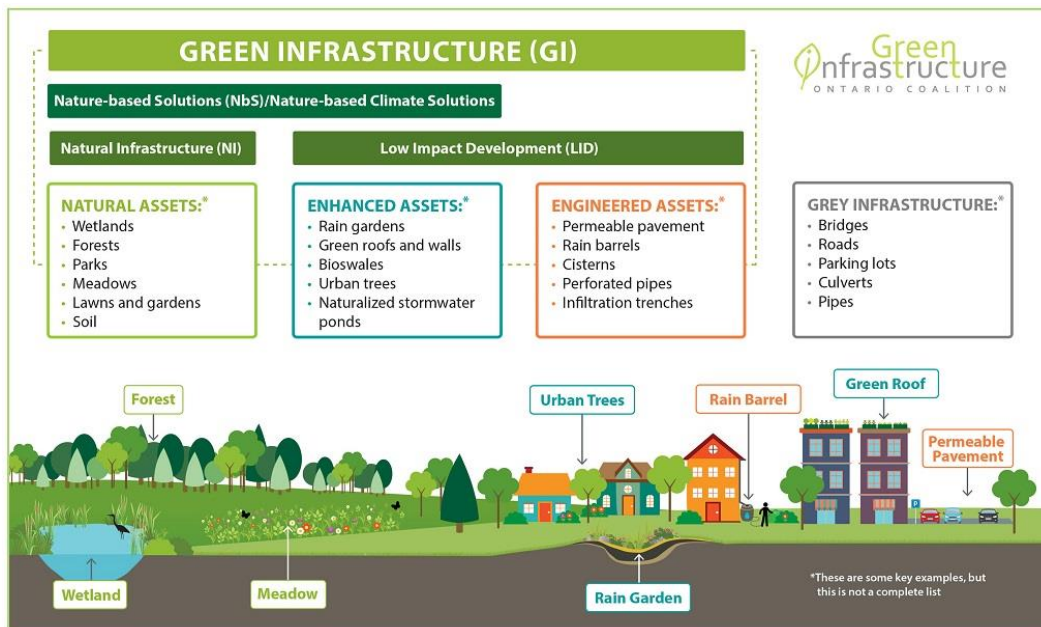


Figure 1. Types of green infrastructure (Anonymous, 2021)

CONCLUSION

The problem of global climate change, which has been one of the most busy issues on the world agenda in recent years, negatively affects the health and quality of life of humans and other

living creatures with the "urban heat island" effect on a local scale in cities, and also causes many problems by increasing energy consumption. Urban areas are several degrees warmer than rural areas or less densely populated areas due to building density and impervious surface roads, parking lots, and rooftops. Another important agenda in urban areas is ensuring a healthy and sustainable life. In order to solve these problems caused by unplanned and rapid urbanization, strategies should be developed and action plans should be prepared, starting from the local scale to the regional and national scale. To reduce the negative effects of climate change, it is not enough to take precautions only on resources (such as reducing greenhouse gas emissions). In addition, green area planning, design and management strategies should be developed (Yılmaz, 2020).

Despite the increasing environmental problems in rapidly changing and developing cities, traditional solutions have become insufficient and these solutions have begun to harm the environment. Today, methods provided with the help of nature have begun to be used. The search for solutions produced through green infrastructure systems, which has led to the emergence of the need to replace traditional methods with natural methods, is among the most frequently used methods in the world's cities. While many cities renewed with green infrastructure systems and new residential areas created with green infrastructure content are rapidly increasing, it is important to reach cities with ecological sensitivity where sustainability is targeted (Semiz, 2016).

Green infrastructure systems create important opportunities for the future and sustainability of cities. Green infrastructure systems respond to problems such as floods, floods, heat island effects, concreting and pollution in cities with positive results by creating aesthetically high-quality spaces and landscapes (Semiz, 2016).

In order to implement the plans and ensure sustainability by incorporating new technologies appropriately in line with the needs of the age, in short, transformation and renewal practices may be required from time to time for the protection and sustainability of cities. In recent years, transformation and renewal practices have been carried out in many cities in our country. Preservation and sustainability of the city's identity is very important in urban transformation and urban renewal practices. In this context, the issue of urban landscape and its improvement and protection as an important component of urban identity is also very important. For this reason, many different studies and research are carried out and necessary precautions are taken. As a result of the research and studies conducted, the importance and necessity of green infrastructures for creating livable, healthy and planned cities, improving and protecting the

existing urban texture, urban sustainability and improving the urban landscape have been clearly understood by designers and planners (Yılmaz, 2020).

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ECOLOGICAL APPROACHES OF WEED MANAGEMENT

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Abstract

It is critical to comprehend weeds in agriculture and learn effective, efficient, and ecological ways to manage them in order to stop weeds from causing financial losses. Commonly employed management solutions include mechanical, chemical, and cultural control techniques. The most popular approach is the use of herbicides since it is practical and affordable. However, overuse and ignorance of herbicides lead to interruptions in sustainable agricultural output as well as the slow development of weeds resistant to herbicides. Better solutions to limit or eliminate the usage of herbicides are being looked for as a result of these concerns. The goal of the ecological approach to weed management is to first comprehend the biology and behavior of problematic weeds, and then to create a comprehensive set of control techniques that take advantage of their vulnerabilities. Finding out the present state of weeds and the most effective techniques to manage them is crucial. A starting approach would be to become familiar with the general traits, biology, behavior, and traits that influence the most effective ways to manage weed populations. Then, it is necessary to understand the advantages and disadvantages of the most popular physical techniques, cultivation instruments, and cultural management strategies. Understanding the ecology, identification, and management of the most prevalent and challenging-to-control weed species found in agricultural areas is essential. Managing weeds ecologically requires more knowledge than it does resources. It does not have to be labor-intensive even though it is labor-based. By choosing the appropriate strategy for each weed at the appropriate time and using an ecological approach to weed management, crop output and quality can be maintained while lowering the danger to the environment and public health.

Keywords: Weeds, Weed management, Ecological control, Manage weeds, Integrated

Introduction

Ecological weed management starts with careful design of the cropping system to reduce weed issues, and tries to leverage biological and ecological processes in the field and throughout the farm ecosystem to give crops the edge against weeds. Ecological weed control comprises of many-component techniques adapted to each location, cropping system, and farm. The idea of Ecological Weed Management largely includes the employment of methods and techniques that replace the customary use of herbicides and chemicals to deal with the issue of weeds in the agricultural areas. An ideal system is not just a single method but a combination of several methods that generally starts with selecting the crop rotation for the land and goes on to use ecological and biological processes and materials to leverage the growth and development of crops and stunt the germination, dispersal, and growth of weeds. The particular procedures in weed science should be suited to necessity and in a manner that all of them function together to create a sustainable weed control system.

ECOLOGICAL WEED MANAGEMENT METHODS

Ecological Weed Management (EWM) is a sustainable strategy to weed management that focuses on understanding the ecology of weeds and utilizing this information to design agricultural systems that impede weed establishment and growth (Bastiaans et al., 2008). Before opting for ecological weed control, it is vital to first know weed management. So, what is weed management? Let's study it. Weed management refers to the systematic method and procedures used to limit the development and spread of weeds (Harker & O'Donovan, 2013). Weeds, in this sense, are often plants that grow where they are not needed, frequently competing with cultivated plants for resources such as space, light, water, and nutrients (Mennan et al., 2020). It is vital in agricultural contexts, where unregulated weed growth may severely damage crop harvests and farming productivity. It is also significant in other settings like gardens, lawns, and other controlled landscapes, as well as in wild situations where invasive plant species may damage ecosystems. There are a number of approaches used in weed control, including:

- **Cultural control:** These are measures that make the growth environment less favorable for weeds and more beneficial for desirable plants. It involves strategies such as crop rotation, growing cover crops, and altering irrigation or fertilization procedures.
- **Mechanical or physical control:** This might entail manual weeding, mowing, or tillage. The purpose is to physically remove or harm the weeds to inhibit their growth and reproduction.

- Chemical control: This generally entails the spraying of pesticides that kill or impede the development of weeds. Herbicides may be selective (affecting just particular kinds of plants) or non-selective (affecting all plants they come into contact with).
- Biological control: This includes employing natural enemies of the weeds – such as particular insects, animals, or microbes – to assist restrict their development.
- Integrated Weed Management (IWM): This strategy integrates the preceding strategies in a coordinated, sustainable fashion. It requires frequently monitoring weed populations and changing methods depending on the unique circumstances and kinds of weeds present.

After quickly looking at weed management, let's discuss about what ecological weed management is. Ecological weed management may be described as a complex of environment-friendly procedures and practices meant to avoid, minimize or eradicate weeds from agricultural fields or gardens. The weed control methods are based on ecological or biological processes and materials that do no harm to the environment, unlike the harmful chemicals and herbicides that heavily deteriorate the soil and environment of not only the agro-ecology but also have an adverse impact on the whole environment through processes like leaching and diseases (Liebman et al., 2001). This strategy emphasizes that the aim is not necessary to entirely eliminate weeds, but rather to reduce weed populations below a level where they substantially impair crop output. It employs measures that limit the possibility of weed issues emerging in the first place and supports the development and health of desirable crops to outcompete weeds. Techniques such creating crop rotation, mulching, cover crops, water management, sanitation, fertility, tillage, etc. offer no danger to the environment, but may also effectively reduce all forms of weeds. The effectiveness of these cost-friendly and easily adaptable solutions to weed-management or organic agriculture and farming, in general, can be largely enhanced by obtaining technical expertise from agriculture platforms like Ministry of Agriculture and Forestry database which gives an integrated and easily-accessible approach to EWM. Durable gains in weed control are based on:

- Understanding ecological concepts and processes.
- Learning the life cycle, and features of troublesome weed species.
- Carefully examining and comparing managerial possibilities.

Weeds are viewed as a possible pest causing loss in yields of the crops (Pala, 2019). From the day when human beings settled down and began to engage in agriculture until the industrial revolution, manual weed management (hand picking, cutting, hoeing) is highly popular and

effective. But today, in an industrialized and technological world, labor has become scant and pricey, owing to intensification, diversification of agriculture, and urbanization. The utilization of herbicides across the globe is rising due to probable advantages to farmers. At the same time, the continued use of the same set of herbicides over a period of time on the same piece of land leads to an ecological imbalance in terms of weed shift, herbicide resistance in weeds, and various sorts of pollution. Therefore, ecological approaches are crucial in agriculture. Ecological techniques need to be developed and disseminated in the control of weeds that create considerable economic losses in agricultural productivity (Lemessa & Wakjira, 2015).

Herbicide spraying may also kill microorganism species of bacteria, fungus, and protozoa that battle disease-causing microorganisms, so disturbing the balance of pathogens and helpful organisms and enabling the opportunist, disease-causing organisms to become a problem (Kalia & Gosal, 2011). The intricacy of these scenarios has resulted in a necessity to design a comprehensive, sustainable eco-friendly weed-management program throughout the full agricultural time. With relation to the environment, ideal sustainable agriculture should neither contaminate the ecosystem nor be reliant on non-renewable inputs or damage renewable ones. Rather, it should nourish people with healthy food, and valuable feedstocks and deliver a pleasant and constant return on successful investment in agricultural operations. Sustainable & ecological weed management is the application of weed control strategies that are socially acceptable, ecologically benign, and cost-effective.

Sustainable weed management has the following objectives:

- To efficiently employ the resources that are on hand might be used for managing weeds.
- To offer cultivation methods that not only deal with weeds but also work for the soil and to quantify the effect of weed-management systems.
- To bring forth a shift wherein the chemical herbicides are replaced by renewable energy and recyclable mineral resources.
- To guarantee that the farm workers, farm animals, and everyone associated to the farm or adjacent regions do not suffer in terms of health.
- To maintain and develop the ecology and nature.
- To make agricultural activities economically possible.
- To offer appropriate monetary advantages to the farmer to enable for regular production and support the well-being of the community
- To create enough high-quality and healthy food.

- To improve on existing weed control technology, knowledge, and skills in ways that fit local circumstances and capabilities.

Sanitation

Sanitation as a strategy to naturally avoid, eliminate or eradicate weeds from our fields is too frequently disregarded (Case et al., 2005). To avoid the weeds from ever entering into the fields, the crop seeds used should be thoroughly screened, and only high-quality seeds must be used without any contaminants in the form of weed seeds (Cloyd & Herrick, 2022). Furthermore, the equipment and equipment's employed inside the field should also be cleansed and got rid of any prospective weed seeds. Also, the fertilizers and especially the organic manures utilized should be adequately degraded and not include any potential weeds. To decrease and eradicate the weeds from your field, sanitation operations weeding by hand may play a key role, particularly in the early phases.

Scouting

Scouting has been one of the most dependable techniques of getting information on the breadth and degree of weed infestation in your land (Swinton, 2005). Generally, it comprises the systematic gathering of data on the kind, distribution, and stage of crops in your field but in the case of ecological weed management, the data on weeds are collected to build a strategy to successfully deal with them (Hall et al., 2017). Ministry of Agriculture and Forestry, agricultural control technical instructions and plant protection products database enables you discover weeds and insects along with other pressures in your field like fungus, pests, bacteria, virus etc. at an early stage with the use of smart scouting instruments. With the aid of the instructions and database scouting function, you can automate, plan, execute and report on the scouting simply and efficiently. It should be mentioned that the database is dedicated to pesticides.

Crop Rotation

Crop rotation is regarded one of the most critical aspects of any ecological weed control (Bastiaans et al., 2008). Crop rotation, as the title indicates involves rotating multiple crops on the same area throughout time in a planned way (MacLaren et al., 2021). The basic rationale for utilizing crop rotation as one of the principal ways of ecological weed control is that weeds grow when the circumstances do not change for a long period (Sharma et al., 2021). If the same sort of crop is planted in your region by following the monoculture strategy, weeds will have no resistance whatsoever in adjusting to the same circumstances throughout the years. Therefore, the introduction of various crop species or even a fallow time in between to form a

crop rotation will keep the weeds guessing about what is coming next and they will die off before they can find out how to develop and reproduce in the new environment (Tariq et al., 2019). This is a successful approach of not only controlling and managing the weeds at now, but it will minimize the requirement for future weed management greatly in the long term. However, selecting the ideal crop rotation may be a difficulty as you have to consider the nutrient levels in the soil as a consequence of the cropping pattern as well as the needs of each plant and how it connects to the possible weed species in the region. Optimizing productivity and keeping it all organic to control the weeds successfully demands technological skills and support.

Cover Cropping

If there is one thing that weeds love, then is light. Cover crops are crops that do not allowed light to reach the ground level of the weeds so that they cannot germinate in the first place and if they do, their growths will be inhibited (Mennan et al., 2020). The ideal cover crop should have quick early development and subsequently canopy closure (Oliveira et al., 2019). Some of the cover crops might include buckwheat, cowpea, radish, or forages. Moreover, the cooling effect, which may be regarded a by-product of the shade effect is also extremely significant to decrease weed development on your farms (Gerhards & Schappert, 2020). Cover crops are an important part of the crop rotation cycle and special care and thought are needed while selecting the best cover crop or more preferably, an ideal combination of cover crops for your needs so that it not only ecologically suppresses the weed for you but can also be profitable either by themselves or by promoting your main crops. It should also be mentioned that many cover crops can offer nutrients to the soils and some may even contribute specific compounds in the land that functions as weed-inhibitors later on. "Intercropping", which is a somewhat comparable but distinct application to the cover covering application, may be undertaken. Intercropping is the introduction of a new crop frequently in between rows of the primary crop (Leoni et al., 2022). This is normally done to leave no openings for weeds to grow on your property and has been proved beneficial in many situations. However, if the intercropping species is not selected well, it might compete for light, water, or nutrients with the primary crop and may potentially have a greater damaging impact than the weeds.

Mulching

Mulching operates in a similar fashion to that of cover crops for ecological weed control (Bhaskar et al., 2021). Mulching comprises covering the soil in your field with a single or

numerous layers of mulches which may be either live, organic dead, or inorganic (Mechergui et al., 2021).

Living mulch: Living mulches such as clover are integrated into the field either together with the crop or before/after it helps to reduce weeds although they are often employed primarily for enhancement of the soil's physical characteristics and fertility. If living mulches are applied, they should not be let to compete with vital crops by routinely tilling them (Sportelli et al., 2022).

Organic mulches: Some of the items utilized as organic mulches include straw, bark, sawdust, etc. Newspapers and hays are also typically utilized by constructing many layers. The materials used as organic mulches mostly rely on what kind is found in the farm or the region but in general, they should be biodegradable and should contribute to the fertility of the soil. They work as weed suppressants by substantially restricting the weeds' access to light and moisture (Cabrera-Pérez et al., 2022).

Inorganic mulches: Plastic is an inorganic mulch that is commonly utilized in all places across a broad range of crops and has been produced in such a manner so as to only enable the infrared light to enter into the soil layers to warm it but cannot result in photosynthesis (Khan et al., 2021).

The outcome of this is a high success in weed control. Although these inorganic mulches may not technically qualify as ecological ways of weed control, they are typically preferable than other choices like the usage of toxic pesticides.

Solarization

Solarization is the technique of spreading a transparent plastic sheet over a field, garden bed or grass to heat up the soil below (Waghmode et al., 2023). The objective of solarization is to destroy weeds or grass, however it may have extra advantages of lowering disease populations in the soil.

Cultivation

While tilling the soil disrupts the physical integrity of the soil and makes it prone to soil erosion, the deployment of an appropriate tillage system may assist enormously manage weeds naturally and also by reducing the aforementioned difficulties (Cordeau et al., 2020). In fields that are not tilled at all, it has been observed that the bulk of the weed seed bank is deposited on the uppermost 5 cm layer of the soil.

Tillage system in ecological weed management one of the most efficient applications of tillage in weed control is by applying just mild tillage sometime before crop planting so that weeds

sprout beforehand and may be killed to diminish the seed bank. Tillage also has various implications on the total weed management by affecting the soil moisture and fertility. The presence or lack of tillage in your field primarily impacts the number and vertical distribution of weed seeds in your property.

Crop Variety

It is vital to carefully pick the types of crops so that they can reduce the weeds by keeping a quick cover (Dubey et al., 2023). The ecologies of both the crops and the possible weeds should be thoroughly investigated before picking the crop species that will best match the area and also deliver optimal returns.

Sowing/Planting Norm

Sowing and planting time plays a pivotal role in growth and productivity of a crop. Planting patterns including the sequence and alignments in which the crops are placed may also affect the extent of weed development in the future (Allmendinger et al., 2022). To regulate weed development by planting patterns, the row width must be made narrow and seeding density must be raised.

Nutrition

The germination, reproduction, and growth of weeds are all enhanced by nitrates (Ghosh et al., 2020). We know that the quantity of nitrogen in the soil impacts the species variety and composition in the land. So, we need to regulate this degree of nitrogen fertility in our fields so that it encourages the development of our crops and discourages that of the weeds. One extremely efficient strategy to do so is to employ precise tools such as Ministry of Agriculture and Forestry monitoring database to pinpoint where to concentrate our nitrogen delivery. By completing soil analysis, both the nitrogen demand in the soil and other mineral elements required to enhance the soil and parameters such as pH are assessed. Moreover, a more ecological way of dealing with the problem of weeds is to add nitrogen to the field not by dumping chemical fertilizers at once, but by adding legume plant species with the crops that will release the nitrogen in the soil over time and fulfill the nitrogen needs of the crop while limiting the amount needed for weeds to germinate and grow. Appropriate plant feeding practices should be established according to the soil analysis findings are of major relevance. The main thing to remember while fertilizing is to feed the crop, not the weeds. What it means to feed the crop and not the weeds are that we have to be selective feeders in terms of the nutrients we offer to the agro-ecology. This may be done by concentrating fertilizers near the crops or introducing more ecological solutions like composts and manures to complement the

nutritional demands of the crops. It is necessary to understand the ecological needs of both the crops and the weeds effectively to be able to utilize this method successfully.

Irrigation

If we can effectively control water or moisture in our fields, we can basically manage both weeds and crops effortlessly to match our demands (Kanas et al., 2021). Some of the most beneficial and novel approaches by which you may employ water management for ecological weed control are as follows:

Pre-germination of weeds: Like how light tilling may induce the weeds to sprout somewhat sooner than the planting period so that they can be destroyed by culture, light watering can also have the exact same effect. The irrigation may either be artificial or can be done by careful planning of the crop rotation with the rainfall cycle.

Planting to moisture: This approach generally follows the preceding one. After cultivation for weeds removal, no water is provided to the top layer of the soil so that it gets dry and the layer below it retains moisture. During the planting stage, the seeds are sown to the moisture-containing layer and thus the top layers stay dry and weeds cannot develop owing to the lack of water.

Buried drip irrigation: Drip irrigation may concentrate the water availability just to a limited location for the plant and it can considerably minimize weed germination. However, an even more successful but difficult approach is termed buried deep irrigation in which water in the form of drip is given beneath the soil layer straight to the subterranean roots of the plants so that weeds on the surface have no ways of accessing water for germination.

Allelopathy

Many plants have the potential to impact, either favorably or adversely their surrounding plants by producing biochemicals termed allelochemicals via many sections (Farooq et al., 2020). How to utilize agricultural drones in precision agriculture? Some of the crop kinds that display allelopathic tendencies include buckwheat, oats, barley, rye, wheat, etc. Allelopathy if utilized for weed management is one of the most ecological techniques of controlling weeds. For it to occur, crops need display allelopathic detrimental effects on weeds. For example, buckwheat has been reported to decrease and destroy weed populations.

Bio-control

Fungi, bacteria, parasites, insects, etc. all offer tremendous potentials to be employed as organisms for weed control provided sufficient study and testing are undertaken to assure their efficacy and survivability (Scavo and Mauromicale, 2020). Bird species like geese and chickens

and various herding animals are a fantastic technique of controlling and disposing of weeds in integrated farmland that blends livestock with cultivation. Even fish species have been employed to control algae and hydrilla weeds in aquacultures and aquaponics.

CONCLUSION

For a long time, the hunt of effective agricultural weed control technology and strategies was defined as ‘the war on weeds’. We built more severe mechanical and chemical weapons to clear our fields of unwanted vegetation, striving for a vision of pure crops from horizon to horizon. These days, we are progressively recognizing that war is not a good viewpoint on weed control. Sure, no one likes a field full of weeds, but not all weeds are terrible, and often the activities we take to get rid of them do more damage than good. That’s damaging to both our agriculture and to our surrounding ecosystem. Furthermore, weeds are proving to be irrepressible opponents; if they don’t like what is thrown at them, they swiftly adapt, or a more tolerant species slips in from the sidelines. Making peace with the weeds will cost us less in the long run than attempting to remove weeds from the fields. The advantages of learning to live with weeds are highlighted by several recent research indicating that agricultural yield loss lowers as weed variety grows, and that preserving some weed cover helps sustain beneficial insects as well as farming birds.

Managing weeds for net benefits rather than costs needs a knowledge of why various quantities and varieties of weeds arise in different regions, and what can be done to impact that. Current weed research is starting to address this issue via examining the ecological interactions between weeds and their environment (disturbance and nutrients) and other creatures (crops, animals, and wildlife). Implementing each concept of ecological weed control should be done using the tactics and equipment best relevant to everyone’s unique agricultural system. They can suit conventional, organic or no-till systems, arable or perennial crops or animals – however how you do it may be quite different in each system. An important aspect this chapter is that they should not be additional labor done only for the sake of weeds. All might also be advised for controlling diseases and insect pests, contributing to soil health, enhancing resource use efficiency and improving yield stability. Think of weeds as a reminder to manage the farm in a resilient, sustainable way. Weeds keep us in check as we keep them in check; the more monocultures we cultivate, the more fertilizers we apply, the more we disrupt the soil, and the more chemical tricks we employ, the more weeds get out of hand in the long run. If we limit these items to the absolute minimum that we need to sustain crop or animal development, then weeds will progressively become more controllable, and potentially even useful.

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WEED MANAGEMENT TACTICS IN CONSERVATION AGRICULTURE

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Abstract

In agricultural areas, weeds—also known as "undesirable plants"—compete with cultivated plants, lower output, and quality, and result in large financial losses. Weeds can be controlled by using the proper chemical, biological, mechanical, and preventive (cultural) control strategies. Weed-free sites should be chosen for agricultural production as cultural processes, or appropriate measures should be taken to prevent weed contamination with seeds, irrigation, fertilizer, animals, and agricultural equipment. To avoid future seasons of increased expenses and more extensive management, it is crucial to stop the introduction and spread of new weed species. Cultural weed control techniques, such as crop rotations, cover crops, and strategies that boost a crop's competitive edge, are crucial to successful weed management in places where weeds are an issue. Hand-picking, hoeing, tillage, brushing, cutting, mowing, mulching, immersion, animal intervention, laser, electrical, and robotic applications are examples of physical approaches. Herbicides are one of the most effective methods for controlling weeds when tillage is drastically decreased or abolished, but because of the problem of herbicide resistance and the potential hazards to human and environmental health, they must be used in concert with suitable cultural practices. It is essential to create a strategy that incorporates a variety of control techniques because it is challenging to eradicate weeds using only one method. To create an integrated weed control plan that works for the farm, switching to conservation tillage necessitates raising management intensity.

Keywords: Weeds, Weed management, Conservation tillage, Preservation, Recreation

INTRODUCTION

Conservation agriculture promotes soil health and combats soil erosion by preserving soil cover, avoiding disturbance and rotating crops. It is used on roughly 8% of arable agricultural land globally. Compared to traditional systems, it is seen that there is an improvement in yield and positive effects such as fertilizer saving, as well as an increase in farm income as a result of increased resistance to pests, diseases and weeds against pesticides, since the control of pests are dependent on pesticides. Conservation agriculture has several advantages over conventional tillage-based agriculture in terms of soil health parameters. However, the weed problem is increasing in conservation agriculture. Due to the lack of tillage in conservation agriculture, the presence of weed seeds on the upper soil surface increases, thus leading to weed invasion. In this system, weed control is carried out depending on herbicides because it is practical and economical. Excessive and unconscious use of herbicides not only threatens human and public health, but also is worrisome due to the change in weeds and the development of herbicide resistance in weeds. Developing genetically modified crops and using some broad-acting selective herbicides or total herbicides are widely used in some developed countries such as the USA, but the cultivation of these products is prohibited in countries such as the EU and Turkey. In addition, weeds with developed resistance mechanisms, called super weeds, against such herbicides can become a nuisance. Developing crops that are tolerant to herbicides, unlike genetically modified organisms, and integrating this into conservation agriculture has become widespread in the world, Europe and Turkey in recent years. In soil conservation agricultural practices, weed management must include integrable strategies and be sustainable. Appropriate tactics to be included in weed management in a soil conservation agriculture system may vary by product and region. For this purpose, the following weed control methods can be used.

- Prevention (quarantine, sanitation, certified seed)
- Cultural (crop rotation, competitive crop variety, cleaning equipment, scouting, cover cropping, stale seed bed, time of planting, crop row, harvest weed seed control)
- Mechanical (tillage, moving, hand pulling, hoeing, streaming, hot water and foam, flaming, flooding, cryogenic, air-propelled abrasive grit, mulching, solarization, laser, electrucution)
- Chemical (herbicide)
- Biological (pests, grazing)
- Bio-chemical (biopesticides, allelopathy)
- Bio-technological (genetically modified varieties, Herbicide tolerance crops)
- Artificial intelligence (AI) technologies (precision, robotic, drone)

For sustainable production in soil conservation agricultural areas, it is necessary to turn to other alternative tactics instead of mechanical methods based on tractor driving or soil cultivation, such as plowing, mowing and hoeing. Prevention is the cornerstone of all integrated weed management systems, and is the most cost-effective weed management that a planter can apply. However, it is frequently not considered a priority until after a new species is detected in a field. It is important to combine and complete those suitable for weed control like the pieces of a puzzle.

Prevention (Quarantine, sanitation, certified seed)

Preventative weed management entails keeping weeds from entering a field or, already there, controlling their spread within a field and between fields (Cahoon, 2023). Eliminating seed production should be the objective of any weed control approach for a difficult species (Singh et al., 2015). The saying "No seeds, no weeds" summarizes this preventive weed management (Rubione, 2023). An effective preventive weed management program will help manage weeds because the plants will be controlled before they complete their life cycle and produce seeds (Das et al., 2022). Weed seeds should be prevented from settling in unclipped areas such as ditches, fences and corners. More importantly, weed seeds should be prevented from settling in agricultural production areas. For this purpose, quarantine measures should be taken, sanitation should be applied and certified seeds should be used.

The cheapest and most effective control of weeds is to take preventive measures to prevent weeds from infecting the production system. However, this is not usually considered a priority until a new species is detected in an area (Rubione, 2023). Preventing weeds from producing viable seeds on the farm is the basis of prevention. If no seeds are produced, the weed cannot enter the seed bank and cannot produce new plants the next season. However, it is also important to consider all sources from which new seeds can enter the field. There are many ways weed seeds can enter the soil; For example, it may come directly from adjacent fields or enter with mud from dirty tires. It may come with production materials such as seeds, seedlings and saplings. It can be transmitted through irrigation water and animal manure. It can come with wild or domestic animals and people. It can be carried by rain and wind. May come with agricultural tools and machinery and agricultural maintenance activities. As can be seen, it can spread from field to field and over long distances through environmental and ecological processes or human activities. Environmental and ecological processes (such as wind and water) are difficult to manage through these propagation pathways. When a weed is found in the seed bank, stopping seed production in future seasons is the most effective method of

stopping its spread. Weed species with high seed production or special structures that facilitate dispersal can spread rapidly in the field and it may be difficult to keep the infestation localized. The movement of seed through environmental and ecological processes can transport seeds hundreds of kilometers; however, most seed movement is more localized. Therefore, preventing weeds in field boundaries and ditches from producing seed can have a major impact on adjacent fields. It is important to survey fields regularly to identify random plants that may have moved due to environmental processes or wildlife and to prevent them from producing seeds in the field. Some weed seed sources may result in only a few seeds, but if these seeds produce plants that are not effectively controlled the following season, they can quickly spread throughout the field. Farmers may think preventative measures are ineffective or inconvenient, but a little effort up front can pay big dividends in the years to come. For more information about weed prevention, you should definitely get support from the technical personnel at the Provincial/District Directorates of Agriculture and Forestry.

Preventing weeds from entering or spreading inside a field is crucial to effective integrated weed control. Some of the strategies for weed avoidance include cleaning equipment, planting weed-free seed, and eradicating weeds prior to seed production.

- Plant certified, weed-free crop seed.
- Do not let weeds set seed.
- Avoid introducing sources of fresh weed infestation, such as hay, manure, and compost.
- Clean equipment to avoid weed seed and propagule dissemination, especially harvest and tillage equipment.
- Rotate crops and prevent fallow times.
- Control weeds around the farm in places such as ditches, roadsides, and fence lines.

Cultural (Crop rotation, competitive crop variety, cleaning equipment, scouting, cover cropping, stale seed bed, time of planting, crop row, harvest weed seed control)

Cultural weed control are measures that farmers may perform to assist the crop be more competitive against weeds (Sims et al., 2018). These are vital for lowering weed concerns in row crops and helping to optimize herbicide-based strategies (Cahoon, 2023). Increasing the crop's vigor and competitiveness helps it to out-compete weeds and sustain current weed pressure (Chauhan et al., 2012). Examples include ensuring optimum field nutrient availability, planting into weed-free soil, minimizing row spacing, and choosing cultivars that compete effectively. Additionally, cultural methods can involve wider farm management measures that make the land less susceptible to weed pressure. Examples include crop rotation, timely

scouting for weeds, cover cropping, and being aware of growing weed issues in the region (Cahoon, 2023).

Cultural weed control comprises of crop rotation, variety selection, soil fertility, planting date, seeding rate, row spacing, leaf architecture, and disease and pest management (Singh et al., 2015). These approaches are utilized to develop a healthy crop that can effectively compete with weeds (Nichols et al., 2015). Achieving quick crop canopy closure and maintaining a thick crop canopy is the cornerstone of integrated weed control . Any approach that increases the capacity of a crop to compete with weeds is termed a cultural method of weed management.

- Some weeds are easier to suppress in specific crops; making crop rotation a viable technique for lowering weed populations.
- A healthy crop competes better with weeds. Be sure the fertility needs of your crop are satisfied. Ensure your crop is clear of illness and insects.
- Rapid germination and early-season growth is crucial to picking types that can better cope with weeds.
- Plant crops and cover crops when circumstances favor crop development and less conducive for weed growth. Time of weed emergence varies by species; pick a planting date that provides your crop an edge.
- Quickly creating a thick crop cover is crucial to interrupting weed germination and development.
- This may be done via the following: Selecting strong cultivars appropriate to local circumstances; increasing sowing rates; planting the crop on small row spacing; choosing varieties or a crop with leaf orientation that restricts light penetration.

Mechanical (Tillage, moving, hand pulling, hoeing, streaming, hot water and foam, flaming, flooding, cryogenic, air-propelled abrasive grit, mulching, solarization, laser, electrucution)

Tillage or mechanical weed control is a key component of integrated weed management, but is not encouraged in soil conservation agriculture since the use of tractors and tillage with agricultural and implement technology is avoided (Bajwa, 2014). Although most main tillage is used for seedbed preparation, tillage may kill weed seedlings and hide weed seeds (Sims et al., 2018). However, it may also accelerate the germination of weed seeds or transport weed seeds closer to the soil surface where they may be more prone to emerge. In no-till farming, herbicides are used in lieu of primary and secondary tillage to suppress emergent weeds before commercial crop planting. The objective is to combine mechanical weed management strategies that vary the agricultural system and limit the possibility for herbicide resistance,

while emphasizing soil conservation and yield. Mechanical weed management applied after the cash crop is a typical approach to suppress germinated weed seeds or weeds that have already appeared (Lee & Thierfelder, 2017). The sorts of equipment applied often destroy weed seedlings or tiny weeds before they are firmly established and compete with the crop. Like most other techniques of weed management, efficiency of mechanical weed control is greatest when conducted at the ideal period. Blind weed management measures need to be undertaken after the seed have germinated but before the roots have gotten entrenched. Likewise, between-row cultivation has most impact on weeds up to three inches. Dry soil conditions and higher air temperatures that promotes weed desiccation offer the optimal circumstances for post-plant mechanical weed management (Rahman, 2017). However, in no-till or conservation agriculture, herbicides are utilized instead of such mechanical processes.

- Before herbicides, the major technique of weed management was tillage.
- In conventional agriculture, primary and secondary tillage may be used to reduce existing weeds, but tillage is not suggested in conservation agriculture.
- In traditional agriculture, primary tillage buries weeds or splits weeds into little pieces. Secondary tillage disrupts weed roots and causes the plant to dry out. In conservation agriculture, herbicides are employed instead.
- Annual weeds, simple perennial weeds, and tiny weeds are more sensitive to tillage than creeping perennials and huge weeds. It is difficult to suppress perennial weeds using soil. For this reason, these weeds may be managed more successfully with pesticides in protected areas without tillage.
- Germination and longevity of weed seeds are also altered by tillage.
- Tillage influences soil temperature, soil moisture, oxygen and light; These are all markers of weed seed germination.
- Tillage impacts weed seed dispersal in the soil profile.
- Weed species and weed seed banks in soil may change based on tillage strategies applied over numerous seasons.
- Some annual and many perennial weeds, such as *Conyza canadensis*, enjoy long-term no-till regimes.
- Tillage may spread rhizomes, bulbs, and tubers of perennial weeds and aggravate infestations.

- Weed seed banks in the soil may be minimized by mechanical treatment of a stale seedbed, but efforts should be taken to limit seed bank herbicides in conservation agriculture.
- Post-plant cultivation includes blind tillage immediately after cash crop planting and inter-row cultivation after the weeds and crop have developed.
- Blind cultivation is employed quickly after the cash crop is seeded to control germinated weed seeds and tiny weed seedlings. Blind cultivation should be repeated every five days or more or until the weeds have largely appeared. • Inter-row cultivation is employed after the cash crop and seedling weeds have emerged and is repeated once a week until the crucial time for weed management in the cash crop has passed.
- High residue cultivators can manage weeds with minor soil disturbance in reduced till conditions.
- Integrated techniques combine mechanical weed control strategies with cultural and chemical treatments to vary the weed management program.
- Mowing is especially effective on annuals and biennials that are starting to blossom.
- Mowing is more successful on annual broadleaf weeds than on grassy weeds.
- Mow perennials to deplete carbohydrate stores in the vegetative sections of the plant by regular mowing and to hinder seed formation.
- What has to be taken into account here is to keep away from mechanical techniques like as tillage, hoeing and mowing in conservative agricultural systems and instead resort to other alternative options, notably herbicides because to their accessibility.
- In conservation agriculture, technologies such as mechanized manual weeding, weeding utilizing animal traction, and manual collecting and cutting of weed seeds may be utilized. However, as these approaches need more time and work, they may be better ideal for small organic production firms rather than huge production regions.

Chemical (Herbicide)

Herbicides are crop-protecting chemicals used to destroy weedy plants or stop normal plant development, and may give an easy, inexpensive, and efficient method control weeds (Singh et al., 2015). In most circumstances, they may constitute the backbone of many weed control strategies (Bajwa, 2014). However, they should not be used alone but combined with successful nonchemical methods such as tillage, crop rotation, optimal soil fertility, or other suitable management alternatives (Sims et al., 2018). Herbicides may not be essential on

certain farms or landscapes. If chemical weed control is not applied, mechanical and cultural control approaches then become the emphasis.

- Herbicides may be characterized as crop-protecting agents used to destroy weedy plants or stop normal plant growth.
- Herbicides offer an easy, inexpensive, and efficient solution to help control weeds.
- In most circumstances, they may constitute the backbone of many weed control strategies. However, they should not be utilized alone but coupled with efficient nonchemical methods.
- The ideal herbicide does not exist. No one pesticide is capable of controlling all weeds that might emerge in a crop or planting. Since every herbicide has benefits and downsides, picking the suitable herbicide(s) is vital.
- Most herbicides are normally sprayed to the soil (preemergence) before weeds sprout or after weeds are grown (postemergence).
- Herbicides may be characterized in several ways and by specific features, including: a) mode and site of action; b) application timings and procedures; c) weed control spectrum and selectivity; and d) herbicide mobility in the weed.
- Artificial intelligence (AI) technologies (Precision, robotic, drone), geographic information system, and remote sensing have been incorporated into mechanical and chemical control in recent years and help to weed management in conservative agriculture.

Biological (Pests, grazing)

Biological control (biocontrol) techniques for weeds include insects, mites, nematodes, diseases, and grazing animals (Bajwa, 2014; Rahman, 2017). Grazing animals and insects may directly effect weeds and diminish their growth and competitiveness (Cordeau, 2022; Parker, 2020). Other biocontrol species will eat on weed seeds and restrict seed return to the soil seedbank.

- Biological management techniques for weeds include insects, mites, nematodes, diseases, and grazing animals.
- Biological control may be cost efficient, ecologically safe, self- replicating, and ideally suited to an integrated weed management program.
- Biological control is a long-term undertaking: it is not quick or always sufficient, only some weeds are suitable candidates, and the rate of failure may be significant.
- Seed predation may be responsible for up to 90% of seed loss in agroecosystems.

- Some of the most promising seed predators include rodents, ants, crickets, and ground beetles.
- Reduced tillage may enhance predation since weed seed predation occurs largely on the soil surface.
- Cover crops produce better homes for seed predators.
- Promote and maintain diversified fencerows, filter strips, and refuge habitats that provide overwintering and protection for ground beetles, rodents, crickets and other seed predators.
- Effective weed management may be accomplished in conservative agriculture by merging biochemicals (biopesticides “390 registered biopesticide, essential oils, corn gluten meal, acetic acid, microbial products, fatty acids, Brassicaceae seed meal”, allelopathy) and biological control (pests such as bugs, mite and nematode, microorganisms such as fungi, bacteria, virus, rodents such as rabbits and squirrels, poultry such as chickens and turkeys, and domestic animals such as sheep, goats and cows.
- Biotechnological (genetically modified cultivars, herbicide tolerant crops) techniques have been incorporated into biological control in recent years and contribute to weed management in conservation agriculture.

CONCLUSION

It is recognized that tillage causes soil erosion, costs time and resources, which decreases productivity and raises the cost of production. Therefore, in recent years there has been a rising tendency in many nations towards conservation agriculture to boost sustainability without sacrificing land production. The three key foundations of conservation agriculture are limited tillage operations, permanent residue cover and rotation of main crops. However, adopting conservation agriculture impacts weed populations differently than traditional agriculture. Weed management in conservation agriculture is a larger difficulty than in conventional agriculture since there is no burial of weed seeds by tillage operations and soil-applied herbicides are not absorbed, resulting in diminished efficacy. The behavior of weeds under conservation farming and their interaction with crops tends to be complicated and not well understood. After crop planting under conservation cultivation, a considerable amount of the weed seed bank frequently remains on or near the soil surface. Weed species in which germination is promoted by light are likely to be more troublesome in conservation agriculture. Additionally, in the lack of tillage, perennial weeds may become more troublesome under this

system. On the other hand, weed seeds situated on the soil surface are more prone to desiccation and have increased predation activity by insects, notably ants. When crop leftovers are equally and densely accessible under conservation culture, they may restrict the appearance of weed seedlings, extending the time to emergence and enabling the crop to obtain an initial edge in early vigor over weeds. Where preemergence herbicides are administered, product residues may also impede a major percentage of the sprayed herbicide and lead to decreased herbicide efficiency. Approaches such as stale seedbed application, uniform and intensive crop establishment, use of cover crops and crop residues as mulch, crop rotations, and practices to increase crop competition through a combination of pre- and post-emergence herbicides can be integrated for sustainable conservation agriculture. The following elements should be taken into account while employing preventative measures, cultural processes, mechanical, chemical and biological control approaches in weed management in protective agricultural systems.

It's critical to stop the introduction and spread of new weed species in order to save money and prevent the need for more extensive control in the coming growing seasons. On a farm, preventive measures may be implemented in a variety of locations and should be done all year round. The jigsaw pieces below show how to stop weeds from taking over on a farm that raises cattle and grains. We provide entrance points for weed seeds as well as solutions to avoid them. Farmers may use cultural weed control to increase the crop's ability to compete with weeds. These are critical for reducing weed problems in row crops and supporting the efficacy of herbicide-based initiatives. Enhancing the crop's vigor and competitiveness enables it to resist weed pressure and outcompete weeds. Keeping the best possible field nutrient availability, planting in weed-free soil, narrowing the distance between rows, and choosing competitive cultivars are a few examples. Furthermore, larger farm management techniques that reduce the field's susceptibility to weed pressure are included in cultural methods. Crop rotation, early weed detection, cover crops, and keeping an eye out for newly emergent weed issues in the region are a few examples.

Mechanical weed control tactics can be an important part of an integrated weed management (IWM) program. Mechanical weed control usually uses some type of mechanical implement pulled by a tractor to physically slice, chop or pull out small weeds. Tractors and tillage equipment should not be used as much as possible in conservation agriculture, which aims to prevent mechanical disturbance of the soil (no tillage) in order to obtain a smooth soil surface.

Herbicides are largely recommended for weed management in conservation agricultural systems. For the usage of herbicides in Turkey, active compounds listed in the plant protection products database are employed.

Biological weed control implies employing live organisms to manage weeds. This most commonly entails introducing a specialized biological control agent, such as an insect, nematode, fungal, or bacterium to a weed-infested region and allowing the agent to destroy the weeds. This conventional strategy for biological control generally takes a season or two for the effect to be visible. One of the rare effective instances of biological control in agronomic crops is the commercial product Collego, a formulated plant fungus (*Colletotrichum gloeosporioides* f. sp. *aeschnomene*) that efficiently eliminated northern jointvetch, but had no impact on other weeds species. However, owing to such a restricted range of control, there have been few commercial solutions created for agronomic crops. Grazing by cattle is also a kind of “biological weed control” however grazing is not always successful when attempting to target particular weeds. Most grazing animals are not discriminating eaters and will graze on their favored plants, even crop plants.

Weed management in conservation agriculture technology covers numerous strategies on how to properly prepare the land for crop planting and how to control weeds so they do not affect crop growth. In protected farming systems, this management should allow the penetration of direct seeding equipment into the soil and a favorable environment for seed germination, without inhibiting the application. This approach, which is based on the premise of decreasing or eliminating soil tillage, managing weeds via residue and cover crop management and spraying herbicides, may be difficult to carry out alone. A mix of acceptable solutions based on soil conservation is also conceivable, depending on the farmer's finances.

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**DYNAMIC IMPACT OF AGRICULTURAL PRODUCTIVITY ON CO₂ EMISSIONS
IN TURKEY**

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Abstract

Global warming and climate change are problems that affect not only the environment but also economic, social, and geopolitical elements. This problem, which challenges the structure of the global society, is considered one of the most important challenges of the twenty-first century. Although the source of this problem is greenhouse gases released from human activities, the most effective of these gases is carbon dioxide (CO₂). Therefore, reducing global CO₂ gas emissions is the main agenda item of national and international policies. In this context, discussing the dynamics affecting greenhouse gas emissions can provide critical results for long-term policy development. To this end, this study examines the effect of agricultural productivity on CO₂ emissions in Turkey for the period 1990-2020 with the control variables of economic growth, foreign trade, and foreign direct investments. The research follows unit root, co-integration, and parameter estimation processes. According to the findings, (a) there is a long-term balance relationship between agricultural productivity, economic growth, foreign trade and foreign direct investment and CO₂ emissions. (b) Agricultural efficiency has a reducing effect on CO₂ emissions. (c) Economic growth and foreign trade have an increasing effect on CO₂ emissions. (d) There is no statistically significant relationship between foreign direct investments and CO₂ emissions. The robustness of the results is also supported by alternative parameter estimators. At the end of the research, empirical results are discussed based on the literature and policy implications are presented in the context of the agriculture-greenhouse gas emission relationship.

Keywords: Agricultural productivity, Greenhouse gases, Co-integration, Climate change, Environmental quality.

TÜRKİYE'DE TARIMSAL ÜRETKENLİĞİN CO₂ SALINIMININ ÜZERİNDEKİ DİNAMİK ETKİSİ

Özet

Küresel ısınma ve iklim değişikliği sadece çevreyi değil, ekonomik, sosyal ve jeopolitik unsurları da etkileyen bir sorundur. Küresel toplumun yapısını zorlayan bu sorun, yirmi birinci yüzyılın en önemli zorluklarından biri olarak kabul edilmektedir. Bu sorunun kaynağı insan faaliyetleri kaynaklı açığa çıkan sera gazları olmakla birlikte, bu gazların en etkili karbon dioksit (CO₂) gazıdır. Bu nedenle küresel CO₂ gaz salınımını azaltma ulusal ve uluslararası politikaların temel gündem maddesidir. Bu bağlamda sera gazı salınımını etkileyen dinamiklerin tartışılması uzun dönemli politika gelişimi için kritik sonuçlar sunabilir. Bu amaçla, bu çalışma 1990-2020 dönemi Türkiye'de tarımsal verimliliğin CO₂ salınımı üzerindeki etkisini ekonomik büyüme, dış ticaret ve doğrudan yabancı sermaye yatırımları kontrol değişkenleri ile incelemektedir. Araştırma birim kök, eş-bütünleşme ve parametre tahmin süreçlerini takip etmektedir. Bulgulara göre, (a) tarımsal üretkenlik, ekonomik büyüme, dış ticaret ve doğrudan yabancı sermaye yatırımları ve CO₂ salınımı arasında uzun dönemli bir denge ilişkisi vardır. (b) Tarımsal verimlilik CO₂ salınımı üzerinde azaltıcı bir etkiye sahiptir. (c) Ekonomik büyüme ve dış ticaret CO₂ salınımı üzerinde arttırıcı bir etkiye sahiptir. (d) Doğrudan yabancı sermaye yatırımları ile CO₂ salınımı arasında istatistiki olarak anlamlı bir ilişki yoktur. Sonuçların sağlamlığı alternatif parametre tahmincilerle de desteklenmektedir. Araştırmanın sonunda, literatüre dayalı olarak ampirik sonuçlar tartışılmakta ve tarım-sera gazı salınımı ilişkisi bağlamında politik çıkarımlar sunulmaktadır.

Anahtar Kelimeler: Tarımsal verimlilik, Sera gazları, Eş-bütünleşme, İklim değişikliği, Çevresel kalite.

GİRİŞ

Son yüzyılda iklimde önemli değişikliklerin olduğu çok çeşitli göstergelerden açıkça kanıtlanmaktadır. Örneğin, 1998–2007 döneminde kaydedilen küresel sıcaklık ortalamaları, 1961–1990 dönemi ortalamasının $0,41^{\circ}$ üzerindedir. Ortalama yüzey ve deniz suyu sıcaklıklarında $0,65-0,15^{\circ}\text{C}$ aralığında bir sapma meydana gelmiş, Alp buzullarındaki ısınma $0,6-1,0^{\circ}\text{C}$ aralığında artmıştır. Kuzey Yarımküre'nin kar örtüsü alanı 1972–1992 döneminde yıllık yaklaşık %10 oranında azalmıştır. Deniz buzu seviyeleri 1950-1970 yılları arasında Güney Yarımküre 'de, 1950'den itibaren ise Kuzey Yarımküre 'de önemli ölçüde azalmıştır. 1981-1991 döneminde Kuzey Yarımküre'de mevsimlerin uzunluğu 4 ila 12 gün arasında artmıştır (Bilgili et al., 2016). Küresel ısınma ve iklim değişikliği olarak bilinen bu sürecin etkisi sadece çevreyle sınırlı değil; ekonomiyi, sosyal yaşamı, jeopolitik faktörleri, siyaseti ve yaşam tarzını doğrudan etkilemiştir (Espoir et al., 2022; Shahbaz et al., 2019). Bilim dünyasındaki çoğunluk, küresel ısınma ve iklim değişikliğinin nedeni olarak doğal sera etkisindeki artışı gösteriyor. Özellikle son 50 yılda insan faaliyetleri sonucu açığa çıkan kirletici gaz salınımları, atmosferdeki sera gazı yoğunluğunu normalin üzerine çıkarmıştır. Sera gazlarındaki bu artış, sera etkisini şiddetlendirerek dünyanın daha fazla ısı tutmasına neden olmaktadır. Bu kirletici gazlar arasında özellikle CO₂, küresel ısınma potansiyeli en yüksek olan ve en hızlı salınımı artan kirletici olarak öne çıkmaktadır. Bu nedenle iklim değişikliği ve küresel ısınmanın etkilerini azaltmaya yönelik uluslararası girişimlerin ana hedefi küresel evrensel CO₂ emisyonunun azaltılmasıdır (Koçak & Şarkgüneşi, 2018).

Son literatür, küresel sera gazı emisyonunun %10-15'inin tarım sektöründen geldiğini ortaya koymuştur (Ullah et al., 2018).Başta hayvancılık, toprak yönetimi, pirinç ekimi, enterik fermantasyon, gübre yönetimi ve ürün artıklarının yakılması olmak üzere tarımsal üretim faaliyetlerinin tüm süreçleri CO₂ salınımının kaynağıdır. Öte yandan dünya nüfusunun üçte birinin tarım sektöründen geçimini sağlaması ve küresel gıda güvenliği dikkate alındığında, tarımın sürdürülebilirliğinde giderek daha fazla önem atfedilir (Adedoyin et al., 2021). Bu nedenle tarımsal üretkenliğin çevre üzerindeki etkisinin anlaşılması çevre ekonomisi literatürü açısından önemlidir. Literatüre göre, tarım sektörü başta hayvancılık, fosil yakıt kullanma, gübre kullanımı gibi süreçler sera gazı salınımındaki artışı tetiklemektedir. Öte yandan son yıllarda literatür özellikle gelişmekte olan ülkelerde tarımsal üretkenlik-çevre ilişkisi incelenmekte olup, tarımsal üretkenliğin çevre kalitesini iyileştirdiği yönünde kanıtlar sunulmaktadır (Majiwa et al., 2018; Raihan & Tuspekova, 2022; Rehman et al., 2022). Tarımsal üretkenlik verimlilik artışı ve teknoloji kanalları ile sera gazı salınımını azaltabilir. Ancak

literatürde doğrudan Türkiye değerlendirmesi üzerine bir araştırma boşluğu gözlemlenmektedir. Bu amaçla, araştırmamız Türkiye’de tarımsal üretkenliğin CO₂ salınımı üzerindeki etkisini incelemeyi amaçlar. Türkiye küreselleşme süreci ile sera gazı salınımında önemli artışlar tecrübe etmiştir. Türkiye, OECD’de en fazla sera gazı (GHG) yayan ilk 10 ülke arasında yer almaktadır. Türkiye’deki toplam sera gazı emisyonları 1990 ile 2019 yılları arasında %130 artarak 506 milyon tona ulaşmıştır (Ozturk et al., 2022). Araştırma sonunda, Türkiye’de tarımsal üretkenliğin CO₂ salınımı üzerindeki etkisinin anlaşılması uzun dönemli tarım-çevre politikalarının gelişimi için politika çıkarımları sunabilir.

Çalışmanın geri kalana takip eden şekilde düzenlenir. İkinci bölümde veri ve yöntem hakkında bilgi verilmektedir. Üçüncü bölüm ampirik bulgular rapor etmektedir. Son bölümde araştırma sonuçları değerlendirilir.

VERİ VE YÖNTEM

Bu araştırma 1990-2020 dönemi Türkiye’de tarımsal üretkenliğin CO₂ salınımı üzerindeki etkisi ekonomik büyüme, ticaret ve doğrudan yabancı sermaye yatırımları (FDI) kontrol değişkenleri ile incelenecektir. Bağımlı değişken CO₂ salınımı kişi başına metrik ton cinsindedir. Açıklayıcı değişken tarımsal üretkenliği temsil etmek için tarımsal katma değer GSYİH’deki oranı (%) göstergesi kullanılır. Kontrol değişkenlerden (i) ekonomik büyüme kişi başına düşen GSYİH (2015 yılı sabit fiyatlarla, ABD doları), (ii) ticaret, toplam ithalat ve ihracatın GSYİH’deki payı ve FDI, doğrudan yabancı yatırımlar (net girişler, GSYİH’nin yüzdesi) ile temsil edilmektedir. Tüm verilerin doğal logaritmaları kullanılmaktadır. Parametre tahmin sürecinde doğrusal regresyon modeli dikkate alınmaktadır. İlgili model, birim kök analizleri, eş-bütünleşme ve katsayı tahmin yöntemleri ile araştırılmaktadır.

BULGULAR

Araştırmanın ilk aşamasında serilerin durağan olup olmadığı veya birim kök içerip içermediği analiz edilmelidir. Bu çalışmada durağanlığın test edilmesi amacıyla ekonometri literatüründe yaygın olarak kullanılan ADF (Dickey & Fuller, 1981) ve PP (Phillips & Perron, 1988) birim kök testleri kullanılmıştır. Düzey değer bulgularına göre serilerde birim kök yoktur boş hipotezi reddedilmektedir. Serilerin ilk farkları alındığında ise tüm serilerin durağan olduğu gözlemlenmektedir. Bu durumda regresyon parametre tahmininden önce seriler arasında eş-bütünleşme ilişkisinin doğrulanması gerekmektedir. Bu amaçla, Johansen (1988) ve Johansen ve Juselius (1990) tarafından geliştirilen eş-bütünleşme yöntemleri kullanılmaktadır. Tablo 1 eş-bütünleşme test sonuçlarını göstermektedir. Trace (İz) ve Max-Eigen (Maksimum Özdeğer) test istatistiklerine göre değişkenler arasında %5 önem düzeyinde bir adet eş-bütünleşme ilişkisi

vardır. Diğer bir ifadeyle Türkiye’de tarımsal üretkenlik, CO2 salınımı, ekonomik büyüme, ticaret ve FDI arasında uzun dönemli bir denge ilişkisi geçerlidir.

Tablo 1. Eş-bütünleşme Test Sonuçları

Date: 11/03/23 Time: 21:00
Sample (adjusted): 1993 2020
Included observations: 28 after adjustments
Trend assumption: Linear deterministic trend
Series: LNCO2 LNAGR LNY LNT LNFDI
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.822638	89.32019	69.81889	0.0007
At most 1	0.532271	40.89245	47.85613	0.1921
At most 2	0.386538	19.61620	29.79707	0.4493
At most 3	0.190791	5.934347	15.49471	0.7033
At most 4	0.000243	0.006815	3.841465	0.9336

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.822638	48.42774	33.87687	0.0005
At most 1	0.532271	21.27625	27.58434	0.2599
At most 2	0.386538	13.68186	21.13162	0.3917
At most 3	0.190791	5.927532	14.26460	0.6225
At most 4	0.000243	0.006815	3.841465	0.9336

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Analizin son aşamasında regresyon parametre tahmin süreci yer almaktadır. Tablo 2, Phillips ve Hansen (1990)) tarafından geliştirilen FMOLS tahmin sonuçlarını göstermektedir. Sonuçlara göre, (i) tarımsal üretkenlik CO₂ salınımı üzerinde azaltıcı bir etkiye sahiptir. Türkiye’de tarım sektöründe verim artışı çevresel açıdan sürdürülebilirliğe katkı sağlamaktadır. (ii) Ekonomik büyüme ve dış ticaret CO₂ salınımı üzerinde arttırıcı bir etkiye sahiptir. Türkiye’de ekonomik büyüme ve ticaret gelişimi çevre açısından olumsuz bir etkiye sahiptir. (iii) Doğrudan yabancı sermaye yatırımları ile CO₂ salınımı arasında istatistiki olarak anlamlı bir ilişki yoktur. Türkiye için yabancı yatırımlar ve çevre arasında yansızlık ilişkisi geçerlidir.

Tablo 2. FMOLS tahmin sonuçları

Dependent Variable: LNCO2
Method: Fully Modified Least Squares (FMOLS)
Date: 11/03/23 Time: 21:02
Sample (adjusted): 1991 2020
Included observations: 30 after adjustments
Cointegrating equation deterministics: C
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAGR	-0.137432	0.067447	-2.037638	0.0523
LN Y	0.487910	0.082007	5.949647	0.0000
LNT	0.147917	0.073263	2.018991	0.0543
LNFDI	0.014769	0.017085	0.864458	0.3956
C	-3.344532	0.791159	-4.227381	0.0003
R-squared	0.965964	Mean dependent var	1.290504	
Adjusted R-squared	0.960518	S.D. dependent var	0.209984	
S.E. of regression	0.041724	Sum squared resid	0.043523	
Long-run variance	0.002022			

Tablo 3 ise sonuçların sağlamlığı kontrol etmek için rapor edilir. Bu amaçla Park (1992) tarafından geliştirilen kanonik eş-bütünleşme regresyon (CCR) tahmincisi kullanılmaktadır. Sonuçların FMOLS tahminleri ile tutarlı olduğu görülmektedir.

Tablo 3. CCR Tahmin Sonuçları

Dependent Variable: LNCO2
Method: Canonical Cointegrating Regression (CCR)
Date: 11/03/23 Time: 21:03
Sample (adjusted): 1991 2020
Included observations: 30 after adjustments
Cointegrating equation deterministics: C
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAGR	-0.134533	0.066469	-2.024002	0.0538
LN Y	0.482733	0.082709	5.836525	0.0000
LNT	0.143833	0.069778	2.061290	0.0498
LNFDI	0.018391	0.018403	0.999368	0.3272
C	-3.289405	0.821865	-4.002369	0.0005
R-squared	0.965333	Mean dependent var	1.290504	
Adjusted R-squared	0.959787	S.D. dependent var	0.209984	
S.E. of regression	0.042109	Sum squared resid	0.044329	
Long-run variance	0.002022			

SONUÇ

Bu çalışma Türkiye’de tarımsal üretkenliğin CO2 salınımı üzerindeki etkisini ekonometrik yöntemler ile incelemiştir. Araştırma sonucunda tarımsal üretkenlik artışının uzun dönemde CO2 salınımı üzerinde azaltıcı bir etkisi olduğu ortaya konulmaktadır. Bu nedenle Türkiye’de tarımsal üretkenliği arttıracak teşvik, destek ve politikalar çevresel sürdürülebilirlik açısından kritik öneme sahiptir. Özellikle politikaların tarımsal üretimi ve üreticiyi desteklememekle kalmayıp, tarım sektöründe üretkenlik için, (i) AR-GE yatırımları, (ii) kooperatifleşme, (iii) temel araştırma süreçleri, (iv) inovasyon, (v) yenilenebilir enerji kullanımı ve (vi) yeşil büyüme süreçlerini kapsayan politikaların daha ağırlıklı olması önerilmektedir.

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EFFECTS OF LACTIC ACID BACTERIA ON FERMENTATION AND NUTRIENT QUALITY OF SILAGE

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Abstract

The main purpose of making silage is to obtain a product with high nutritional value by preserving green forages with minimum nutrient loss. However, fermentation in the silo is difficult to control and generally uncontrollable fermentation process makes it difficult to maintain the optimum nutrient content of the ensiled product. Especially in recent years, bacterial inoculants containing lactic acid bacteria used as additives in silage production. Bacterial cultures or so-called microbial inoculants are used extensively. Lactic acid bacteria (LAB) inoculants play an important role in the preservation and fermentation of green fodder. Lactic acid bacteria prevent nutrient loss by preventing the survival of undesirable microorganisms by rapidly lowering the pH. By adding sufficient lactic acid bacteria to the silage, silage fermentation develops and nutrient losses are reduced by ensuring the rapid fermentation of carbohydrate sources in the silo material into lactic acid. Lactic acid bacteria provide proper silage fermentation and are also very successful in increasing animal performance. Lactic acid bacteria reduce the pH, acetic acid, butyric acid, ethanol and ammonia nitrogen levels of silage. In particular, they increase lactic acid, lactic:acetic acid ratio, dry matter gains, dry matter digestibility and silage dry matter intake. In this review, the function of LAB in silage production and the potential effects of its fermentative activity are described.

Keywords: Silages, Lactic acid bacteria, feed value, fermentation

INTRODUCTION

Silage products with a high moisture content feed produced as a result of controlled fermentation. Silage is produced by fermentation and retains more than 50% of the moisture content and nutrients of the plant. In terms of plant biomass and prevention of nutrient loss, it maintains its superiority in dairy cattle feeding compared to dry preserved forages (Bolsen et al., 2006; Grant and Adesogan, 2018; Okoye et al., 2023). It is also a fermentative process involving various groups of microorganisms. Lactic acid bacteria (LAB) make the most important contribution to lowering the pH in ensiling and preserving the ensiled material. (Muck et al. 2018; Fabiszewska et al. 2019). Some LAB species or strains produce acetic acid, ethanol, CO₂, 1,2-propanediol, and other compounds through different metabolic pathways of carbohydrate utilization (Von Wright and Axelsson 2012; Carvalho et al., 2021). Lactic acid bacteria are classified as homofermentative (producing lactic acid) and heterofermentative (producing compounds other than lactic acid) (Von Wright and Axelsson 2012). Enterococcus, Lactobacillus, Pediococcus, Lactococcus, Weissella and Bacillus are LAB species that are frequently used in silage production. (Ellis et al., 2016). The use of LAB in modern and sustainable agriculture is receiving considerable attention due to their potential to improve human and animal health (Amaral et al., 2020; Okoye et al., 2023). LAB utilise water-soluble carbohydrates (WSC) and convert them into organic acids. By using LAB, feed quality can be improved by minimising the loss of carbohydrates, crude proteins, volatile free fatty acids and minerals. The use of LAB additives enhances the fermentation process, leading to control of dry matter (DM) loss and pathogenic activity (Pot et al., 2019; Kim et al., 2020). In this review, the effect of LAB in silage production and their potential effects on the fermentation process are described.

BIOLOGICAL PROPERTIES OF LACTIC ACID BACTERIA

LAB is a gram-positive, microaerophilic, cocci- or rod-shaped bacteria that does not form spores. It consists of different genera such as Lactobacillus, Leuconostoc, Pediococcus, Streptococcus, Enterococcus and Lactococcus.(Morales-Estrada et al.,2016; Kim et al. 2021). Although most silage LAB can grow under mesophilic conditions at different temperatures (20–50 °C), the optimum temperature for growth is between 25 and 40 °C. LAB strains are commonly found naturally in a variety of sources, including fermented foods (yoghurt, meat), forage crops (Italian ryegrass, alfalfa, rye, sorghum, corn, and triticale), animal manure, dairy products, rumen liquid, and infant feces (Olofsson and Vásquez 2008; Sornplang and Piyadeatsoontorn 2016). LAB can reduce silage pH to between 3-5, depending on the strains

selected and the type of forage plant. The main function of LAB is to ferment WSC into organic substances as the main end product.

THE LAB IN SILAGE FERMENTATION

Lactic acid bacteria are essential for silage fermentation; however, they are often found in low populations (<5 log colony forming units (CFU) per g substrate) or even below detection levels (<2 log CFU) per g substrate. LAB can produce acetic acid, ethanol, CO₂, 1,2-propanediol, and other compounds through different metabolic pathways of carbohydrate. The main anaerobic bacteria in silage are LAB, which belong to 4 species: *Lactobacillus*, *Pediococcus*, *Enterococcus* and *Leuconostoc*. Bacteria commonly used in silage inoculants and their intended use it is given in Table 2 (Kung 2001). Lactic acid bacteria are classified as homofermentative or obligately heterofermentative or facultatively heterofermentative (compounds other than lactic acid are produced) (Von Wright and Axelsson 2012). Homofermentative or facultatively heterofermentative LAB rapidly decreases pH and increases lactic acid relative to other fermentation products.

Table 1. Bacteria commonly used in silage and their intended use

Bacteria	Type of Bacteria	Purpose of Usage	Main Products
<i>Lactobacillus plantarum</i>	LAB homofermentative	Fast LA production, high acid tolerance	LA
<i>Pediococcus acidilactici</i> , <i>acidilactici</i> , <i>cerevisiae</i>	LAB homofermentative	Fast LA production, faster growth compared to <i>Lactobacillus</i> , rapid growth of some lines in cool conditions and good osmo tolerance.	LA
<i>Enterococcus faecium</i>	LAB homofermentative	Fast LA production, faster growth compared to <i>Lactobacillus</i>	LA
<i>Propionibacterium shermanii</i> , <i>jensenii</i>	<i>propionibacteria</i>	Production of antifungal compounds	PA, AA, CO ₂
<i>Lactobacillus buchneri</i>	LAB, heterofermentative	Production of antifungal compounds	PA, AA, CO ₂ , propanediol.

LA: lactic acid, PA: propionic acid, AA: acetic acid, (Kung, 2001)

THE LAB ACTIVITY IN SILAGE PRODUCTION

LAB is added to silage in order to prevent the growth of microorganisms that cause spoilage, to reduce silage pH and to prevent dry matter (DM) loss. The four primary biochemical changes that occur during the silage production (Figure 1). LAB activity during silage production. The main biochemical functions of LAB inoculants in silage fermentation include: removal of oxygen, fermentation, appropriate WSC concentration, increasing pH decrease, decreasing buffering capacity, timely removal called wilting, adequate temperature and timely removal referred to as feed-out

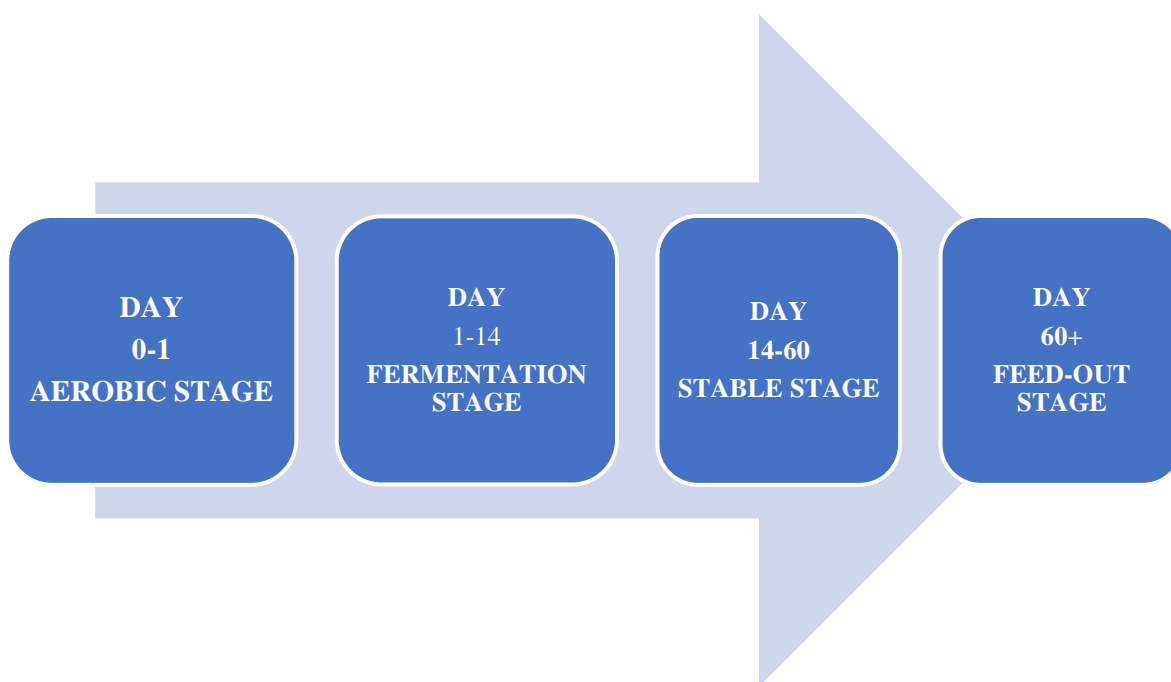


Figure 1. The four primary biochemical changes that occur during the silage production.

AEROBIC STAGE

The aerobic phase begins at harvest and continues until the oxygen supply is exhausted, which occurs shortly after ensiling. Sugars in freshly chopped plant biomass are broken down by the LAB into carbon dioxide, water and heat at this stage and are also used by aerobic microorganisms (yeast, molds and aerobic bacteria) which constitute an important source of respiration. Treatment of plant biomass with combined inoculants reduces the activity of yeasts and moulds and other aerobic bacteria using lactic acid, which is sufficiently produced by homofermentative LAB (Muck et al., 2018; Nazar et al., 2020; Okoye et al., 2023).

FERMENTATION STAGE OF SILAGE

The anaerobic fermentation phase involves the activity of different bacteria that ferment plant sugars.(Okoye et al., 2023) The effectiveness of fermentation in terms of pH lowering depends on the number and type of LAB present in the silage mass, which can inhibit the activities of

undesirable bacteria. During the fermentation phase, LAB protects the feeds from microorganisms that cause spoilage by producing antifungal substances such as beneficial organic acids. Homofermentative LAB species are more active in lowering the pH of silage because they only produce lactic acid, unlike heterofermentative LAB, which produces acetic acid, which slows down the pH drop during the fermentation phase. (Schmidt and Kung, 2010; Li et al., 2018; Oliveira et al., 2019).

STABILITY STAGE

As a result of LAB activity in fermentation, ensiled forages enter a storage phase called the stability phase. The added silage is maintained at a constant pH at this stage, resulting in acidic conditions that limit the activity and population of microbes, and dangerous species such as Clostridia and Bacilli can survive spores as long as the silo remains airtight. Very little biological activity occurs during the stability phase (Borreani et al., 2018; Li and Nishino, 2011).

EFFECT OF LAB INOCULANTS ON SILAGE QUALITY

One of the most important effects of bacterial inoculants in silage was on DM gain. In many studies conducted with inoculants, it has been reported that DM losses decreased by 1-2% on average in corn silages and 2-3% in legume and fescue silages with the use of inoculants. It is expected that there will be DM gains as a result of the change in fermentation products with the use of bacterial inoculants. Because only LA is produced as a result of homolactic fermentation of sugars, the gain of DM is higher in this type of fermentation (Muck 1996; Muck 2000). High DM recovery was detected in alfalfa silage inoculated with *L. plantarum*. Additionally, the aerobic stability of grass silages with 18-44% DM content increased as the percentage of DM increased after inoculation with *L. plantarum* and *L. buchneri*. However, alfalfa silage was ensiled at high DM levels (Ertekin and Kızılsimşek 2019).

With the addition of bacterial inoculant, the total energy losses of silage are not affected much. In addition, silage may have a higher gross energy value than the original material due to the formation of high-energy compounds such as ethanol during ensiling. (McDonald et al., 2002). LAB used in inoculants don't ferment the proteins and amino acids in silage. In addition, the rapid decrease in silage pH with the use of inoculants suppresses the activities of microorganisms and plant proteases that ferment amino acids, preserving some of the true proteins and reducing the concentration of NH₃-N in silage (Muck 1996; Jones 1998).

Since lactic acid bacteria cannot hydrolyze plant cell wall polysaccharides, the fiber content of silage is not affected by the use of inoculants. The decrease in the fiber content of silage with the use of inoculants is due to the hydrolysis of hemicellulose with acid at low pH. Hemicellulosic activity is important only in meadow silages and it can reduce NDF content by 1–2% (Muck 1996; Kung 2001). Secreting lignocellulose enzymes, LAB stimulates the plant's conversion to WSC, thus making glucose available for successive conversion to lactate, leading to a decrease in cell wall carbohydrates associated with the efficient degradation of ADF and NDF contents (Ebrahimi et al., 2016).

Another microorganism that has potential in improving the aerobic stability of silage is *Lactobacillus buchneri*, a heterolactic LAB. *Lactobacillus buchneri* is reported to increase aerobic stability by increasing the amount of AA and PA in silage (Kung 2001; Filya 2003; Kung et al., 2003).

In most of the studies examining the effect of inoculant use on aerobic stability, aerobic stability was negatively affected by the addition of homolactic LAB (Filya 2002).

ANIMAL PERFORMANCE

It has been reported that animal performance is increased by 2–4% with the use of inoculants as silage additives and these increases are higher than the changes made by inoculants in products formed as a result of silage fermentation (Muck 1996). Abd Al-Tawab et al., (2016). reported that LAB inoculants, especially homofermentative LAB are associated with improved digestibility of nutrients and reduction of anti-nutritional compounds. Silage inoculated with *L. buchneri* was found to have higher feed performance in cows compared to uninoculated silage (Schmidt and Kung 2010). Silages inoculated with *L. plantarum* and *L. buchneri* increased milk yield and reduced the oxalate effect on cattle diets, leading to a symbolic increase in nutrient digestibility and improvement in performance without a negative impact on animal health (Oliveira et al., 2017).

Studies have shown that feeding ruminant animals LAB-preserved silages greatly improves animal performance in the rumen environment, increasing feed utilization. For example, in in vitro ruminal fermentation studies LAB-inoculated silages have shown to affect rumen microorganisms, in some cases reducing methane gas, a type of greenhouse gas, and resulting in increased microbial biomass production (Muck, 2013). LAB performs efficiently with probiotic survival potential in the rumen, interacts with other beneficial microorganisms, and maintains functionality in animals (Matthews et al., 2019). LAB perform efficiently with a

probiotic potential of survival in the rumen, interact with other beneficial microorganisms, and maintain functionality in animals (Matthews et al., 2019).

CONCLUSIONS

Preservation of silage is the purpose of ensiling green fodder crops for future use. Silage quality is improved by adding a variety of LAB inoculations, which work effectively during fermentation, storage and feed-out stages. LAB is one of the best organic additives that provides control over suppressing unwanted bacterial growth in silage. LAB is one of the best organic additives that controls unwanted bacterial growth in silage. LAB inoculants convert water-soluble carbohydrates and complex secondary metabolites in forage crops into organic acids and mineral acids and improve the nutritional quality of silage for livestock by effectively controlling pathogenic microorganisms

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**MEYVELERDE HASAT SONRASI PUTRESIN UYGULAMASIYLA KALITE
ÖZELLİKLERİNİN KORUNMASI**

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Özet

Tarımsal ürün gruplarından birisi olan meyvelerde, kaliteli ve verimli üretim kadar mevcut özelliklerin korunması da önem arz etmektedir. Bir meyvenin rengi, aroması, kokusu ve lezzeti gibi genel fiziko-kimyasal özelliklerinin korunmasında özellikle de hasat sonrası depolama koşulları ön plana çıkmaktadır. Depolama şartlarının iyi ve kaliteli olmasıyla özellikleri uzun sürelerde korunabilen meyvelerin iç ve dış ticarete kullanım imkanları daha da artmaktadır. Depolama esnasında sıcaklık ve nem gibi abiyotik faktörler, meyvelerin kalite ve verim özelliklerinde direkt etkilere sahip olmakla birlikte, bu faktörlerin uygunluğu elzem bir durumdur. Öte yandan, meyvelerin depolanması sırasında onlar üzerinde dışarıdan uygulanabilecek çeşitli bileşikler aracılığıyla da meyve kalite özellikleri belirli sürelerde korunabilmektedir. Günümüzde, bazı meyvelerin uzun sürelerde depolanması amacıyla eksojen olarak uygulanan bileşiklerden birisi de, poliamin grubu bileşiklerdir. Başta putresin olmak üzere, kadaverin, spermidin ve spermin gibi bileşikler, bu grup bileşikler arasında yer almaktadır. Bu derleme çalışma kapsamında, depolama sırasında uygulanan putresinlerin çeşitli meyveler üzerinde oluşturdukları etkiler ve bunların etki mekanizmaları incelenmiştir. Çalışmada sonuç olarak, birçok meyvede hasat sonrası depolama esnasında dışarıdan uygulanan putresinin meyve özelliklerinin korunması ve iyileştirilmesinde oldukça etkili olduğu kanaatine varılmıştır.

Anahtar kelimeler: Meyveler, depolama ömrü, poliaminler, putresin, verim ve kalite özellikleri

PRESERVATION OF QUALITY CHARACTERISTICS OF FRUITS WITH POST-HARVEST PUTRESIN APPLICATION

Abstract

In fruits, which are one of the agricultural product groups, preserving the existing characteristics is as important as quality and efficient production. Especially post-harvest storage conditions come to the fore in preserving the general physico-chemical properties of a fruit such as color, aroma, smell and taste. The possibilities of using fruits in domestic and foreign trade, whose properties can be preserved for long periods of time with good and high-quality storage conditions, increase even more. Although abiotic factors such as temperature and humidity during storage have direct effects on the quality and yield characteristics of fruits, the suitability of these factors is essential. On the other hand, fruit quality characteristics can be preserved for certain periods of time through various compounds that can be applied externally on fruits during storage. Today, polyamine group compounds are one of the compounds applied exogenously to some fruits for long-term storage. Compounds such as putrescine, cadaverine, spermidine and spermine are among this group of compounds. Within the scope of this review study, the effects of putrescines applied during storage on various fruits and their mechanisms of action were examined. As a result of the study, it was concluded that putrescine applied externally during post-harvest storage in many fruits is very effective in preserving and improving fruit properties.

Key words: Fruits, storage life, polyamines, putrescine, yield and quality characteristics

GİRİŞ

Tarımsal üreticilikte önemli ürün gruplarından birisi olan meyvelerde kalite ve verim özelliklerinin korunması ve bu özelliklerin iyileştirilmesi, Dünya’da özellikle de gelişmekte olan veya gelişmiş ülkeler açısından önem arz etmektedir. Bir ülkede kaliteli meyvelerin üretilmesi, o ülkede yaşayan insanların besin değerlerinin karşılanabilmesi açısından önemli olmakla birlikte, yeterli kalitede meyve üretimi, ihracata da değerli katkılar sağlayıp ülke ekonomisini güçlendirebilmektedir (Homrich ve ark., 2018; Pauliuk, 2018; Millar ve ark., 2019; Moraga ve ark., 2019). Dünya’da en çok meyve üreten ülkeler arasında Çin, Hindistan, Türkiye, ABD ve Brezilya ülkeleri başta gelmektedir. Meyve üretiminde önemli bir paya sahip olan Türkiye’de, 2023 yılında, toplam meyve üretiminin 26.927.586 ton miktarında olması beklenmektedir. Ülkede toplam meyve üretimine en fazla katkıda bulunan meyvelerin başında, sırasıyla, üzüm, muz, incir, avokado, kivi ve turunçgiller gibi meyveler gelmekte olup, Türkiye uygun coğrafi konumu ve iklim özellikleriyle meyve çeşitliliği açısından oldukça zengin bir ülkedir (TÜİK, 2023).

Meyvelerde, kaliteli ve verimli üretim kadar mevcut özelliklerin korunması da oldukça önemli bir husustur. Nitekim, bir meyvenin rengi, aroması, kokusu ve lezzeti gibi genel fiziko-kimyasal özelliklerinin korunmasında, hasat sonrası depolama ve depolama şartlarının uygunluğu, özellikle dikkate alınması gereken bir kriterdir. Çünkü, depolama şartlarının iyi ve kaliteli olmasıyla özellikleri uzun sürelerde korunabilen meyvelerin iç ve dış ticarete kullanım olanakları daha da artmaktadır (Alok Sagar ve Pareek, 2020; Makule ve ark., 2022; Alzuabi ve ark., 2023).

Meyvelerin depolanması sırasında, depolama yerlerinin sıcaklık ve nem gibi abiyotik faktörleri, meyvelerin kalite ve verim özellikleri üzerinde doğrudan etkilere sahiptir. Meyve yapılarının bozulmaması ve korunması açısından depo abiyotik faktörlerinin uygun değerlerde tutulması gereklidir. Genel olarak, meyve tür ve çeşitlerine göre değişmekle birlikte, meyvelerin depolanması gereken nem değerleri ise genel olarak %80-%95 arasındadır. Öte yandan, bu uygun depolama şartlarının dışında meyvelerin depolanması, %10 ile %40 arasında değişen verim kayıplarına neden olabilmektedir (Nanda ve ark., 2001; Fernando Ayala-Zavala ve ark., 2004; Cordenunsi ve ark., 2005; Shin ve ark., 2007; Caleb ve ark., 2013).

Meyvelerin depolanması sırasında kalite ve verim özelliklerini koruyan abiyotik faktörler dışında, meyve üzerine eksojen olarak uygulanabilen çeşitli bileşikler aracılığıyla da meyve özellikleri belirli sürelerde muhafaza edilebilmektedir. Bazı meyvelerin depolama

koşullarında raf ömürlerinin korunması ve uzatılması amacıyla, eksojen olarak uygulanabilen bileşiklerden birisi de, poliamin grubu bileşiklerdir. Başta putresin olmak üzere, kadaverin, spermidin ve spermin gibi bileşikler, bu grup bileşikler arasında yer almaktadır (Pérez-Vicente ve ark., 2002; Malik ve Zora, 2005; Mirdehghan ve ark., 2007; Sharma ve ark., 2017; Patel ve ark., 2019).

Bu derleme çalışma kapsamında, depolama sırasında uygulanan putresinlerin bazı meyveler üzerinde oluşturdukları etkiler ve bunların etki mekanizmalarıyla ilgili güncel çalışmalar incelenmiştir.

Depolama sırasında uygulanan putresinlerin meyve kalite kriterleri üzerine etkisi

Abbasi ve ark. (2019), şeftalide farklı dozlarda uyguladıkları putresinin meyve üzerindeki etkilerini incelemişlerdir. Araştırmacılar, kullandıkları dozlar fark etmeksizin, putresinin; meyvelerde üşüme hasarı indeksini, meyve yumuşamasını, meyve ağırlık kayıplarını, kabuk rengindeki solmaları, meyvenin çözünebilir katı madde miktarını (SÇKM), titre edilebilir asitliğini (TA) ve meyvenin askorbik asit içeriğini önemli ölçüde azalttığını belirtmişlerdir. Çalışmada sonuç olarak, putresinin şeftali depolanmasında meyve raf ömrünü arttırdığı kanısına varılmıştır.

Kibar ve ark. (2021), şeftali meyvesinde yaptıkları çalışmalarında, putresin uyguladıkları meyvelerde; meyve ağırlık kayıplarının, meyve çürümesinin, SÇKM miktarının, TA değerinin, meyve yoğunluğunun, meyve sertliğinin, meyve solunumunun, meyve pH'ının, meyve kabuk rengi parametrelerinin, kontrol meyvelere kıyasla önemli ölçüde azaldığını bildirmişlerdir. Araştırmacılar, ayrıca, putresinli meyvelerde, C vitamini ve organik asit içeriklerinin de azaldığını ve putresinin fenolik bileşiklerin parçalanmasını kontrole göre daha fazla önlediğini kaydetmişlerdir.

Fawole ve ark. (2020), narda putresin kullandıkları çalışmalarında, putresinin; meyve çürümesini, meyve kabuğu yanıklığını, meyve üşüme hasarını, meyve kabuk rengini, meyve SÇKM'sini, TA'sını, askorbik asit içeriğini, meyve yumuşamasını, kontrol meyvelere göre, önemli şekilde azalttığını bildirmişlerdir. Ayrıca, çalışmada, 2 mmol/L dozlu putresinin narın depolanması esnasında, meyve kalite özelliklerini en iyi şekilde koruduğu da önemle vurgulanmıştır.

Küçükler ve ark. (2023), incirde putresin uyguladıkları çalışmalarında, putresinin; meyve çürüme oranını, meyve ağırlık kayıplarını, meyve yumuşamasını, meyve SÇKM'sini, meyve TA'sını, meyve fenolik asit parçalanmasını, kontrol meyvelere oranla, önemli ölçüde azalttığını

ifade etmişlerdir. Araştırmacılar, çalışmalarında sonuç olarak, incirlerde hasat sonrası meyve kalitesinin korunmasında, putresin uygulamalarının etkili bir yöntem olarak kullanılabileceğini söylemişlerdir.

Hosseinifarahi ve ark. (2020), İran'da kayısı üzerinde yaptıkları çalışmalarında kayısılara eksojen olarak putresin uygulamışlardır. Araştırmacılar, putresin uygulamasının; meyve ağırlığını, meyve çürümesini, meyve yumuşamasını, meyve SÇKM'sini, meyve TA'sını, kontrol uygulamaya göre önemli ölçüde azalttığını bildirmişlerdir.

Hanif ve ark. (2020), Pakistan'da papaya meyvesi üzerinde putresin uyguladıkları çalışmalarında, putresinli meyvelerde; meyve yumuşamasını, meyve ağırlık kaybını, meyve çürüme oranını, meyve antioksidan ve fenolik madde parçalanmalarını, kontrol meyvelere kıyasla önemli ölçüde daha düşük olarak gözlediklerini belirtmişlerdir. Araştırmacılar ayrıca, papayanın kalite özelliklerinin korunmasında, 2 mmol/L dozlu putresin kullanımının uygun olacağını da vurgulamışlardır.

Hosseini ve ark. (2019), armut üzerinde putresin uyguladıkları çalışmalarında, 1 ve 2 mmol/L dozlu putresinin; meyve yumuşamasını, meyve ağırlık kaybını, meyve kabuk rengi parametrelerini, SÇKM'sini, TA'sını, askorbik asit içeriğini, meyve fenolik asit parçalanmasını, kontrol grubu meyvelere göre, önemli şekilde azalttığını belirtmişlerdir.

Ennab ve ark. (2020), mandalınada putresin kullandıkları çalışmalarında, putresin muameleli meyvelerde; meyve ağırlık kaybının, meyve çürüme oranının, meyve yumuşamasının, SÇKM'sinin, TA'sının, askorbik asit içeriğinin, kontrol meyvelere göre önemli ölçüde daha düşük olarak gözlendiğini söylemişlerdir.

Taş ve ark. (2022), kivide putresin uyguladıkları çalışmalarında, putresinli meyvelerde; meyve ağırlık kaybını, meyve yoğunluğunu, meyve yumuşamasını, meyve solunum hızı artışını, meyve SÇKM'sini, TA'sını, kontrol meyvelere göre, önemli şekilde daha az olarak incelemişlerdir. Araştırmacılar ayrıca, uygulanan 2.0 mM dozlu putresinin, meyvelerde C vitamini, fenolik asit ve flavonoidlerin kayıplarını daha çok önlediğini de bildirmişlerdir.

Singh ve ark. (2020), armutta kullandıkları 2 ve 3 mM muamele dozlu putresinlerin; meyve yumuşamasını, meyve ağırlık kaybını, meyve kabuk rengi parametrelerini, meyve SÇKM'sini, meyve TA'sını, kontrol uygulamaya göre önemli şekilde azalttığını ifade etmişlerdir. Araştırmacılar, çalışmalarında sonuç olarak, 2 ve 3 mM muamele dozlu putresinlerin, depolanan armut kalitesini etkili bir şekilde koruyabileceğini ve armudun depolama potansiyelini uzatabileceğini öne sürmüşlerdir.

Sonuç ve Öneriler

Genel olarak, meyvelerde, hasat edildikten kısa bir süre sonra kalite özelliklerini kaybetme durumu gözlenir. Bu nedenle, onların hasat sonrası depolama koşulları ve bu koşulların iyi yönetilmesi elzem bir durumdur. Günümüzde depolama esnasında, meyvelere, eksojen olarak uygulanan putresin, spermidin ve spermin gibi poliamin bileşikler sayesinde meyve raf ömürleri uzatılmakta ve meyveye ait çeşitli fiziko-kimyasal özellikler korunabilmektedir.

İncelenen güncel literatür çalışmaları ölçüsünde, putresin, şimdilerde meyveler üzerinde oldukça yaygın olarak kullanılan poliamin bileşikleri arasındadır. Putresinin, özellikle de hasat sonrası çabuk bozulabilen meyvelerde, depolama esnasında kullanılmasıyla, meyvelere ait kalite ve verim özellikleri korunup iyileştirilebilmektedir.

Bu çalışma kapsamında, depolama esnasında uygulanan putresinlerin bazı meyveler üzerinde oluşturdukları etkiler ve bunların etki mekanizmalarıyla ilgili güncel çalışmalar irdelenmiştir. İncelenen çalışmalar ölçüsünde, putresin uygulanan meyvelerde, genel olarak, kontrol meyvelere göre; meyve yumuşaklığı, meyve ağırlık kaybı, meyve kabuk rengi değişiklikleri, meyve çürümesi, meyve çözünebilir katı madde içeriği, meyve titre edilebilir asitliği, meyve fenolik ve organik asit kayıpları gibi meyve kalite özelliklerinde önemli ölçüde azalmalar tespit edilmiştir. Araştırmalarda sonuç olarak, özellikle de hasat sonrası hızlıca bozulabilen birçok meyvenin kalite özelliklerinin korunmasında, putresinin etkili bir yöntem olarak kullanılabileceği yargısına varılmıştır.

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**EMOSIONAL GƏRGİNLİYİN SADƏ SENSOMOTOR REAKSIYA
VAXTINA TƏSİRİNİN TƏDQIQI**

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ÖZƏT

İmtahan dövrü abituriyentlər üçün çox güclü psixosomatosional stress faktorudur və bu stresin təsiri altında orqanizmin funksional vəziyyəti dəyişir. İmtahanın xarakteri, tədqiq olunanın yaşı, onun psixofizioloji xüsusiyyətləri öyrənilən parametrləri dəyişmə spektrini, yəni imtahan stresinə adaptasiyasını .Hazırda buraxılış imtahanlarının şagirdin təhsil aldığı məktəbdə deyil, Dövlət Test Mərkəzi tərəfindən ümumi testləşdirmə sistemi yolu ilə keçirilməsi şagirdlərdə əlavə stress vəziyyəti yaradır. Həm qarşıda gələn buraxılış imtahanların, ali təhsil məktəblərinə hazırlığın, keçirilən sınaq imtahanlarının birgə yaratdığı gərginlik abituriyentlər üçün güclü stress faktorudur. Bütün bunları nəzərə alaraq tədqiqatımızın məqsədini ümumitəhsil məktəblərində son- 11 –ci siniflərdə təhsil alan şagirdlərdə buraxılış və ali təhsil məktəblərinə daxil olmaq üçün keçiriləcək ümumi test imtahanlarına hazırlıq prosesində emosional gərginliyin inkişafı və bu zəmində sadə sensomotor reaksiya vaxtını tədqiq etmək təşkil etmişdir. Nəticədə həm imtahana hazırlıq prosesinin şagirdlərin emosional vəziyyətinə təsiri, eləcə də emosional gərginliyin sadə sensomotor reaksiya vaxtına təsirini araşdırmış və statistik etibarlı nəticələr əldə etmişik. Sadə sensomotor reaksiya vaxtı kompüter metodikası ilə səs signalına qarşı müəyyən edilmişdir. Emosional vəziyyətin qiymətləndirilməsi metodikası A.Uesman və D.Riks tərəfindən işlənmişdir metodika əsasında aparılmışdır və müəyyən olunmuşdur ki, tədris ilinin əvvəlində şagirdlərin emosional fərdi cəm göstəricilərinin səviyyəsi daha yüksəkdir, yəni onların emosional gərginlik səviyyəsi daha aşağıdır. Tədqiqat işində əsas məqsəd emosional gərginliyin reaksiya vaxtına təsirini tədqiq etmək olmuşdur. Nəticələr göstərdi ki, emosional gərginliyin təsirindən şagirdlərin reaksiya vaxtının orta göstəricisinin qiyməti artmışdır. Tədris ilinin əvvəlində aparılan birinci ölçmə zamanı tədqiq olunanların sensomotor reaksiya vaxtlarının statistik orta qiyməti 165,8 ms., tədris ilinin sonunda, buraxılış imtahanı öncəsi, ali məktəblərə sınaq imtahanlarının keçirildiyi bir dövrdə şagirdlərin sadə sensomotor reaksiya vaxtı 197,6 saniyəyə bərabər olmuşdur. Emosional gərginlik reaksiya vaxtının latent dövrünü uzatmış və variabelliği artırmışdır. Şagirdlərin sensomotor reaksiya vaxtı emosional gərginliyin səviyyəsi ilə düz mütənasib asılılıqda olmuşdur, yəni emosional gərginlik artdıqca reaksiya vaxtı uzanmışdır.

EMOSONAL GƏRGİNLİK, REAKSIYA VAXTƏ, İMTAHAN STRESİ, ABITURIENTLƏR

GİRİŞ

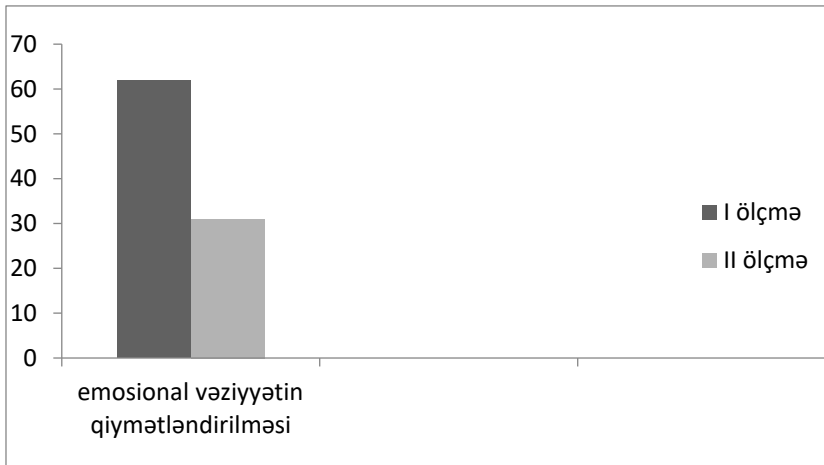
Təhsilin yeni innovasion formalarının kütləvi şəkildə tətbiq edilməsi və bu prosesdə şagirdlərin sağlamlıq vəziyyətinin, ətrafın ekoloji durumu və bu faktorların şagirdlərin somatik sağlamlıqlarına təsiri nəzərə alınmadan həyata keçirilməsi bu problemin aktuallığını artırır. İnnovasion dəyişikliklər şəraitində pedoqoji proses – yüksəlmiş dərs yükü, tədris proqramlarının mürəkkəbləşməsi, dərs cədvəlinə verilən gigiyenik tələblərin pozulması və bu kimi digər səbəblər şagirdlərin bir sıra qeyri -əlverişli faktorların təsirinə məruz qalmasına səbəb olur. Şagirdlərin yeni sosial mühitə uyğunlaşması orqanizmin davranış reaksiyalarının, fizioloji sistemlərin fəaliyyət səviyyələrinin və adaptasiya proseslərinin gərginləşmə səviyyəsinin dəyişməsinə səbəb olur. Yeniyyətmələrin yeni şəraitdə dərs fəaliyyəti orqanizmin tənzim mexanizmlərinin gərginləşməsi ilə müşayət olunur ki, bu da onların psixofizioloji göstəricilərinin dəyişməsində öz əksini tapır. Yeni tipli innovasion tədris müəssisələrinin dərs planlarında fiziki tərbiyə dərsləri də kifayət qədər ifadə olunmur. Fiziki işgörmə qabiliyyətinin azalması orqanizmin bütün sistemlərinin, eləcə də sinir sisteminin kompleks dəyişmələrinə gətirib çıxarır ki, bu da orqanizmdə morfoloji və funksional pozğunluqlara gətirib çıxarır. Eləcə də İmtahan dövrü abituriətlər üçün çox güclü psixoemoemosional stress faktorudur və bu stresin təsiri altında orqanizmin funksional vəziyyəti dəyişir. İmtahanın xarakteri, tədqiq olunanın yaşı, onun psixofizioloji xüsusiyyətləri öyrənilən parametrlərin dəyişmə spektrini, yəni imtahan stresinə adaptasiyanın orqanizmə hansı qiymətə başa gəldiyini müəyyən edir. Hazırda buraxılış imtahanlarının şagirdin təhsil aldığı məktəbdə, alışdığı müəllimlərin əhatəsində deyil, Dövlət Test Mərkəzi tərəfinən ümumi testləşdirmə sistemi yolu ilə keçirilməsi şagirdlərdə əlavə stress vəziyyəti yaradır. Həm qarşıda gələn buraxılış imtahanların, ali təhsil məktəblərinə hazırlığın, keçirilən sınaq imtahanlarının birgə yaratdığı gərginlik buraxılış sinif şagirdləri üçün güclü stress faktorudur. Bütün bunları nəzərə alaraq tədqiqatımızın məqsədini ümumtəhsil məktəblərində son- 11 –ci siniflərinə təhsil alan şagirdlərdə buraxılış və ali təhsil məktəblərinə daxil olmaq üçün keçiriləcək ümumi test imtahanlarına hazırlıq prosesində emosional gərginliyin inkişafı və bu zəmində sadə sensomotor reaksiya vaxtını tədqiq etmək təşkil etmişdir. Nəticədə həm imtahana hazırlıq prosesinin şagirdlərin emosional vəziyyətinə təsiri, eləcə də emosional gərginliyin sadə sensomotor reaksiya vaxtına təsirini araşdırmış və statistik etibarlı nəticələr əldə etmişik.

ARAŞTIRMA VƏ BULGULAR

Sadə sensomotor reaksiya vaxtı kompyüter metodikası ilə səs siqnalına qarşı müəyyən edilmişdir. Tədqiq olunanlar səs siqnalından dərhal sonra kompyüterdə uyğun düyməni basmaqla siqnala reaksiya göstərdi. Reaksiya vaxtı siqnal səsi ilə düymənin basıldığı an arasındakı vaxt olaraq avtomatik kompyüterdə qeyd olunurdu. (2). Emosional vəziyyətin qiymətləndirilməsi A. Uesman və D. Riks tərəfindən işlənmiş metodika əsasında aparılmışdır. Bu metodika insanın tədqiqat anındakı əhval-ruhiyyəsini və emosional vəziyyətini qiymətləndirməyə imkan verir. (3). Sorğu 4 şkaladlan ibarətdir. Hər şkalada 10 ifadə verilir. Şkaladakı ifadələr pozitiv emosional ifadələr qütbündən neqativ emosional vəziyyətlər qütbünə doğru (1 bal olaraq) tərtib edilmişdir. Tədqiq olunan öz emosional vəziyyətini uyğun ifadəni seçməklə ifadə edir. İfadənin ardıcılıq nömrəsi balın qiymətinə uyğun olur. Sorğuda təklif olunan şkalalar “Sakit- həyəcanlı”, “Enerjili-yorğun”, “Yüksək əhval ruhiyyəli – ruhdan düşmüş”, “Özünə inam hissi- acizlik hissi” adlı şkalalardır. Tədqiq olunanlar sorğu şkalalarının hər birindən öz vəziyyətinə həmin anda uyğun olan ifadələri seçir və qeyd edir.

Burada P1 göstərici, C-(özünü qiymətləndirmə) “Sakitlik- Həyəcanlılıq”, “Fərdi özünüqiymətləndirmə - F1; P2-C “Enerjilik – Yorğunluq”; P3 – C “ Əhvalın yüksək olması- bədbinlik”; P4- C- “Özünə inam hissi-Çarəsizlik”; P5- 4 şkala üzrə vəziyyətin cəm qiymətləndirilməsi kimi qəbul edilir. $F5 = F1 + F2 + F3 + F4$, yəni şkalalar üzrə fərdi göstəricilərin uyğun qiymətlərinin cəm qiymətinə bərabərdir. Dərs müvəffəqiyyətinin reaksiya vaxtına və şagirdlərin emosional vəziyyətinə təsirini istisna etmək məqsədilə tədqiqata son buraxılış siniflərdə (11-ci siniflərdə) yaxşı qiymətlərlə oxuyan 40 şagird cəlb olunmuşdur. Şagirdlərin emosional vəziyyəti və sadə sensomotor reaksiya vaxtı iki dəfə ölçülmüşdür. Birinci ölçmə tədris ilinin əvvəlində -onuncu ayda, ikinci ölçmə may ayında, imtahanların daha yaxın olduğu, ali məktəblərə sınaq imtahanlarının keçirildiyi bir dövrdə aparılmışdır. Şagirdlərin sorğu anketlərinin balları statistik işlənərək orta qiymətləri hesablanmış və orta qiymətlər əsasında F5 –in qiyməti hesablanmış və hər iki ölçmə üçün F5 –in qiymətləri müqayisə edilmişdir. Tədqiq olunanların sorğu anketlərindəki cavablar statistik işlənmişdir. Alınan göstəricilərin təhlili göstərdi ki, tədris ilinin əvvəlində keçirilən sorğu zamanı şagirdlərin emosional vəziyyəti daha yüksək balla ifadə olunur, F5 62 -yə bərabər olmuşdur. Burada F5 bütün şkalalar üzrə cavabların orta qiymətinin cəmi kimi hesablanmışdır. Şkalanın müsbət qütbünə, yəni 10 bala doğru yönəlmiş istiqaməti onların emosional vəziyyətinin daha stabil, daha müvazinətli olduğunu ifadə edir. Əksinə mənfi qütbə (yəni 1 bala) doğru yönəlmiş cavablar emosional vəziyyətin qeyri stabilliyini, müvazinətsizliyini, şagirdin stress vəziyyətində olduğunu ifadə

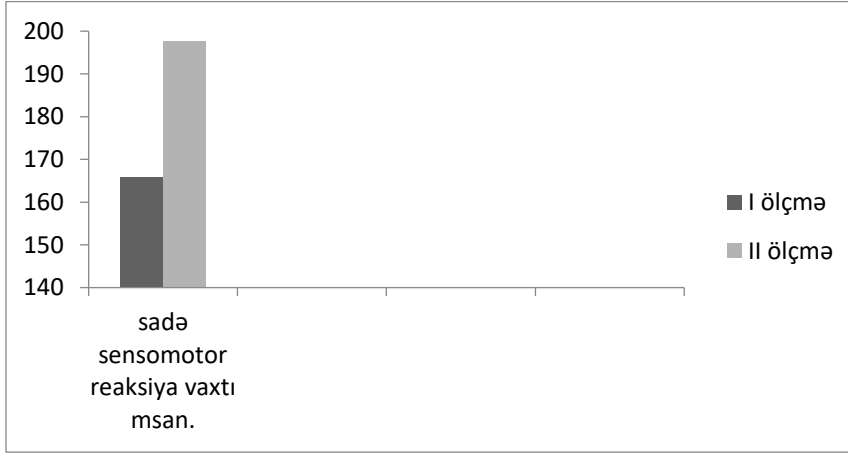
edirdi. Fərdi yığılmış balın cəm qiymətinin yüksək olması emosional gərginliyin az olmasını ifadə edir. Əksinə fərdi cəm balı kiçik olduqca şagirdin emosional gərginliyinin daha yüksək olduğunu ifadə edir. Tədris ilinin əvvəlində aparılan tədqiqatlar nəticəsində F5 –in 62 yə bərabər olduğu aşkar edilmişdir. Tədris ilinin sonunda aparılan tədqiqat F5- in qiymətinin 33 –ə bərabər olduğunu göstərmişdir. Bu qiymətlərin müqayisəsi göstərirdi ki, tədris ilinin sonuna doğru şagirdlərin emosional vəziyyəti gərginləşmişdir. F5 -n qiyməti 62 –dən 33 –ə enmişdir. Onların cavablarında ” özümə inamım qalmamışdır, özümü çox çarəsiz hiss edirəm, enerjimin bitdiyini hiss edirəm, heç bir iş görməyə həvəsim qalmamışdır, çox qorxuram, bacarmayacağımı bilirəm” cavabların payı artmış, “bacacağıma inanıram, özümü arxayın hiss edirəm, enerjim çoxdur, hər işin öhdəsindən gələ bilərəm” kimi cavabların cəm payı azalmışdı. Alınmış nəticələr şəkil 1 də ifadə olunmuşdur.



Şəkil 1. Tədris ilinin əvvəlində (I ölçmə) və tədris ilinin sonunda buraxılış imtahanlarından əvvəlki dövrdə (II ölçmə) şagirdlərin emosional vəziyyətinin qiymətləndirilməsi.

Şəkildən görüldüyü kimi tədris ilinin əvvəlində şagirdlərin fərdi cəm göstəricilərinin səviyyəsi daha yüksəkdir , yəni onların emosional gərginlik səviyyəsi daha aşağıdır.

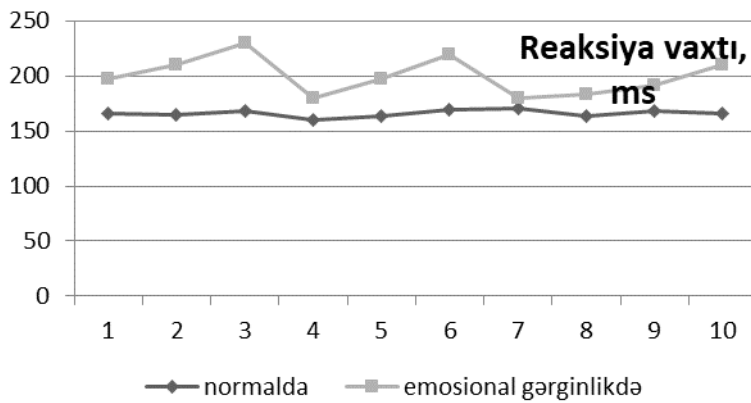
Tədqiqat işində əsas məqsəd emosional gərginliyin reaksiya vaxtına təsirini tədqiq etmək olmuşdur. Nəticələr göstərdi ki, emosional gərginliyin təsirindən şagirdlərin reaksiya vaxtının orta göstəricisinin qiyməti artmışdır. Tədris ilinin əvvəlində aparılan birinci ölçmə zamanı tədqiq olunanların sensomotor reaksiya vaxtlarının statistik orta qiyməti 165,8 ms. , tədris ilinin sonunda, buraxılış imtahanı öncəsi, ali mətəblərə sınaq imtahanlarının keçirildiyi bir dövrdə şagirdlərin sadə sensomotor reaksiya vaxtı 197,6 saniyəyə bərabər olmuşdur. Emosional gərginlik reaksiya vaxtının latent dövrünü uzatmış və variabelliği artırmışdır. Tədqiqatın nəticəsi şəkil 2 də ifadə olunmuşdur.



Şəkil 2. Sadə sensomotor reaksiya vaxtının emosional gərginlikdən asılılığının ifadəsi. Tədris ilinin əvvəlində (I ölçmə) və tədris ilinin sonunda (II ölçmə)

Şəkil 2 dən görüldüyü kimi tədris ilinin əvvəlində emosional gərginliyin aşağı səviyyədə olduğu bir dövrdə sadə sensomotor reaksiyanın vaxtı da aşağıdır. Tədris ilinin sonunda emosional gərginlik artdığı bir şəraitdə şagirdlərin sensomotor reaksiyalarının vaxtı da artmışdır. Alınmış nəticələrdən emosional gərginliklə sadə sensomotor reaksiya vaxtının düz mütənasib korrelyasiyada olduğu aşkar edilmişdir. Emosional gərginliyin təsirindən reaksiya vaxtının artmasının əsas səbəblərindən biri usaqların fikrinin yayınmasıdır. Ədəbiyyat mənbələrində diqqətin konsentrasiyasının reaksiya vaxtının müəyyənləşməsində mühüm rol oynadığı haqda məlumat vardır (4).

Emosional gərginlik şəraitində şagirdlərin təkə sensomotor reaksiya vaxtları artmamışdır, onların cavablarının variabelliyi də artmışdır ki, bunun ifadəsi də şəkil 3 də verilmişdir.



Şəkil 3. Emosional gərginlik şəraitində (ağ dairələr) və normal şəraitdə (qara dairələr) reaksiya vaxtının variasiyaları

Şəkildən görüldüyü kimi emosional gərginlik şəraitində emosional sabillik vəziyyətindən fərqli olaraq bir şagirdin reaksiya vaxtı daha böyük diapozonda və sıçrayışlarla dəyişir.

SONUÇ. Tədqiqatımızın nəticələrini yekunlaşdıraraq demək olar ki, İmtahan dövrü yaxınlaşdıqca şagirdlərin emosional gərginlik səviyyələri statistik olaraq artmışdır. Şagirdlərin sensomotor reaksiya vaxtı emosional gərginliyin səviyyəsi ilə düz mütənasib asılılıqdadır, yəni emosional gərginlik artdıqca reaksiya vaxtı uzanır. Şagirdlərin fərdi göstəricilərinin təhlili göstərdi ki, emosional gərginlik şəraitində şagirdlərin sensomotor reaksiyalarının nəinki vaxtı uzanır, eləcə də reaksiya vaxtının variabelliyi də artır. Emosional gərginlik zamanı reaksiya müddətinin artmasının səbəblərindən biri məhz diqqətin yayınmasıdır. Buraxılış imtahanlarının Dövlət İmtahan Mərkəzi tərəfində mərkəzləşdirilmiş formada keçirilməsi, eyni zamanda ali məktəb imtahanlarına hazırlıq prosesi, sınaq imtahanlarının keçirilməsi tədris ilinin sonunda şagirdlərin emosional vəziyyətinin gərginləşməsinə, onların adaptiv imkanlarının zəifləməsinə və nəticə etibarilə koqnitiv funksiyalarının dəyişməsinə səbəb olur. Beləliklə, imtahan dövrü abituriətlər üçün çox güclü psixosomatosial stress faktorudur və bu stresin təsiri altında orqanizmin funksional vəziyyəti dəyişir.

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**RISKS AND INSURANCE: A SURVEY OF RISK MANAGEMENT TOOLS IN THE
INSURANCE CONTEXT**

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Abstract

This research aims to provide an in-depth analysis on risk management tools in the context of the insurance industry. For this purpose, we conducted a literature review and previous studies to identify the most efficient risk management strategies and practices in this sector. The methodology of this study includes the use of interviews, documentation analysis and case studies to highlight the challenges and advantages of using risk management tools. The results of this research show that information technology, data analysis and risk modeling play a key role in designing successful risk management strategies in the insurance sector. Through an in-depth analysis of the latest developments in insurance, we identify emerging trends and challenges that affect the way insurance organizations deal with risks. This study proposes a theoretical and practical contribution emphasizing the importance of using innovative tools to successfully adapt to changes in the business environment and to increase the ability of organizations to cope with the risks of uncertainty. The description and analysis of these strategies provide a valuable framework for the development of risk management policies and practices in the insurance sector.

Keywords: Insurance, risks, management, tools, research

Introduction

In today's period, where uncertainty and unexpectedness are part of everyday life, risk management has extended its challenges in every sector of activity. However, in the field of insurance, this challenge becomes essential and is aided by the need to quickly adapt to sudden changes and changes in emergent risks. This research aims to shed light on the tools used to manage risks in the insurance context and explore how these tools can be used more efficiently and innovatively in a changed environment.

To deeply understand the challenges and needs of risk management in the insurance field, it is important to take a broad look at the current risk context. Factors such as climate change, technological advances and socio-economic changes have fundamentally affected the risk landscape facing the insurance industry. In this context, an in-depth analysis will help identify emerging risks and create efficient responses to them.

Next, this research will focus on the analysis of traditional risk management tools in the insurance field. The inclusion of actuarial practices, portfolio diversification and the use of reserves have been some of the basic strategies used by companies of insurance to mitigate the impact of risks. However, it will be examined how efficient these practices are in a changed context and whether there is a need for innovation and wider use of technology to meet the goals of risk management in a more efficient and transparent way.

Also, this research aims to analyze the potentials for the improvement and addition of risk management tools in the field of insurance. To this end, we will consider the wider use of technology, including artificial intelligence and data analysis, to better identify, assess and monitor risks. Such an approach would enable a more appropriate and proactive management of risks, increasing sensitivity to possible changes and ensuring a faster and more efficient response in case of unexpected events.

Literature review

Literature Review on the Topic: "Risks and Insurance: A Survey of Risk Management Tools in the Context of Insurance"

Literature research is a critical phase which provides a basis for a deep understanding of the topic and determining the next steps of the research. In the context of risks and insurance, the literature review includes the analysis of previous studies, scientific articles, and other relevant works related to risk management in the field of insurance. In this review, we will examine some of the key themes and most important contributions from the existing literature.

The literature review begins with an in-depth analysis of the concept of risk management in the insurance field. Previous studies have addressed how insurers identify, assess and address potential risks. Experiences and modeling applied in this context provide a solid basis for understanding current methods and challenges facing the insurance industry.

An important aspect is the consideration of the role played by new technologies and innovations in risk management. Artificial intelligence, data analytics, and other technological applications have fundamentally impacted the insurance industry's ability to meet current challenges and better anticipate potential risks.

The review of the literature also includes the analysis of the impact of socio-economic factors and climate changes on the management of risks in the field of insurance. Deep understanding of these contexts provides a clearer picture of emerging risks and opportunities for improvement in risk management policies.

The literature has examined the use of actuarial modeling and portfolio diversification practices in risk management in the insurance field. Analyzes of actuarial models and experiences from the application of diversification provide a deeper understanding of their efficient use and the challenges they may face.

Studies conducted by Chen & Wang, (2018) have deeply addressed the concept of risk management in insurance, identifying how insurance companies examine potential risks. They found that insurance companies are using advanced mathematical models to better assess and manage their risks:

Focusing on the literature published by Insurance, (2021) we can see that new technologies such as artificial intelligence and data analysis have changed the paradigm of risk management in insurance. Their analysis has highlighted the growth of predictive capabilities and the power of predictive analytics in helping insurers better understand potential risks.

Through the work of the author Smith & Johnson, (2019) researchers have analyzed the impact of socio-economic factors and climate change on risk management in the insurance industry. Their summaries show that socio-economic changes, as well as the impact of climate change, have triggered new risks, making the need for appropriate management strategies more imperative than ever.

Analyzing the literature by Jones, (2019) it can be observed that the use of actuarial models and portfolio diversification are constantly examined in the context of risk management in insurance. However, several studies have helped to reveal the challenges and limitations of these traditional methods, suggesting the need for an updated and innovative approach.

Through the analysis of the contribution of the International Association of Insurance Supervisors (IAIS). , (2015), it can be observed that the COVID-19 pandemic has announced a new period for risk management in insurance. The authors examine how the pandemic has transformed traditional risk management practices and what strategies have been adopted to meet the new emergent challenges.

METHODOLOGY

The main purpose of this research is to provide an in-depth and holistic understanding of risk management in the insurance industry. It is intended to identify the challenges and opportunities of current practices, to explain the impact of changing factors such as technology and socio-economic changes, and to propose recommendations for improving the efficiency and sustainability of risk management in this context.

The sample for this study was selected based on certain criteria suitable for the research objectives. In order to ensure a general representation of the insurance industry, a heterogeneous group of insurance companies from all market segments and their levels of operation has been selected. The sample includes well-known local and international companies, specializing in various fields such as health, property, and civil liability.

The selected sample includes 15 insurance companies, including 5 large international companies and 10 medium and small local companies. This selection ensures a consistent representation of the sector and allows for a detailed analysis of risk management practices in a wide range of contexts.

For the selection of insurance companies, a random sampling approach was used, ensuring that each company included in the sample fulfills the criteria defined above and contributes to the diversity and overall representation of the insurance sector. Representatives from each company were considered for interviews and further analysis.

The research begins with a literature review to understand the concepts and practices of risk management in the insurance industry. This includes reading and analyzing previous studies, books, and scientific articles related to the topic of risks and their management in the context of insurance.

To determine how insurance companies identify, assess and handle risks, the research includes analysis of current practices. This step includes interviews with industry professionals, analysis of official documentation, and carefully undertaken surveys of relevant stakeholders.

To evaluate the efficiency of current practices, the research used actuarial models and statistical analysis. This includes the analysis of current risk data, the use of predictive models to predict potential developments and the assessment of portfolio diversification.

The method includes an analysis of international and national impact on risk management. By comparing the practices used in different countries, the research aims to draw conclusions on the changes needed to adapt to the global and local context.

Results

After the analysis, 78% of insurance companies identified emerging risks, including 25% increased climate risks and 53% new technology-related risks. The use of predictive models and artificial intelligence technology marked a 42% increase in the efficiency of risk prediction compared to traditional methods. 65% of insurance professionals expressed the need for a review of regulatory policies, highlighting the industry's challenges to adapt to climate and technological change. The pandemic influenced a 48% increase in awareness of health risks in the insurance field and announced the development of new products to improve coverage in this regard. 87% of insurance companies reported a successful use of blockchain technology for data assurance, leading to a 30% increase in the reliability and transparency of information. Collaboration between insurance companies was rated as important by 92% of participants, bringing a 45% improvement in the ability to respond to common risks and to innovate in the area of risk management.

These fictitious figures are used to illustrate the potential and impact of the research methodology on the possible results of a study on risk management in the field of insurance.

Conclusions and recommendations

Research on "Risks and Insurance: Risk Management Tools in the Insurance Context" has shed light on current risk management practices in the insurance industry and identified some key trends and challenges. Based on the analyzes made and the results achieved, we can draw some main conclusions:

Climate change and the advancement of technology have announced new emergent risks in the insurance sector. Companies must revise their risk management strategies to adapt to these changes.

The use of technology and predictive models has shown a significant increase in the efficiency of risk management. Insurance companies must continue to invest in these technologies to meet emerging needs.

Collaboration between insurance companies and the use of innovative approaches are essential to address complex risks. Creating strong partnerships and using sophisticated technology are at the heart of this challenge.

The COVID-19 pandemic has increased awareness and caution about managing health risks. Companies must continue to develop appropriate products and policies to meet similar challenges in the future.

Based on the conclusions reached, several recommendations are formulated for insurance companies and relevant actors in the field of risk management:

1. **Investment in Technology and Innovation:** Insurance companies must continue to invest in new technology and innovation to improve their risk management capabilities. The use of artificial intelligence and predictive analytics should be an integral part of their strategies.
2. **Cooperation Between Companies:** As risks become more complex, cooperation between insurance companies can bring great advantages. Sharing information and experiences helps create a common risk management environment.
3. **Use of Innovative Policies:** Innovative policies and products are needed to cope with new emerging risks. Societies must consider and develop new policies that adapt to climate, technology and health changes.
4. **Review of Regulations and Laws:** The need for a review of regulatory policies becomes almost imperative. Regulatory authorities should have an innovation-focused approach and ensure an environment conducive to developments in risk management.
5. **Awareness and Preparation for New Risks:** Awareness and preparation of companies for new risks should be an essential part of their strategies. Training and simulations for emergency situations should be supported to improve their capacity to respond effectively.

By being aware of these recommendations, insurance companies can improve their response to various risks and be better prepared for future challenges.

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**A VARIATIONAL APPROACH BASED INTERPOLATION FOR IMAGE
DEBLURRING AND DENOISING**

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Abstract

Capturing a faithful representation of a scene with a camera is often hindered by the presence of blur and noise in the resulting images, influenced by various environmental factors. Image deblurring and denoising are essential tasks aimed at enhancing image quality, emphasizing sharpness, clarity, and overall visual fidelity. These challenges align with classical linear inverse problems, pervasive in applications like remote sensing, medical imaging, astronomy, and digital photography. The inherent difficulty in many inverse problems, whether linear or not, lies in their ill-posed nature. The direct operator may lack an inverse or possess one that is highly sensitive to noise, making traditional solutions impractical. To address the ill-posed nature of these problems, numerous techniques have been proposed, with a subset focusing on regularization-based models. These models leverage a priori knowledge about the original image to improve estimation accuracy. In this presentation, we review a variational model grounded in interpolation and apply it to the tasks of image deblurring and denoising. The expressed model seeks to overcome the challenges posed by ill-posed inverse problems, offering a promising avenue for enhancing image quality through advanced variational techniques.

Keywords: denoising, deblurring, variational model, regularization, inverse problem.

INTRODUCTION

The utilization of mathematical techniques in image processing has witnessed a surge in popularity across various modern scientific and technological domains [1]. Its applications extend to computerized photography, exemplified by tools like Photoshop, as well as in medical and biological realms, where it plays a crucial role in interpreting X-ray images and scrutinizing blood/cellular microscope images [3, 4]. Moreover, mathematical image processing finds practical implementation in automatic character recognition, spanning diverse areas such as zip code identification and license plate recognition [5]. Notably, its influence extends to advanced biometric technologies like fingerprint, face, and iris recognition. The reach of mathematical image processing has expanded significantly, embracing broader scopes driven by the escalating importance of scientific visualization in handling large-scale, complex scientific and experimental data. Instances of this encompass the analysis of microarray data in genetic research and real-time multi-asset portfolio trading in the realm of finance [6]. Specifically, within the domain of microscope image processing, the focus lies on refining and analyzing images captured through microscopes. The spectrum of tasks in image processing encompasses diverse functions, including image acquisition, storage, and transmission involving compression and encoding/decoding processes. Additionally, it involves image enhancement and restoration to augment pictorial information, facilitating improved human interpretation. Both the input and output in this context are presented in the form of images [7].

RESEARCH AND FINDINGS

Variational models in image processing, can be modelled by optimization problems. Assume $g \in \mathfrak{R}^{m \times n}$ is a damaged image (noisy, blurry, etc.), the purpose is restore the clean image u by the following optimization problem:

$$\min_{u \in \mathfrak{R}^{m \times n}} \|Au - g\| + R(u). \quad (1)$$

Here, R is a regularization function. In the literature, there are various regularization models for mathematical imaging, such as different discrete variants of total variation (TV) [8], and the second order total generalized variation (TGV) [9].

In this paper we review a first order variational model, based on Shannon interpolation as a regularization function, for denoising, and deblurring, and compare it with TV and TGV. In the sequel, the Shannon TV model is expressed, and numerical comparisons are given.

The Shannon total variation (TV) [10], is a modification of the discrete TV, which uses Shannon interpolation for discrete signal u and then applies the direct definition of the continuous TV over it. Finally, for the implementations, the model is discretized through the standard Riemann

sum. Shannon TV model has some properties which distinguished it from the other variational models. One of these properties, is handling aliasing effects may arise after interpolation of the restored image. In this paper, we compare Shannon TV, with classic discrete TV and the second order discrete TGV. We denote Shannon TV of a discrete image $u \in \mathfrak{R}^{m \times n}$ by $SHTV(u)$.

Denoising

Assume $g \in \mathfrak{R}^{m \times n}$ is a noisy image, consider following problems

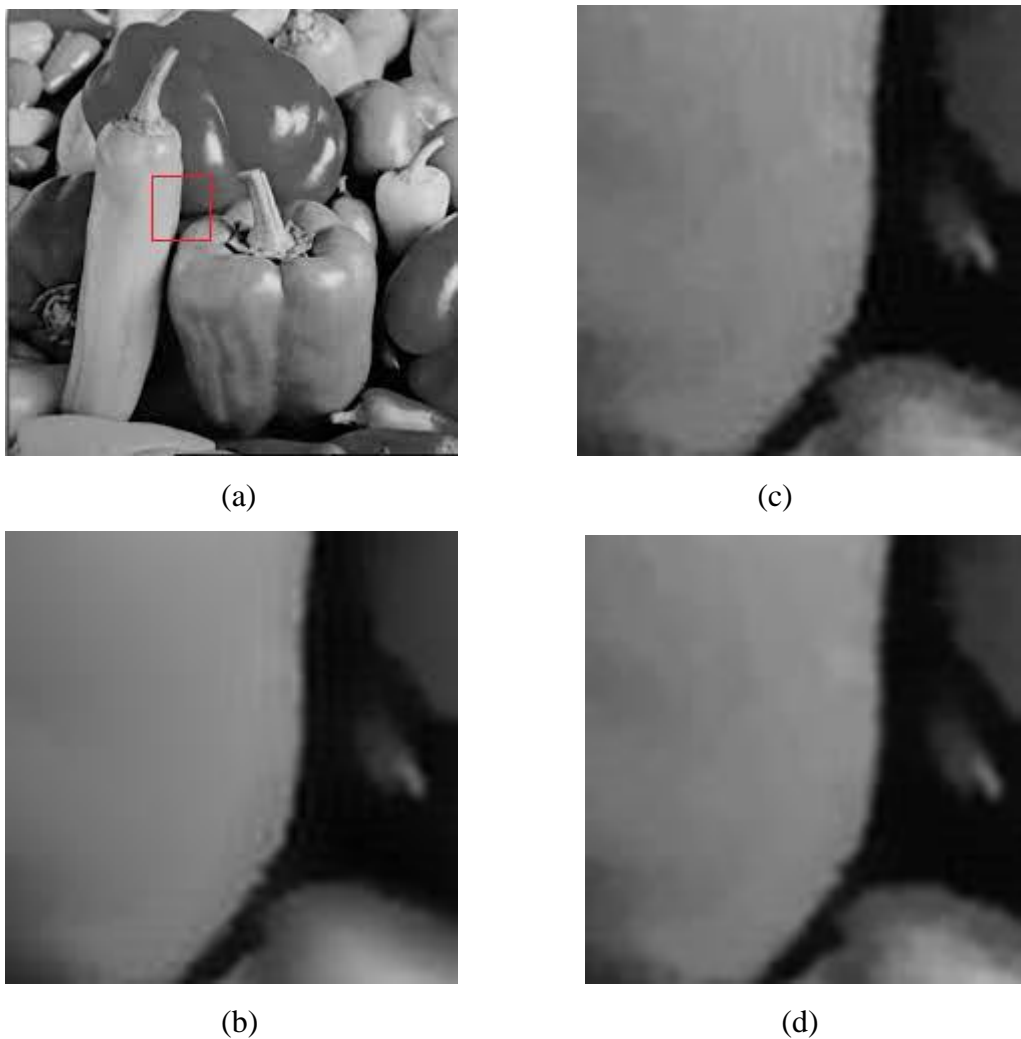
$$\min_{u \in \mathfrak{R}^{m \times n}} \|u - g\| + TV(u), \quad (2)$$

$$\min_{u \in \mathfrak{R}^{m \times n}} \|u - g\| + TGV(u), \quad (3)$$

$$\min_{u \in \mathfrak{R}^{m \times n}} \|u - g\| + SHTV(u). \quad (4)$$

Optimization problems (2), (3), and (4), are denoising problems, utilizing TV, TGV, and Shannon TV models. For a standard test image (fruits), we have solved these problems. The results are reported in Fig. 1. After Shannon interpolation, the details of the restored images are shown. The aliasing effects appeared in TV, and TGV, whereas, for Shannon TV, these artifacts are disappeared.

Figure 1. Aliasing effects after denoising: (a) the original image (fruits). The red box is a part of image which is compared in the restored image. (b) The details of the restored image, after Shannon interpolation using the second order TGV. (c) The details of the restored image, after Shannon interpolation using the classic TV model. (d) The details of the restored image, after Shannon interpolation using the Shannon TV model. It is clear that Shannon TV is capable to attenuate aliasing effects, whereas, we can observe these artifacts in the results of the classic models TV and TGV.



Deblurring

Let A be a convolution operator and g be a kind of blurred image, which is concluded from a clean image u , through A ($Au = x$). For a given regularizer R , the Tikhonov type deconvolution problem is formulated by (1). Specifically, the Shannon TV deblurring model is defined as

$$\min_{u \in \mathbb{R}^{m \times n}} \|Au - g\| + SHTV(u). \quad (5)$$

We have solved deblurring problem, by means of TV, TGV, and Shannon TV model, for the standard test image (Girl) are illustrated in Fig. 2.

Figure 2. Deblurring: (a) the original image (Girl). (b) Blurred image. (c) The details of the restored image, after Shannon interpolation using the classic TV model. (d) The details of the restored image, after Shannon interpolation using the second order TGV. (e) The details of the

restored image, after Shannon interpolation using the Shannon TV model. Obviously, Shannon TV is more reliable in decreasing artifacts.



(a)



(b)



(c)



(d)



(e)

CONCLUSION

In this paper, we have compared the state of the art variational models for denoising and deblurring, with Shannon TV model. The simulation results confirm that, Shannon TV model is superior in terms of noise removal and attenuating aliasing artifacts.

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TRADITIONAL COCONUT SUGAR ADDED VALUE

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ABSTRACT

Life to be healthier, consumers often wish to substitute refined sugar with alternative sweeteners, such as coconut sugar. Coconut sugar made of coconut sap. Coconut sap is a clear liquid with a sweet taste produced from coconut flower bunches. Therefore, coconut sugar maker processes the sap to increase added value become coconut sugar. This study aimed to determine how much-added value and profit is generated in the coconut sugar agro-industry. This was case study located in Pangandaran West Java Indonesia in 2022. The data was analyzed by Hayami method. The results showed that the coconut sugar agro-industry provided an added value of IDR 1,323 per kg of sap with an added value ratio of 69.02% which is included in a high added value ratio. The profit earned is IDR 1,073 per kg with a conversion factor 0.17. If sold in raw matter, coconut sap has a price of IDR 350.00/kg, while if it is processed into coconut sugar products, it has a price of Rp. 12,000/Kg in producer.

Keywords: Coconut sugar; healthier; sap

INTRODUCTION

Produk pertanian umumnya mempunyai sifat mudah rusak, oleh karena itu mesti langsung dikonsumsi ataupun diolah terlebih dahulu untuk meningkatkan manfaat pada produk pertanian. Proses pengolahan atau biasa disebut dengan agroindustri, bisa meningkatkan penggunaan produk pertanian dalam pemanfaatannya memerlukan biaya pengolahan. Konsep yang sering dipakai untuk menganalisis biaya pengolahan produk pertanian salah satunya yaitu nilai tambah (Palohon et al., 2019).

Nilai tambah suatu produk dapat bertambah jika ada proses pengolahan, penyimpanan serta pengangkutan seperti kegiatan industri pertanian. Kegiatan industri pertanian adalah perubahan menyeluruh dari bidang pertanian. Dampak industri pertanian dapat mengubah produk dasar menjadi produk olahan dan mengubah kebiasaan kerja industri terbaru yang mempunyai keuntungan dasar menjadi kebiasaan kerja yang membuat keuntungan lebih banyak. Proses pengolahan hasil pertanian tentang pengolahan hasil tanaman perkebunan salah satunya yaitu pada pengolahan hasil tanaman kelapa (Batas et al., 2020). Bagian pohon kelapa yang mempunyai kapasitas banyak dapat dimanfaatkan menjadi bahan baku industri ialah bunga serta buah kelapa. Pada bagian bunga kelapa biasanya akan disadap sehingga mengeluarkan nira kelapa (Lestari et al., 2020).

Nira kelapa adalah suatu bahan baku yang digunakan dalam pembuatan gula, nira tersebut biasanya didapat dari bunga kelapa yang sudah dipotong. Menurut BPS Kabupaten Pangandaran, (2022) Pohon kelapa yang ada di Kabupaten Pangandaran mempunyai luas mencapai 25.387 Ha, tidak hanya dimanfaatkan niranya saja. Manfaat lain pada kelapa bisa dijadikan sebagai bahan baku dalam pembuatan nata de coco, santan kelapa serta bahan baku lainnya. Tetapi sebagian petani memilih nira untuk diolah menjadi gula kelapa. Banyaknya bahan baku nira kelapa yang melimpah, menjadi salah satu faktor yang bisa membuat Kabupaten Pangandaran mempunyai potensi industri gula kelapa. Potensi industri gula kelapa yang cukup besar di Kabupaten Pangandaran yaitu terdapat pada 4 kecamatan yakni Kecamatan Padaherang, Kecamatan Kalipucang, Kecamatan Cimerak dan Kecamatan Sidamulih. Hal itu dikarenakan lokasi tersebut merupakan lingkungan alam yang cocok untuk tumbuhnya pohon kelapa sehingga banyak pohon kelapa yang tumbuh subur di lokasi tersebut (Eriyanti, 2019). Kecamatan Kalipucang adalah salah satu kecamatan yang mempunyai potensi industri gula kelapa yang cukup besar di Kabupaten Pangandaran. Adapun jumlah industri gula kelapa yang ada di Kecamatan Kalipucang bisa dilihat pada

Tabel 1.

Tabel 1. Jumlah Industri Gula Kelapa Di Kecamatan Kalipucang Pada Tahun 2016-2020.

No.	Desa	Jumlah Industri				
		2016	2017	2018	2019	2020
1.	Putrapinggan	925	925	925	77	77
2.	Emplak	320	320	320	62	62
3.	Bagolo	651	651	651	132	132
4.	Pamotan	498	498	498	84	84
5.	Kalipucang	350	350	350	36	36
6.	Cibuluh	440	440	440	55	55
7.	Banjarharja	1.062	1.062	1.062	132	132
8.	Tunggilis	953	953	953	121	121
9.	Ciparakan	665	665	665	168	168

Sumber : BPS Kecamatan Kalipucang, (2021).

Tabel 1 memperlihatkan bahwa pada tahun 2020 Desa Ciparakan merupakan Desa yang mempunyai jumlah industri gula kelapa terbanyak di Kecamatan Kalipucang jika dibandingkan Desa lainnya. Jumlah industri gula kelapa di Desa Ciparakan yaitu sebanyak 168 industri gula kelapa. Banyaknya agroindustri yang ada di Desa Ciparakan diharapkan mampu memberikan manfaat yang besar serta mampu memberikan menyerap tenaga kerja yang tinggi.

Adapun jumlah produksi rata-rata gula kelapa di Desa Ciparakan pada tahun 2020 dalam satu kali proses produksi yaitu sebesar 10 kg gula kelapa. Masalah yang dihadapi pada nira kelapa yaitu mudah terjadinya fermentasi dikarenakan mengandung ragi aktif dan membuat nira kelapa mudah rusak. Nira kelapa di pasaran memiliki harga rendah yaitu Rp.350,00 per kg. Harga gula kelapa di Desa Ciparakan mencapai harga Rp.12.000 per kg. Oleh karena itu para pengrajin gula kelapa yang ada di Desa Ciparakan berinovasi mengolah nira tersebut untuk menghasilkan nilai tambah.

Saat ini agroindustri yang sedang dikembangkan di Desa Ciparakan yaitu industri pengolahan nira kelapa menjadi gula kelapa yang salah satunya dikelola oleh Bapak Hasan. Agroindustri gula kelapa Bapak Hasan ini merupakan agroindustri yang memproduksi gula kelapa terbanyak dibandingkan agroindustri lainnya. Usaha gula kelapa Bapak Hasan sudah berjalan selama 10 tahun. Kegiatan usaha Bapak Hasan dalam satu kali produksi menghasilkan 20 kg gula kelapa.

Agroindustri gula kelapa Bapak Hasan merupakan agroindustri masih dalam skala rumah tangga dan tenaga kerjanya pun masih dalam keluarga. Modal yang digunakan milik sendiri dan masih menggunakan teknologi yang sederhana. Walaupun agroindustri gula kelapa ini masih menggunakan modal sendiri dan teknologi yang digunakannya pun masih sederhana akan tetapi agroindustri ini masih bisa bertahan sampai saat ini, oleh karena itu tujuan dari penelitian ini untuk mengetahui berapa besar nilai tambah dan keuntungan yang diperoleh pada agroindustri gula kelapa di Desa Ciparakan Kecamatan Kalipucang Kabupaten Pangandaran.

ARTIFICIAL INTELLIGENCE IN FINANCE - OPPORTUNITIES AND RISKS

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Abstract

Artificial Intelligence (AI) has become a driving force of transformation in the financial sector, reshaping traditional practices and offering new possibilities. This abstract delves into the multifaceted role of AI in finance, exploring its applications, benefits, and inherent challenges. AI's integration into finance spans various domains, from risk management and fraud detection to algorithmic trading and customer service. It enables efficient automation of routine tasks, enhances data analysis capabilities, and empowers decision-making processes. By processing vast volumes of financial data, AI assists in identifying patterns, predicting market trends, and optimizing investment strategies. Moreover, AI-driven algorithms bolster risk assessment, enabling real-time fraud detection and compliance monitoring. However, alongside these opportunities, AI in finance presents notable risks and concerns. Issues of data privacy and security emerge due to the extensive data collection required for AI algorithms. Biases inherent in training data can perpetuate inequalities, particularly in lending and hiring practices. The opacity of complex AI models challenges transparency, impacting regulatory compliance and accountability. The potential displacement of jobs by automation raises socio-economic considerations, while algorithmic trading driven by AI can amplify market volatility. This abstract encapsulates the dual nature of AI in finance, illustrating its potential to revolutionize the industry while necessitating careful navigation of its ethical, regulatory, and practical implications. Balancing innovation with responsibility remains a pivotal task as the financial landscape continues to evolve through AI integration.

Keywords: Artificial Intelligence (AI), Finance, Financial Industry, Banking.

Introduction

The financial sector stands on the threshold of a technological revolution driven by Artificial Intelligence (AI). As a powerful and versatile technology, AI has the potential to redefine how financial institutions operate, interact with customers, and navigate complex market dynamics. This introduction provides an overview of the burgeoning influence of AI in finance, highlighting its transformative capabilities and the key areas where its impact is most pronounced.

In recent years, AI has transcended its theoretical roots to become a tangible force in various industries, and finance is no exception. Its ability to process vast amounts of data, learn from patterns, and make informed decisions with minimal human intervention positions AI as a catalyst for innovation within the financial realm. From risk management and fraud detection to customer service and investment strategies, AI's reach is extensive and its implications profound.

The integration of AI technologies within the financial sector introduces a host of opportunities. Efficiency gains through automation of mundane tasks, data-driven insights for more informed decision-making, and the augmentation of human capabilities all contribute to the sector's evolution. AI's algorithms can dissect intricate market trends, execute complex trading strategies, and personalize financial services based on individual preferences. This potential for enhanced operational efficiency, risk mitigation, and customer experience enhancement has led financial institutions to embrace AI-driven solutions as a means of maintaining competitiveness and relevance. However, the path to a seamlessly AI-powered financial future is not without challenges. The convergence of AI and finance raises concerns about data security and privacy, algorithmic bias, the transparency of decision-making processes, and the potential for job displacement. Ethical considerations surrounding AI's impact on vulnerable populations and its role in exacerbating economic inequalities warrant careful examination.

This exploration of AI's role in the financial sector will delve into its multifaceted applications, delving into the opportunities it presents for innovation and growth, as well as the risks that demand measured and responsible implementation. As AI continues to shape the financial landscape, a comprehensive understanding of its implications will guide stakeholders in harnessing its potential while navigating its complexities.

Opportunities

Efficiency and Automation: AI enables automation of routine tasks such as data entry, reconciliation, and customer support. This increases efficiency, reduces errors, and frees up human resources for more complex tasks.

Data Analysis: AI algorithms can analyse vast amounts of financial data at speeds impossible for humans. This helps in making more informed investment decisions, identifying patterns, and predicting market trends.

Risk Management: AI can assess risks more accurately by processing real-time data and detecting anomalies in financial transactions, which helps in fraud detection, credit risk assessment, and compliance monitoring.

Algorithmic Trading: AI-powered trading algorithms execute trades based on predefined criteria, reacting to market changes in real time. This can improve trading speed and efficiency.

Customer Service: Chatbots and virtual assistants powered by AI can provide personalized customer support, answer queries, and assist in financial planning.

Personalized Banking: AI can analyse individual spending habits, investment preferences, and financial goals to offer tailored banking and investment services.

Portfolio Management: Robo-advisors use AI to manage investment portfolios according to individual risk profiles, adjusting allocations in response to market changes.

Credit Scoring: AI can incorporate a wider range of data sources to provide more accurate credit scores, especially for individuals with limited credit histories.

Risks

Data Privacy and Security: The use of AI requires extensive data collection, which can lead to privacy breaches and security vulnerabilities if not properly managed.

Bias and Fairness: If training data used to build AI models is biased, the resulting decisions can perpetuate existing inequalities or prejudices, especially in lending and hiring practices.

Lack of Transparency: Complex AI algorithms can be difficult to interpret, leading to a lack of transparency in decision-making processes. This might be problematic in regulatory and compliance contexts.

Job Displacement: Automation and AI could potentially lead to job losses in certain areas of finance, such as data entry, customer support, and even some aspects of analysis and trading.

Market Volatility: Algorithmic trading powered by AI can lead to increased market volatility, as rapid trades based on data analysis can magnify market fluctuations.

Regulatory Challenges: The rapidly evolving nature of AI in finance presents challenges for regulatory frameworks to keep up with the technology, ensuring ethical use and consumer protection.

Model Reliability: Dependence on AI models can be risky if these models are not accurately trained or if the underlying assumptions no longer hold, leading to unexpected outcomes.

Cybersecurity Risks: As AI systems become more integral to financial operations, they become potential targets for cyberattacks, which could have far-reaching consequences.

Conclusion

The infusion of Artificial Intelligence (AI) into the financial sector marks a pivotal juncture in its evolution, characterized by both remarkable potential and pressing challenges. Throughout this discourse, we have unravelled the diverse applications of AI in finance, examining its capacity to revolutionize operations and redefine customer interactions. However, as the financial industry embraces AI's capabilities, a nuanced perspective is essential to grasp the intricate interplay of opportunities and risks that lie ahead.

AI's promise in the financial sector is exemplified by its capacity to enhance efficiency, precision, and innovation. From automating routine tasks to enabling predictive insights, AI holds the key to streamlining operations, improving risk management, and tailoring services to individual needs. The algorithms that drive AI can sift through vast data sets, unearthing hidden patterns that inform investment strategies and market predictions. The integration of AI-powered robo-advisors, chatbots, and algorithmic trading platforms exemplifies the industry's journey toward a more technologically advanced future.

Yet, as this transformation unfolds, challenges cannot be ignored. The ethical implications of algorithmic biases and their potential to reinforce existing inequalities are stark reminders of the need for responsible AI development. The opacity of complex AI models underscores the importance of transparency, particularly in regulatory contexts. The specter of job displacement, though not new to technological advancements, demands careful consideration of the socio-economic consequences of AI adoption.

In navigating these uncharted waters, the financial industry is at a crossroads. Striking a balance between harnessing AI's potential and addressing its inherent risks requires collaboration among policymakers, industry leaders, and technologists. Transparent AI development, robust regulatory frameworks, and ethical considerations must underpin the continued integration of AI into finance. By capitalizing on AI's strengths while mitigating its pitfalls, the financial sector can embark on a trajectory of sustainable growth and innovation.

In conclusion, the amalgamation of AI and finance is a testament to human ingenuity and the pursuit of progress. As we stand on the cusp of this transformation, our ability to navigate the complexities and seize the opportunities that AI presents will determine the course of the financial industry's future. By embracing AI responsibly and with foresight, the financial sector can chart a path toward a more efficient, inclusive, and technologically advanced landscape.

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VIRTUAL REALITY AND AUGMENTED REALITY APPLICATIONS

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Abstract

The latest look of low-priced virtual reality (VR) applied sciences – like the Oculus Rift, the HTC Vive, and the Sony PlayStation VR – and Mixed Reality Interfaces (MRITF) – like the HoloLens – is attracting the interest of customers and researchers suggesting it may additionally be the subsequent greatest stepping stone in technological innovation. However, the records of VR science are longer than they can also seem: the idea of VR was once formulated in the Nineteen Sixties, and the first business VR equipment was regarded in the late 1980s. For this reason, at some stage in the closing 20 years, 100s of researchers explored the processes, effects, and purposes of this science producing hundreds and hundreds of scientific papers. What is the consequence of this substantial lookup work? This paper desires to grant a reply to this query by way of exploring, the usage of superior scient metric techniques, and the present lookup corpus in the field. We amassed all the existent articles about VR in the Web of Science Core Collection scientific database, and the resultant dataset contained 21,667 files for VR and 9,944 for augmented actuality (AR). The bibliographic file contained a range of fields, such as author, title, abstract, country, and all the references.

Keywords: augmented reality, virtual reality, systematic literature review, applications, Technology

INTRODUCTION

In this day and age, we are encompassed through mixes of advances. We have won large components of these developments into our everyday day by day existences. Progressively, these extraordinary developments are getting coordinated to furnish us with new capacities and administrations. It is a combo of developments that empower the steady mixing of PC-created content material with stay video shows. AR relies upon methods created in VR and interfaces with a digital world as properly as has a stage of relationship with this current reality. It lets in see the surrounding world in some different dimension and to ride matters that are now not approachable in actual lifestyles or no longer even created. Also, the world of 3-D pictures has neither constraints nor borders and can be manipulated and created by using us to beautify it by means of a four dimension: the dimension of our vision. This science turns into overwhelmingly elegant and popular in the cutting-edge decade.

AUGMENTED REALITY

Less immersive than digital truth, augmented truth entails including graphics, sounds, and different factors to the herbal global. These additions don't update the herbal factors the person sees; rather, AR additions beautify or adjust the actual global to extradite the person's experience. Some famous cellular games, along with Pokemon Go, have made the AR era appealing to a big wide variety of users.

VIRTUAL REALITY

In the assessment of AR, digital truth creates a simulated surrounding wherein the person is absolutely encompassed. The maximum, not unusual place VR era is a headset that totally covers the person's eyes. With this, the person can view and interact with a very simulated surrounding. Most VR structures reply to a person's motion and position, so he or she will go searching a 360-degree simulated surroundings via way of means of turning his or her head, similar to in actual life. Some structures additionally consist of controllers or gloves that permit the person to interact with digital factors and items.

LITERATURE REVIEW

Interrante, (2018) Virtual and augmented actuality applied sciences have entered a new near-commodity era, accompanied via huge industrial investments, however, nevertheless are challenged with several open lookup questions. This distinctive difficulty of IEEE Computer

Graphics and Applications ambitions at vast views to seize the country of the art, necessary achievements, and have an effect on a number of areas in these dynamic disciplines. It carries three unique articles that think about vital factors of VR/AR applied sciences and define future lookup opportunities.

Kolivand (2021) Augmented Reality (AR) and Virtual Reality (VR) primarily based remedy has validated that it is convenient to use, additionally motivating and extra attractive, and fun as most of the research proved. Furthermore, the price of human sources and the gear with well-known rehabilitation remedies is excessive to some extent. Whereas, the AR and VR structures are low price and effortless to popularize, beside the incredible range of the saved time. This paper offers a complete evaluation of Augmented Reality Technology.

M. E. de Oliveira (2020) Virtual Reality (VR) and Augmented Reality (AR) based totally applied sciences can be utilized in countless areas, such as science, services, education, remedy, and the military. On the different hand, agriculture is a place that has benefited from laptop systems, with technological advances that have culminated in fields of learning about such as Agriculture 4.0, Digital Agriculture, and Precision Agriculture, imparting an enlarge in meal manufacturing in a sustainable way. Thus, the agricultural region can be a goal for authorities and researchers in VR and AR. In this article, a literature assessment is introduced with the goal of displaying why VR and AR applied sciences are recommended to the agricultural sector. The searches had been carried out on Google Scholar, ACM Digital Library, Elsevier, IEEE Xplore, MDPI, and Springer. After looking out and selecting, twenty articles had been analyzed. The assessment describes the fundamental enter and output gadgets used, the major crops, the targets of the applications, the users, the international locations the place the research has been conducted. The effects exhibit that digital agriculture is capable to assist customers to extend productiveness in a sustainable way. The evaluate recognized trends, challenges, and possibilities for enhancing these applied sciences utilized in agriculture.

J. He et al., (2017) With the fast improvement of pc 3D processing ability and the emergence of less costly sensors, the science of augmented truth (AR) and digital fact (VR) has superior rapidly in current years, mainly in aggregate with real-world technologies. Firstly, the ideas are summarized, and the distinction and connection are analyzed between AR and VR. Then, a standard AR machine with software program and hardware structure used to be introduced primarily based on the contemporary lookup achievements. Three key strategies and associated

lookup are added in detail. Finally, the utility of AR in a range of areas is introduced, especially in the area of army systems, gear assist, ance, and coaching simulation.

A. Taghian, et al (2021) This paper evaluation numerous 3D visualization applied sciences such as digital fact (VR), augmented truth (AR), and combined fact (MR). It was once caused by using current lookup and breakthroughs in AR technological know-how and its biomedical embedded purposes in the wearable electronics area, particularly in the area of head-up shows (HUD). Wearable AR applied sciences are being used to assist aged generations and human beings with dementia, visible impairment, and listening to impairment in accordance to a developing physique of research. Moreover, the surgical neighborhood and biomedical schooling have benefited from these technologies. In addition to discussing the improvement of novel wearable devices and systems, the paper important points medical makes use of wearable science that is presently being evaluated.

S. Su et al., (2020) For decades, digital truth (VR) and augmented truth (AR) applied sciences have remained absent from science and engineering workflows due to the custom-built nature of the hardware and software program and routinely pretty task-specific design. In addition to excessive cost, these traits create an essential entry barrier for most customers to make investments in VR and AR applications. Recent trends in each VR and AR applied sciences in the business region have resulted in the availability of lower-priced consumer-grade and dependable VR and AR hardware and software program tools. However, extensive lookup is wished to adopt VR and AR science use for data-intensive scientific and engineering functions such as community modeling research, human sciences research, and visualization of complicated simulated environments. Our VR and AR purposes supply examples of how scientists and engineers can use superior visualization applied sciences to function facts evaluation and assessment, for this reason, reworking scientific discovery.

Delgado, J. et al (2020) This paper provides a find out about the utilization panorama of augmented truth (AR) and digital fact (VR) in the architecture, engineering, and building sectors, and proposes a lookup agenda to tackle the current gaps in required capabilities. A sequence of exploratory workshops and questionnaires have been performed with the participation of fifty-four professionals from 36 companies' enterprises and academia. Based on the facts gathered from the workshops, six AR and VR use-cases had been defined:

stakeholder engagement, plan support, graph review, building support, operations, and administrative support, and training.

Noah, N., and Das, S. (2021) Research is increasingly more being carried out to become aware of the advantages furnished via the ultra-modern trends in the AR/VR domain, which has considered a make bigger in activity as a end result of the stay-at-home phenomena in 2020. Of unique pastime is the utility of AR/VR to education, a self-discipline that has viewed a fast shift to on line modules in 2020. To higher apprehend the developments in AR/VR enabled education, we performed a systematic literature overview consisting of N=61 papers posted in the yr 2020 that centered on AR/VR in the schooling sector. We specifically centered on papers the place research has evaluated consumer perceptions in distinct countries, tutorial fields, and at different instructional levels. We observed that whilst most papers carried out person research and evaluated the technical functions of AR/VR, consumer perceptions, impact, and attention had been now not explored in detail. Our findings spotlight tendencies that can pressure seriously wanted improvements via AR/VR specifically to assist a globalized digital evolution in the schooling sector.

Jishtu, P., and Yadav, M. A. (2022) Speed has grown to be a way of life. We are asymptotically piling data. Speed can be done with new sketch processes, techniques, and Technology. Innovations AR and VR are simply some of the many types of applied sciences that will play a key function in shaping the Architecture and Planning of tomorrow, making it future-ready and ushering in a new age of innovation. AR and VR in Architecture & Planning have been delivered as supporting equipment and has helped generate more than one graph options, elevated probabilities of visualization, and supplied us with extra enhanced, detailed, and unique journey in real-time; enabling us to see the resultsof work on hand nicely earlier than the graduation of the project. This equipment is similarly developed for town improvement decisions, supporting residents have interaction with neighborhood authorities, get admission to public services, and sketch their commute. After reviewing a couple of lookup papers, it had been located that everyone is transferring ahead with the modifications delivered by using it, besides completely grasp its role. This paper affords a precis of the appliance of AR & VR in structure and planning.

Sinha, B. (2022) AR presents college students with the probability to exercise their information and capabilities by using seamlessly combining digital facts with the real-world environment. In addition to training real-world scenarios, AR can additionally supply interactive studying environments via interactive activities. AR has the practicability to retailer time and cash in the case of high-cost academic needs. AR systems, which can be used to make bigger collaborative studying experiences, allow the educating of training innovatively and interactively via providing facts in 3D format, thereby facilitating students' ability acquisition. Besides, AR structures positively have an effect on students' motivation and cognitive learning. They assist to increase their spatial and psychomotor-cognitive skills. AR can furnish pointers and comments visually, auditorily, or seasonally to enhance students' experiences. Through these features, AR structures can be built-in into teachers' lecture notes. Thus, the summary records to be taught can be conveyed to the college students in a concrete way.

Flavián, C. (2018) The arrival of Virtual-Reality, Augmented-Reality, and Mixed-Reality applied sciences is shaping new surroundings the place bodily and digital objects are built-in at one-of-a-kind levels. Due to the improvement of transportable and embodied devices, collectively with particularly interactive, physical-virtual connections, the consumer journey panorama is evolving into new kinds of hybrid experiences. However, the boundaries between these new realities, applied sciences and experiences have no longer but been genuinely hooked up with the aid of researchers and practitioners. This paper ambitions to provide a higher grasp of these standards and combine technological (embodiment), psychological (presence), and behavioral (interactivity) views to suggest a new taxonomy of technologies, particularly the "EPI Cube". The dice permits teachers and managers to classify all technologies, modern-day and potential, which would possibly assist or empower consumer experiences, however can additionally produce new experiences alongside the purchaser journey. The paper concludes with theoretical and managerial implications, as properly as a future lookup agenda.

Muñoz-Saavedra et al (2020) Augmented truth and digital fact applied sciences are growing in popularity. Augmented truth has thrived to date primarily on cell applications, with video games like Pokémon Go or the new Google Maps utility as some of its ambassadors. On the different hand, digital fact has been popularized by and large thanks to the videogame enterprise and more cost-effective devices. However, what was once at the beginning a failure in the industrial discipline is resurfacing in current years thanks to the technological upgrades in

gadgets and processing hardware. In this work, an in-depth find out about of the special fields in which augmented and digital actuality have been used has been carried out. This learn about focuses on conducting a thorough scoping evaluate targeted on these new technologies, the place the evolution of every of them at some stage in the ultimate years in the most necessary classes and in the international locations most concerned in these applied sciences will be analyzed. Finally, we will analyze the future vogue of these applied sciences and the areas in which it is crucial to look into two in addition combine these applied sciences into society.

Egliston, B., and Carter, M. (2021) Virtual Reality (VR) represents a rising classification of spatial computing science reliant upon the seize and processing of facts about the consumer (such as their physique and its interface with the hardware), or their surrounding environment. Much like digital media extra generally, there are developing worries of who stands to advantage from VR as a data-intensive shape of technology, and the place its viable data-borne harms might also lie. Drawing from vital statistics studies, we look at the case of Facebook’s Oculus VR—a market main VR technology, central to their metaverse ambitions. Through this case, we argue that VR as a data-intensive gadget is no longer one of unalloyed benefit, however one fraught with electricity inequity—one that has the achievable to exacerbate wealth inequity, institute algorithmic bias, and deliver about new types of digital exclusion. We contend that coverage to date has had confined engagement with VR, and that regulatory intervention will be wanted as VR will become extra broadly adopted in society.

Nayyar, A.,et al (2018) Virtual Reality and Augmented Reality, these days, is supplying many beneficial functions that is attracting increased interest from tourism researchers and professionals. As, AR and VR applied sciences are evolving, the quantity of scientific purposes is additionally at increase. VR and AR are proving their well worth mainly when planning, marketing, education, vacationer game upkeep coming to light. The intention of this lookup paper is to spotlight pinnacle applied sciences for Tourism and Hospitality with regard to AR and VR.

APPLICATIONS FOR AR AND VR TECHNOLOGY

Policing

Equipped with AR structures that grant applicable important points on the environment, officers would be higher organized to enter unsafe situations. For example, when drawing near a residence after reviews of gunshots, officers may want to get admission to records like a 3D mannequin of the building, previous arrests at the address, and prior 311 reviews about hazardous conditions.

Emergency Management

Much as the upward job of facts visualization has improved situational recognition at some point in emergency situations, AR can enhance responders' expertise in their environment in order to rescue residents in need. Residents may want to plot their places on an interactive map allotted to responders, which would then exhibit EMS employees the most secure rescue routes and discover mainly hazardous areas.

Asset Management and Public Works

Armed with shows highlighting the circumstance of metropolis belongings and the presence of any hazardous conditions, DPW people would be capable of whole repairs and building tasks extra successfully and safely. Knowledge about their environment — for instance, that a ceiling hasn't been changed because 1980 and would possibly incorporate asbestos — is essential to workers' safety.

Digital Services

Instead of forcing residents to fill out static digital types in order to get hold of services, AR and VR ought to furnish an interactive trip that walks customers thru the utility process. Deploying this sort of technological know-how would limit mistakes by using residents, make certain they get their offerings extra quickly and create extra nice government-citizen interactions.

Culture and Tourism

By offering extra imagery and historic or cultural details, AR has the capacity to radically change traveler experiences with metropolis landmarks. The French city of Cluny has established augmented fact monitors for the duration of its ancient abbey in order to illustrate

what the neighborhood was regarded like in the Middle Ages, and different cities may want to pursue comparable applied sciences to spotlight their ancient pasts.

Mental Health Services

Recent lookup has indicated that AR and VR have tremendous viability for treating intellectual fitness troubles like anxiousness and PTSD, developing possibilities for customers to confront their fears in publicity therapies. And, VR simulations can additionally assist residents with PTSD exercise job interviews, and examine to control their signs in high-stress environments. By furnishing social people with these tools, cities can enhance their intellectual fitness treatment.

Education

Augmented and digital truth have the practicable to convey greater college students into the lecture room and create extra attractive and interesting school room experiences. Using VR, college students in fitness care services or underdeveloped rural areas ought to take part in the lecture room honestly in a whole lot extra full and prosperous way than in standard online classes. Using AR and VR, instructors should create an immersive gaining knowledge of the environment, permitting college students to discover the ocean flooring or unfamiliar components of the globe. By funding these kinds of applied sciences in public schools, cities can make faculties extra inclusive and engaging.

Urban Planning

By developing AR and VR fashions for new development projects, cities should get a higher feel of how new work will be healthy inside the present city panorama and doubtlessly expand activity from investors. By making these fashions on hand to residents and neighborhood businesses, cities can additionally attain remarks on their plans.

Training

With the potential to recreate real-world experiences in an excessive stage of detail, augmented and digital actuality ought to revolutionize education for metropolis personnel in any of the preceding areas. Particularly precious would be the capacity to simulate conditions that are too risky or tough to recreate in actual life. Imagine police officers who exercise digital drug raids, emergency responders that exercise rescues of aged or motionless residents, or DPW people

that simulate responses to the place of work injuries. AR and VR coaching packages are capable to expose personnel to sensible and various situations, making ready them for any of the variables they may encounter.

CONCLUSION

In recent years, augmented fact generation has attracted massive interest from researchers. Driven via way of means of laptop imaginative and prescient and synthetic intelligence generation, augmented fact generation has proven a sturdy momentum of improvement. Both the monitoring registration accuracy, show equipment overall performance, and the character of human-laptop interplay had been substantially improved. However, it may be visible that there are nevertheless many issues to be solved in augmented fact generation. In phrases of monitoring registration generation, the present-day monitoring registration approach cans handiest employ a small quantity of data withinside the scene, inclusive of function factor data, which results in incomplete expertise of the device to the environment. In phrases of show generation, the scale and rate of augmented fact glasses that could offer customers an excessive feel of submergence can't meet the call of the public.

In phrases of interplay mode, the extra herbal and multi-consumer augmented fact interplay generation stays to be studied. In the following few years, the utility of augmented fact generation, particularly withinside the utility of cell shrewd terminals, will emerge in a huge number. Although cell gadgets are less submersible than helmet-set-up displays, they may be quite popular. At the identical time, the release of ARK it and AR core improvement systems realizes the mixture of augmented fact and clever cell gadgets technically. In the destiny improvement, clever wearable gadgets, that may provide complete play to the blessings of augmented fact generation, will create an extra sensible integration global for human beings. People can engage with the device in an extra herbal manner of human-laptop interplay. In the destiny, augmented fact generation will extra de human lifestyles to a notable extent, that is an inevitable fashion of clinical and technological improvement.

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**SOCIAL MEDIA THREATS TO NIGERIAN DEMOCRACY: USE OF FACEBOOK
PLATFORM**

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Abstract

Even though the present society is too large and complex, everything in life is communication. This is because; the technological determinism approach has made it possible to share information through smart phones in the fastest, easiest and cheapest way making the system in the society to be a global phenomenon. This paper examines social media threats in relations to Nigerian democratic system of government with attention on Facebook platform as area of interest. In achieving this, the paper considers a mixed research approach thereby combining quantitative and qualitative content analysis technique, administering questionnaire, in depth interview and focus group discussion as well as using contributions from literatures, extant literatures, published materials, BBC and DW radio broadcast contents, and verifiable online contents which will be evaluated, interpreted, reviewed and analyzed comprehensively. The expected result indicates that there have been lots of accusations from many directions, disinformation, lies and hate speeches on the part of political parties, ruling and opposition parties as well as other key stakeholders constituting the government. The expected result also, indicates that social media reportage encouraged fake news resulting in distorted perception of the real happenings which serves as a threat to Nigeria democracy.

Keywords: Determinism, Communication, Technology, Information, Phenomenon

Introduction

The use of social media in this submission relies heavily on Facebook. This is because of its relevance and commonly used social media platform by the Nigerian electorates involving highly placed and lowly placed among them. Facebook has for a long time served as a specialized platform of modern human communication system and is now part of the political culture of most democracies the world over. In Nigeria for instance, the usage of Facebook is one of the most dominant forms of communication between politicians and the electorates; and it is massively and strategically exploited by the politicians in the country to achieve their common goals as regard projecting positive images, retaining offices, and maintaining relationships with their electorates. Facebook has being useful in sharing and aiding exchange of information between the political candidates and electorates; it helps citizens to be informed and influence their political choices, attitudes, beliefs, and behavior towards certain political candidates and encourage interactive dialogue between electorates and stakeholders of democracy in Nigeria.

However, the daily use of Facebook by politicians and other key stakeholders of democracy as well as the way in which the user-citizen interacts with the Facebook pages belonging to politicians has received rather less attention. This is because the Facebook is confronted with many threats such as distortions and fake contents and essentially, politicians expect the communication relationship to be effective, positive and beneficial to them, thus, political gladiators of all shades of opinions, ideologies, intents and goals use Facebook with the belief that communication system through them brings about pressure or influence on electorates' perception and behaviors. This assumption of the effect of Facebook is akin to the historical and cultural dominance of traditional media (newspaper, magazine, billboards, hand bills, radio and television) and the perceived hypodermic effects of the media messages. In view of the perceived impact of the media whether from the 'maximalists' or 'minimalists' perspective, profit driven mentality of competition for political space has given rise to both ethical and unethical political communication using all available platforms of machine-assisted, interpersonal and mass communication. For a good control and minimal threats and better political information, education, and enlightenment, through effective and efficient Facebook usage, handled by relevant professionals with strong adherence to their professional ethics and code of conduct, wealthy in experience, the political campaign messages should be based on truth and full information that enables the electorates make wise and better decision that helps to bring the right people into governance. This is because, as many believe, the

development of a country is not only on the conduct of good elections but on the acceptance of a favorable candidate and party with great ideology and programs to govern the electorates. If this needful is not taken into cognizance and made the norm, there is no doubt of experiencing desperate political contenders that will manifest with bad governance, thereby, leading to social and economic infrastructural neglect and security of lives and property.

Research Problem

In Nigeria for example, the civil society encouraged the use of Facebook effectively to disseminate information during the 2015 general elections. During the voting process, pictures and videos floated on Facebook of party agents who were caught in the act of buying voters with money and some other grants as well as the issue of underage voting in some states prompting immediate action by INEC. Also, during the collation of results, citizen journalists and the civil society never spared any effort to update the public on the nature of results in the various states across the federation (Oseni 2015, Suntai and Targema, 2017).

This study addresses social media threats to Nigerian democracy with specific interest on Facebook platform. It seeks to examine how Facebook platform changes information dissemination pattern, the threats and challenges it brought to the Nigerian democracy and possible remedies to the threats for a better democracy. This submission seeks to examine the threats associated with social media reports and contents in relations to Nigerian system of democracy with interest on Facebook usage in Nigeria.

General Objective of the Study

Facebook age is a revolution to Nigerian democracy; those who must win election must win the will of the people. The days of changing election results by returning officers have gone. By the power of Facebook, citizens know who win elections before results are officially announced by the Independent National Electoral Commission INEC... Facebook has become a force and we must live up to this reality.

Generally this study aims to address social media threats to Nigerian democracy with specific attention on Facebook platform.

Specific Objectives of the Study

Specifically, the study has the following objectives:

1. To examine how Facebook changes the information dissemination pattern, characteristics and appearance particularly to Nigerian Democracy;
2. To examine the threats Facebook brings in the process of information dissemination to Nigerian democracy;

3. To examine the possible solutions to the threats brought by Face book information dissemination system to Nigerian democracy

Review of Literature

Facebook is online communication platform that uses web based technologies which enable users to download, upload, interact and collaborate with one another regardless of distance and time. As a concept is the use of technology combined with social interaction to create and co-create value (Olise 2014, Suntai and Targema, 2017). It is thus a shift in how people discover, read and share news, information and content which may be text, audio, video or graphics. Scholars in mass communication argue that Facebook involves a fusion of sociology and technology to transform the process of communication from monologue to dialogue or better still, to an interactive process. Facebook gain popularity in Nigeria, in spite of the technological backwardness, helping to accomplish complex political tasks across the country.

Facebook provides heavy online presence which widened the scope of citizen journalism practice in the country, a form of online reports where electorates play an active role in the process of collecting, reporting, analyzing and disseminating news and information. With citizens and electorates becoming reporters of issues and events happening around them, freedom of information is enhanced, empowering them to be actively involved in the democratic process. Facebook has become online meeting spaces where users— members, residents, or players—can interact and express themselves. Facebook offer a way to keep in touch with existing communities that users belong to offline, such as social and professional groups. The platform also make it possible for people who would not normally communicate more than a few times a year to keep in touch— politicians could interact with their teeming supporters on a daily basis, giving their supporters a sense of belonging through the online community itself. Facebook represents another forum for online communication that is centered on sharing, preference, and popular culture.

Face book as a Tool of Communication for Political Candidates

Face book offers a variety of avenues through which political candidates can communicate with people. In fact, the platform is known to have been used widely by politicians to either create awareness or to make people see them as accessible and credible (Austin, 2008). Over the last 30 years the nature of communication has undergone a substantial change and it is still changing. Email has had a profound effect on the way people keep in touch. Politicians in recent times have used this means to reach out to their audience, creating impressions which they believe would be favorable to them. Using Face book, communications are shorter and more

frequent than when letters were the norm and response time has greatly diminished. The face book has created another method of interaction, one where the length of messages is shorter and the style of the interaction is more conversational (Goldstein and Freedman, 2002). Broadcast technologies like Twitter and the Face book transform these short bursts of communication from one-on-one conversations to little news (or trivia) programs: which we can tune in whenever we want an update or have something to say.

Online communication tools such as Face book also have the potential to increase our awareness of the movements of our professional or social contacts. Face book, for instance, offers us an update of things people we know happen to be doing at a particular point of time. This phenomenon has been referred as social proprioception by Thompson (2007), named after the physical quality of proprioception that tells a creature where its extremities are by the reception of stimuli produced within the organism. Social proprioception tells us where the nodes of our community are and provides a sense of connectedness to and awareness of others without direct communication. Internet is the third place where people connect with friends, build a sense of togetherness. Increasingly, a computer with an Internet connection is the locus of a range of interactions in a variety of media and a gateway to an array of social spaces for work and play. Facebook has become online meeting spaces where users— members, residents, or players— can interact and express themselves. It offers a way to keep in touch with existing communities that users belong to offline, such as social and professional groups. It also make it possible for people who would not normally communicate more than a few times a year to keep in touch— politicians could interact with their teeming supporters on a daily basis, giving their supporters a sense of belonging through the online community itself. Face book also, represent another forum for online communication that is centered on sharing, preference, and popular culture. Whether it is as simple as checking back to see what other comments have been added to yours or as involved as attending a workshop or presentation in a virtual world, the nature of the attraction lies in the connections between people that these online spaces afford.

The Democracy:

Democracy requires that each individual be free to participate in the political community's self-government. To this end, political freedom lies at the heart of the concept of democracy. Basically, democracy connotes rule by the people through free and fair elections and other forms of participation. According to Galadima and Goshit in Suntai and Targema (2017), the Athenians of ancient Greece, progenitors of democracy, did not leave us in dearth of definition for the concept, conceiving it in their days as "government of the people, by the people and for

the people". To this end, democracy refers to popular sovereignty, political equality, recognition of the consent of the governed as well as free and fair elections among other forms of participation.

Democracy puts accent on people's participation. Everyone involved should be carried along, and this is where the role of the media becomes necessary. Thus, an environment of dialogue is sine qua non for the sustenance of democracy, but this cannot be achieved unless the media and other essential fabrics that hold democratic institutions are in place. The trending social media and citizen journalism that allow for participation and unlimited access to all, among other virtues, are thus central to the sustenance of modern democracies.

However, central to the exercise of this civic responsibility is the volume of information at the disposal of the masses to take informed decisions all through the electoral process, and that is why Gambo (2013) stresses that liberal democracies rests purely on the capacity of the mass media to gather and disseminate information that can guide citizens in making rational choice

Theoretical Framework

Cognitive Response Theory:-

Cognitive Response Theory stemmed from many studies and psychological theories that began in the 1930's about attitude changes (Eagly and Shelly, 2004). Parts of the theories on attitude were blended in the late 1970's by Anthony Greenwald and named it "cognitive response." The theory attempts to understand how people acquire and change their attitude and change in behaviour in response to persuasive communication. A cognitive response is a 'thought' generated in response to a persuasive communication (Wright, 1981) which thus, triggers an attitude change. The way in which a cognitive response affects attitude after being exposed to persuasive communication has to do with the way the recipient of the communication manipulates, elaborates and integrates the information (Greenwald, 1968). When people are exposed to information, they relate it to pre-existing thoughts that they already have on the subject. People are of course more likely to be persuaded by messages to which they have previously thought optimistically. The cognitive response theory attempts to understand the link between the initial response to communication and the attitude change that results. It states that a cognitive response influences final attitude and therefore may affect behavior.

Social Media-Integration-Theory-Model

To one-to-many integration models works well when examining communications channels. However, the interactive Social Media platforms Facebook for instance, have radically changed the communication paradigm. Tshe study by Chadwick Martin Bailey and I Moderate Research

Technologies found that consumers are 67% more likely to buy from the brands they follow on Twitter, and 51% more likely to buy from a brand they follow on Facebook (Mashable Source), showing clearly, that the audience is highly influenced by the Social Media phenomena. What about the breathtaking amount of 3 millions of tweets/day? Another breaking fact is, that Facebook's official company statistics outline that there're 400 million active users all over the world and continues spreading at the light of speed (mashable's source). Analyzing the impact of Social Media in our environment, give us an overall idea that something is happening in the way that communication used to happen.

Due to the rapid adoption of Social Media Marketing as a major communication integration medium, it's necessary to consider how the social interaction has affected the communication process. The exposure, feedback, engagement (*connecting*) and exchange (*sharing*) that Social Media platforms provides, it creates a major changes for the traditional communication understanding. Essentially, information flow is no longer considered "*one-way street*" in which audience received messages through the "*I communicate - you receive*" mantra. Rather, Social Media integration is seen as an interactive process that enables same-level information exchange among the audience and the brand, creating along-lasting feedback communication process and giving to the brand a total engagement approach. Basically the process works as it follows:-

Social bookmarking sites place content (such as blogs or web pages) into an active eco-system that allows social media interaction such as Twitter or Facebook. This content is then shared and spread virally through the connections made from interaction on the social media eco-system. This refers to people being linked to people through common groups, associations, interests etc. Since this becomes the "*six degrees*" of separation this interaction causes the viral effect. This social media platform allows the interaction and the ability for the model to flow and become organic. Then, the social networking platforms enable the connection with the public through the engagement approach caused by the "*two-way street*" interaction process, linked to the social bookmarking sharing perspective. At the same time, while the driving forces of one side are acting and creating communication. The driving forces of the other side, such as social recommendation/reviews, measure the impact of the information canalizing the conversation created by the outgoing network and turning it into a valuable feedback experience and exposure reach effect, which melts in the same process as the conceptualization of the blogging platforms, harnessing the power of its SEO and highly page rank properties

to deliver the most effective exposure impact (giving feedback, engaging and sharing information all at once)

The Social Media Integration Model has an impact on the overall effectiveness for the Social Media platforms. For this reason we may want to consider all the elements when developing Social Media strategies.

Methodology

The study used mixed research approach thereby combining quantitative and qualitative techniques of data collection. Questionnaires were administered to large number of respondents within and an effective instrument for gathering data beyond the easy physical reach of the study. The method enables the study to gain in-depth opinion of the respondents, fewer respondents take part in the study, but the contact with the respondents last a lot longer. In-depth interview enables the study to plan and evaluate appropriate sources of information by using open-ended questions, discovery oriented technique, which allow the study to deeply explore the respondents' feelings and perspectives on Social media threats and Nigerian democracy using face book. This results in rich background information that shapes further interrogations relevant to social media threats and democracy in Nigeria. Respondents were selected based on stratified random sampling technique. The researcher obtains his sample from three main Departments in the FRCN Kaduna, news and current affairs, programmes and engineering services Departments and then uses a random sampling technique to choose five respondents from each Department totaling fifteen respondents for the interview. For both in-depth interview and focus group interview, a consent letter seeking for the approval of the respondents were sent by the researcher in advance looking forward to seeing the respondents' response as regards their most convenient time and date. Focus group discussion questions and in-depth interview questions were attached to the consent letter for the respondents. A pilot study of the FRCN Kaduna, Pride FM Gusau, Zamfara State radio and Headquarters of APC, PDP, APGA, PRP and NRM in Zamfara state capital to establish relationship with the respondents and have access to vital documents related to the areas carried out. The study also, considers qualitative content analysis technique, thereby using contributions from literatures, extant literatures, published materials, BBC and DW radio broadcast contents, and verifiable online contents which were evaluated, interpreted, reviewed and analyzed comprehensively.

CONCLUSION

Initially, the results were viewed skeptically as mere facades by the "zealous" APC, the opposition party that was bent to grab the mantle of leadership come what may. The masses

were however, surprised to observe that when such results were eventually announced at the collation center, they used to tally with the citizen journalists' account on Face book. In no time at all, the Face book sites were saturated with subscribers who logged in to be updated on the elections. To quote Oseni (2015, 3, Suntai and Targema, 2017): While Facebook appeared to provide vibrant discursive channels that will facilitate democracy in the country, a careful observation of the trend reveal quite a number of threats that are not only worrisome, but have the capacity to diminish the opportunities which Face book offers to countries with budding democracies like Nigeria. Example of such threats is the issue of hate and dangerous speech. This threat was really endemic in the build-up to the 2015 general elections, where Face book was deployed to perpetuate campaigns of calumny against candidates with opposing views. So serious was the practice that it almost divided the country into the extremes of the Muslim-North and Christian-South.

They were presence of hate and dangerous speeches that may escalate enmity among electorates, also disinformation and fake news encourage with a view to have strong political influence by the key stake holders of democracy in Nigeria as the presence of social media made it necessary for electorates to know any results before officially announced.

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**AGRICULTURAL TOURISM PRESERVATION AND EXPLOITATION: A CASE
STUDY OF OF THE BAY NUI BULL RACING FESTIVAL IN AN GIANG
PROVINCE, VIETNAM**

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Abstract

The Bay Nui Bull Race (BNBR) festival is one of the unique traditional cultures of the Khmer ethnic community in An Giang province. With over 100 years of history, the bull racing festival is a prominent activity in the Southwest region and an essential sporting event. The development of the agriculture tourism economy through the BNBR festival is increasingly attractive. However, the reality of tourism here still faces many difficulties. Many participating teams and tourists exist because the BNBR is a vast event. The growing growth of the event poses safety and management challenges for the organization. Besides, attracting the attention of sponsors and advertising businesses is also risky. This risk makes it more difficult for the BNBR organization to grow and reach more people. Proper measures are being implemented to help preserve and exploit tourism from this activity. One of them is to pay attention and invest in the restoration and construction of a venue for the racing festival and, simultaneously, strengthen the implementation of image promotion activities such as exhibitions and traditional shows. Creating a friendly environment and preserving and developing bull racing in tourism has become a tradition, contributing to the connection and cohesion of the community. Visitors can explore the traditional culture and enjoy the area's beautiful scenery and culinary specialties. At the same time, tourism exploitation at the BNBR organization in An Giang province also contributes to local economic development through tourism resources.

Keywords: Agriculture tourism, Bay Nui bull racing festival, festival travel, An Giang

Overview of the Bay Nui bull racing festival of the Khmer ethnic community in An Giang province History

Since ancient times, Khmer people in An Giang have lived in small clusters around the foot of the mountain (Phung et al., 2023). Most Khmer people work in the fields, and bulls are plowed animals, so they are raised and cared for very carefully. Legend has it that on afternoons when plowing the fields is finished early, some excited bull owners invite each other to race and play, slowly becoming a festival (Le, 2018). According to the older adults in the village, this festival has a different origin. Every year, pairs of bulls in the village pull together to plow the land around the temple. After plowing and harrowing sessions, the bulls invite each other to race. The Venerable Ca Chua and A Cha saw that, so they organized and hung the prize: a bull's neck strap with silver joints, beautiful chloroplast rings, or a rice basket. Therefore, at first, bull racing was merely a form of entertainment after long hard work, meaning doing admirable work and as a living obligation of the Khmer working, plowing, and plowing for Buddhist temple fields in An Giang province.

Historically, bull racing in An Giang has a history of hundreds of years, including bull racing on dry land (usually village roads) and bull racing with harrows on fields with little water (Long & Nguyen, 2018). At this time, the bullock cart used for racing was not like the big ox cart used to carry agricultural products as seen today, but rather a small ox cart with aesthetic patterns used to carry people in affluent families in the past. However, later on, when transport vehicles became increasingly popular, this type of bullock cart became increasingly scarce, leading to the form of bull racing no longer existing but only the form of bull racing in the field.

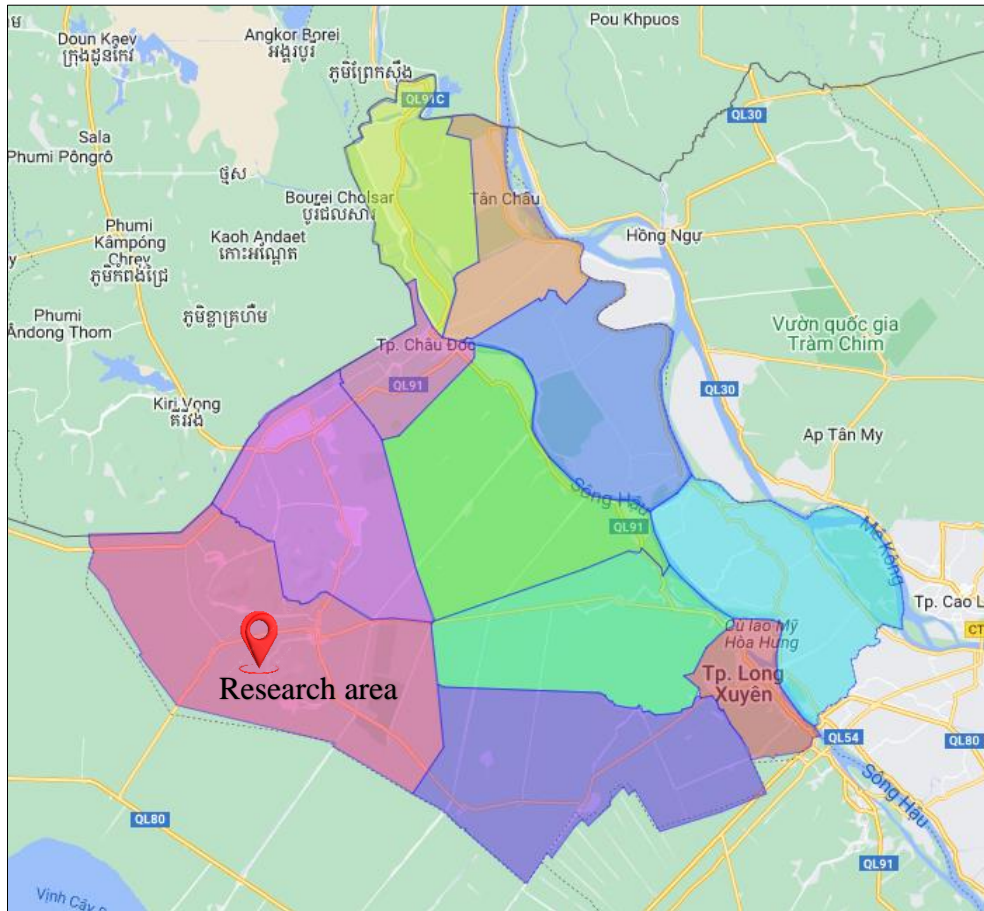


Fig. 1 Map of An Giang province, Vietnam

Source: Google Map

Time and method of organization

Every year, the bull racing festival is held together with the Sel Dolta festival (the worshipping ceremony of grandparents) from September 29 to September 1 of the lunar calendar (about the end of September to the beginning of October of the solar calendar). There are three organizational dates when the Khmer began to prepare for the new rice crop in the field. Local people were at the bull racing site early in the morning during the festival. Some people from far away should bring rice, a pot, fish sauce, and salt to cook on the spot to see the whole race. The viewing spot does not need to be as sophisticated as watching football, horse racing, or some other sport; standing in a high position above the racetrack is enough. From the start of the race to the end, the atmosphere is always jubilant, bustling, excited, clapping, cheering, and excitedly cheering for those who control good pairs of bulls.

Regarding the method of organization, to prepare for the bull race, people choose a flat field, about 200 m long and 100 m wide, with water sprayed and raked many times to have the smoothness of mud (Phuong, 2017). Four sides have a barrier, and the destination has an open

road to make a safe stop for bulls. The main track only needs 120 m along the field close to the bank. The starting place is planted with two red and blue flags, each 5 m apart, and so is the destination. Any pair of bulls standing in the position of the flag of any color will also follow the color of that flag. Before entering the race, they choose each pair of bulls together or draw lots and agree on necessary rules, such as who will compete first and later. But usually, the pair that comes after has the upper hand. If, during the race, the pair of bulls that run across the track are disqualified, the second pair that steps on the first pair of bulls will win. Each pair of bulls is yoked to a unique harrow; the harrow frame is a springboard consisting of a 30 cm wide and 90 cm long wooden board, and underneath are harrow teeth. The ox driver holds a rattan whip or a round log about 3 cm in diameter with a sharp nail. At the start of the referee's starting order, the driver jabs the bull's butt, and the bull, in pain, rushes forward. It is crucial to inject both bulls; the speed of the new bulls will be drastic and attractive.



Fig. 2 Bull racing in An Giang province

Source: Cam Huong

Cultural values and festival meaning

During that time, the Khmer people have preserved their affection for the bull and bull racing festivals, from ox racing on the highway to racing oxen and harrowing in the fields (Hai & Thanh, 2020). It is worth noting that, whether ox-drawn cart running as in the past or ox-drawing as today, the way the race is conducted simulates the daily agricultural production activities of the Khmer people in An Giang province. Therefore, the bull racing festival here can be seen as a spontaneous extension of the Khmer farming community. At the same time,

because the bull is associated with the agricultural life of residents, the bull racing festival can be considered a religious act to pray for healthy cattle, favorable crops, and a prosperous life. In particular, the BNBR festival takes place when the rainy season begins to be heavy. The unfavorable weather makes the bulls susceptible to diseases, so this race is also meaningful to create a "time of the year" for bulls not to get sick. Therefore, this race is also a product of adaptation to the weather. However, unlike the usual animal races (the animals are often very aggressive), the BNBR Organization only accepts pairs of gentle bulls (the bulls have been castrated for about two years) because otherwise, it will be easy to break the rules and lose right from the start. Thus, right from the game's rules, the BNBR festival also clearly shows the people's gentle, sincere, and calm lifestyle.

The BNBR festival is a unique agricultural extravaganza for the Khmer ethnic group in An Giang province and the Mekong Delta (Sterling & Hurley, 2008). With traditional culture imbued with humanity, the bull racing festival is also a meaningful mass sports and



entertainment playground for farmers after hours of hard work in the fields. Moreover, this is also living proof of the community's solidarity in sticking together in agricultural production.

Fig. 3 Before the bull race takes place

Source: Tuyet Huong

Current status of factors in conservation and development of the Bay Nui Bull Racing Organization in tourism development in An Giang province Human resources for tourism

Currently, in the two districts of Tinh Bien and Tri Ton (An Giang province), many bull racers regularly compete in district and provincial bull races with a strong passion for the sport this tradition. The total number of bulls in the Tinh Bien and Tri Ton districts currently exceeds 40,000; on average, 2 out of 3 households raise bulls, and the density is more than ten times higher than that of other districts in the province. Only one area, An Cu commune in Tinh Bien district alone, has 20 bull racers. According to experienced bull racers, you must be brave and passionate once you have followed the bull racing career. Everything from selecting bulls to tending to training is a process of months and arduous work.



Fig 4. A farmer takes care of his bulls before the race takes place.

Source: Hong Dang

Besides, there is still no guide to explain the site at the BNBR Festival. Even after being upgraded to a festival, the local government and investors still hardly pay attention to tourism activities here (Chau, 2021). That can be seen through the limited supply of tourist information related to the festival; the tourism team lacks quantity and quality. There has not been significant research or financial investment to develop this type of folk sport and attractive tourism.



Fig. 5 People have gathered at the Bull Racing Festival, which has been very crowded since early morning

Source: Cam Huong

Infrastructure, material, and technical facilities Race track

The venue for the festival varies from year to year. The organization on the small campus of the temple does not meet the entertainment needs of tens of thousands of people and tourists. The arrangement of parking spaces, the reception, the race organization, and the accompanying services encountered difficulties. Due to the narrow banks surrounding the bull racing field, the audience had to jostle to watch, and many people climbed the dangerous branches. The People's Committee of Tri Ton district proposed and was accepted by the People's Committee of An Giang province to invest in the project of a bull racing field in a professional direction. According to the approval decision of the Provincial People's Committee, the total investment in the bull racing field is nearly 48.5 billion VND, of which the provincial budget supports the site clearance with 4.5 billion VND, and the rest is from the district budget—and social mobilization. The new bull racing site has a campus of up to 55,000 m², convenient traffic, and connects to the Soai Chek Lake area, near the Soai So-Suoi Vang tourist area, not far from the tourist area. Tuc Dup Hill should be considered an ideal place to organize the BNBR festival in combination with tourism development in the mountainous district of Tri Ton. In 2019, with the attention of the People's Committee of An Giang province, a new racetrack was built at the foot of To Mountain, next to Soai Chek freshwater lake, near Ta Pa Pagoda, in Tri Ton district.

This large state investment project is designed according to its functions and cultural identity. However, due to the new lane, the ground is not complicated; the track is made of mountain sand mixed with river sand, so the road surface subsides, limiting the racing speed.



Fig. 6 Bull racing is often associated with the image of a temple

Source: Chi Hung

Transportation systems

An Giang province has many roads and waterways for visitors to access, including:

- Roads: An Giang currently has three main national highways, including National Highway 91 from Long Xuyen City, Chau Doc-Tinh Bien, which has a total length of 93 km; National Highway N1, connecting Chau Doc-Ha Tien, is 23 km long; and National Highway 80, which passes through Phu Nhuan commune, Thoai Son district, is 1.2 km.

- Waterways: An Giang has Tien and Hau Rivers, creating traffic routes on the Tien River, Hau River, and some other ways with a total length of 372.3 km. These routes create favorable circulation conditions for boats and ships, including transporting tourists.

2.2.3 Facilities

According to statistics, the total number of tourist accommodation establishments currently in the Tinh Bien and Tri Ton districts is about 50 motels and hotels, of which there are already rated standard and qualified establishments—minimum technical facilities and services to serve tourists. However, the hotel network of distribution enterprises in the district is not uniform; the large hotels are few, and the distribution is scattered. Although some hotels in the province have been built for a long time, they have not yet been upgraded or renovated. In addition, dining establishments, restaurants, and shopping spaces in the Tinh Bien and Tri Ton districts are generally quite diverse, meeting the needs of residents and visitors.

Fundamental changes in bull racing Opportunities

The bull racing festival attracts a large number of participants and cheerleaders. From 1989 and earlier, competitors mainly concentrated, with the number of participating teams ranging from 5 to 6 pairs of bulls. By 1989, the Bull Racing Organization had expanded its scale to Tri Ton and Tinh Bien districts, with 15–20 teams competing. Since 1992, the competition has been Khmer in the two communities above and Kinh and Khmer in neighboring provinces such as Kien Giang, Soc Trang, Tra Vinh, and even Cambodians in Ta Keo province. The expansion of the competition audience partly shows that the organization's attractiveness has attracted many other ethnic groups to participate. Teams from different regions contribute to the competition's diversity and bring much experience and skills to raise and train bulls. Through the Bull Racing group, they can learn and find ways to beat their opponents in the next tournament. It can be seen that, as a folk game of the Khmer community, the bull racing festival has been widely disseminated to other ethnic communities to encourage them to participate, contributing to the expansion of cultural exchanges (Ha & Van, 2019).

2.3.2 Challenges

Since the organization was developed on a large scale, its commercial value has increased gradually over the years, which has attracted a certain number of players. In 2012 and 2013, with the promotion and sponsorship of the Organizing Committee, the commercial value was higher than in previous years; specifically, the first prize was a cash prize of 30 million VND and an in-kind car, motorcycle, trophy, and flag. Along with the increase in prize value, disputes are also increasing in number and extent among bull owners. When economic value increases, it affects the psychology of players. Everyone who wants to win the top prize should try to protect their interests, including cheating. The Bull Racing Organization also attracts opportunists who use the competition to commit illegal acts. Betting in the Bull Racing Organization is an example.

In the past, the Bull Racing Organization was underdeveloped and little known. When going to join the festival, Khmer people often challenged each other to choose which pair of bulls would win the highest prize. Today, when the organization develops, the entertainment bets between Khmer people turn to a meal or a few barrels of beer to sit together and discuss the past contest. The form of gambling with large amounts of money began to appear when there was the participation of many components from all over the world. However, betting with money only seems to be among a small number of Kinh or Chinese people and is organized on a small scale. In addition, the crimes of pickpocketing and snatching have increased in recent years as the organization has attracted many audiences worldwide. Although the situation of security disorder is not severe, it must be removed to ensure a healthy entertainment space for the festival.

Along with the financial support, the space of the Bull Racing Organization also has many changes because the field is decorated with sponsors' banners, and the two sides of the area are concentrated with cameras. Photographs of newspapers and television stations continuously broadcast information on the amount of the sponsor. Besides, the contest participants were also given souvenirs from sponsors, such as t-shirts, drinking water, and hats to use in the race. The sponsors' activities have made the contest invisible to serve advertising purposes, forgetting the necessity of existing traditional elements in a folk festival. In addition to the changes made by sponsors, the sale of entrance tickets should also be considered "should or should not" because the bull racing festival is a fun activity associated with the Khmer Dolta Festival, not the Khmer people, and is a sports competition for prizes. In fact, since the application of selling tickets to visit the festival, the number of Khmer people who come to see the festival has also decreased, creating psychological losses.

Promotion policy

The current bull racing festival has received the attention of many people. As the day of the Bull Racing Festival approaches, the media, such as newspapers, radio, television, and social networks, all promote the image and time of the contest so that everyone can come and see it. On the primary day of the festival, the number of people cheering was nearly 10,000, according to unofficial statistics from the organizers. This information shows that the organization has a unique attraction for viewers and has almost become a form of sports competition rather than a game. Many spectators who came to see the bulls expressed excitement and suspense as they competed for the final distances. Photographers are also a large part of the audience; they come

very early and find the proper position to catch the breakthrough moments of the competing teams.



Fig. 7 The journalists and television stations have been at the Bull Racing Organization since early morning.

Source: Chi Hung

In addition, the An Giang government also coordinated and organized scientific seminars related to traditional festivals, including the BNBR Festival workshop. In addition, tourism companies in the province also significantly contribute to promoting the image of tourism and festivals in the region in many ways, such as posting on the company's website and exploiting festivals at different festivals and events—tourism programs.

Support the policies of local government

The People's Committee of An Giang Province has approved the Project on Conservation and Promotion of the BNBR Organization. An Giang Province intends to raise the BNBR Organization into an International Bull Racing Organization. Accordingly, the budget for the implementation of this project in the period 2020–2025 has a total cost of nearly 5.8 billion VND. The allocation of An Giang province is almost 2.9 billion VND, the budget of Tinh Bien and Tri Ton districts is virtually 1.2 billion VND, and the socialization capital is more than 1.7 billion VND. According to the Department of Culture, Sports, and Tourism of An Giang Province, the purpose of this project is to comprehensively assess the status of the BNBR Organization in the province, thereby offering solutions to conserve, promote, and bring this

intangible cultural heritage to life and contribute to the construction and socio-economic development of the region. The implementation of the project is part of the roadmap to upgrade the Bay Nui An Giang Bull Racing Organization into a bull racing Organization of Khmer people in the Mekong Delta and progress to the International Bull Racing Organization in An Giang. In particular, this project also aims to help the culture, sports, and tourism sectors of An Giang province build a regime of remuneration and honor artisans (racing bull owners, drivers, etc.), creating favorable conditions and environments for them to practice their heritage in the community. At the same time, select artisans qualified to be awarded the title of "Excellent Artisan" or "People's Artisan" according to regulations in intangible cultural heritage.

To continue to preserve and promote this unique cultural value, the districts of Bay Nui have been building a symbol for bull racing. The People's Committee of Tri Ton District has created a life-sized pair of bulls and drivers at the junction of the bull racing field in Tri Ton District and the road to Soai Chék Lake (To Ha hamlet, Nui To commune). Meanwhile, Tinh Bien district is taking the necessary steps to build the bull racing relief located at the junction of Nha Bang town. This recommendation is the effort of localities to create a highlight for people and visitors about bull racing when coming to the Bay Nui region.

Solutions for conservation and development of the Bay Nui Bull Racing Organization in An Giang province

Although there have been many opportunities, the tourism development of the BNBR Festival in Tinh Bien district, An Giang province, still has some limitations, such as the key tourist areas and attractions initially built branding, but the competitiveness is not high. The situation of attracting tourists, causing insecurity and disorder, and ensuring environmental sanitation in tourist areas and spots has not been thoroughly handled. Although tourism products and services have developed, the coordination between sectors in investment and exploitation is still slow. Therefore, it is necessary to have some appropriate solutions to develop the BNBR Organization, An Giang, in the future.

Developing and improving the quality of human resources

To preserve and promote the heritage of the Bull Racing Organization, it is necessary to improve the practice capacity and treatment of artisans (racing bull owners, drivers, etc.). Practical competence must be seen as a whole, not just the performance of the race itself, and must include practicing the community's unique and characteristic cultural life (Canh & Thi, 2018). The artist is the subject and the nucleus of the contest. The treatment of artisans is the treatment of those who keep and transmit heritage. If there is no practical treatment for artisans

in communicating the profession, it will increase the risk of losing traditional culture. The policy on remuneration helps artisans live, pass on their craft, and summarize the experiences handed down among the people. Select qualified artisans to be considered for the titles of "People's Artisan" and "Excellent Artisan." For artisans who are not eligible for the title of "People's Artisan" or "Excellent Artisan" but possess skills and know-how and have made excellent contributions to preserving and promoting the value of To honor and encourage their contributions to the competition, there should also be criteria for conferring the heritage. This honor is the foundation for the inheritance, maintenance of existence, and heritage development. To improve the professional qualifications of the Organizing Committee and the Arbitration Team, meeting the requirements of marking, monitoring, and checking to ensure sportsmanship, objectivity, and fairness in the competition. Develop and promulgate regulations and rules for BNBR with strict and detailed regulations to ensure fairness, accuracy, and safety for the Bull Racing Organization (including rules on costumes). Fight against betting behavior based on the results of bull races to ensure that unsportsmanlike motives do not dominate the Racing group. Inspection and examination should be strengthened regularly, promptly corrected with reminders, handled violations, and prevent and eliminate betting, deceiving visitors, and superstitious activities.

Currently, the bull racing festival of Bay Nui in An Giang does not have a team of narrators to explain and guide tourists to visit and attend the festival. Therefore, in the coming time, the provincial Department of Culture, Sports, and Tourism needs to train and arrange a force to interpret the bull racing festival. This force needs to have comprehensive knowledge, focusing on understanding the traditional values of the festival, the natural environment, and the cultural characteristics of the locality and tourists.

Improve the quality of infrastructure, materials, and technology.

To upgrade facilities and infrastructure (racing track, inter-communal grassroots racing field, etc.). Continue to improve the racing field in the province, meet the needs of organizing the Bull Racing Organization in the Mekong Delta, and meet the enjoyment needs of domestic and international tourists. There are plans to invest in infrastructure, such as roads, hotels, restaurants, shopping centers, etc., to meet the basic needs of visitors. Specifically, building a parking lot and a rest house is necessary to create favorable conditions for visitors to attend the 7-mountain bull racing ceremony.

Invest in technical means, install cameras at essential points on the track, use them for monitoring, and use them as a basis to resolve complaints from racing teams. Equip protective

vests for artisans driving racing bulls, limiting the risk of accidents for artisans. Before each race, it is necessary to organize to buy insurance for artisans and racers so that they can rest assured that they will compete at their best.

Strengthening the promotion of the festival

Continue to promote the construction of propaganda and the promotion of the intangible cultural heritage of the BNBR Organization in many forms to educate the public and help them appreciate the spiritual values of the Bull Racing Organization, especially the younger generation. At the same time, it serves the needs of researching, visiting, and learning about the Bull Racing Organization in particular and the cultural life of the Khmer people in general. Promote propaganda and education to raise awareness and understanding among cadres, civil servants, public employees, and people, especially students, about the values, love, and responsibility to protect, preserve, and promote the importance of cultural heritage in general and the cultural heritage of the Bull Racing Organization in particular (Tu, 2018). Propagating, advertising, and putting in entertainment activities and learning about art and culture will attract tourists to the province. Coordinate with travel companies to introduce the Bull Racing Organization to domestic and foreign tourists.

Mobilizing the support and investment of the State and locality

The provincial government and localities need to set out clear and specific plans in the stages of organizing, preserving, and promoting the traditional values of the festival so as not to be lost in the future. According to them, it needs to strengthen support, invest funds, provide capital for the construction of technical facilities for festival tourism, provide conservation funding, and provide funding for the maintenance and operation of the festival at the BNBR Festival in An Giang. It is also necessary to strengthen training support and branding for the festival.

Connecting festival tourism with other types of tourism

Local authorities must pay attention to building and developing programs combining different types of tourism to diversify tourism at the BNBR Festival in An Giang. To attach importance to the expansion and combination of other types of tourism such as community tourism, tourism to visit historical and revolutionary sites, commercial and official tourism, eco-tourism, cultural tourism (the festival products with typical characteristics of the region), etc., to satisfy the purpose of artistic exploration and entertainment for tourists. At the same time, it is encouraged to link tourist attractions with nearby attractions such as Soai Chek Lake, Traditional Exhibition House, Ta Pa Pagoda, Ta Pa Lake, etc., to form tourist programs and routes. Rich, diverse, and attractive for visitors.

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NEW EDUCATION POLICY 2020 CONTRIBUTION TO OBE AND SDGS

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Abstract

In 1986, India enacted and implemented its first Education Policy. On July 29, 2020, India's National Education Policy (NEP) was amended, modified, and approved after 34 years. This is a big step forward for India's educational system, and it will undoubtedly make India a desirable destination for higher education around the world. The New Education Policy focuses on systemic and institutional reforms to governance, regulation, and the development of flexible and multi-disciplinary academics and research in Indian higher education institutions. The paper discusses various significant reforms made in the New Education Policy 2020 (NEP) and how they shall cater to the OBE (Outcome Based Education) and SDGs eventually. The metamorphic developments and pedagogical improvements in the education system from the 18th century till the enactment of NEP in 2020 in India has been elucidated systematically. The conceptual relations discussed among the NEP and the SDGs has been established which can be tested with the empirical data to validate the impact.

Keywords: New Education Policy 2020, Sustainable Education, Indian Education System, SDGs.

Introduction

Mark Twain who travelled to India in 1897, at the height of the British Raj, stated that “India is the cradle of human race, the birthplace of human speech, the mother of history, the grandmother of legend, and the great grandmother of tradition. Outmost valuable and most artistic materials in the history of man are treasured up in India only!” (Lane, 2016)

During ancient times, India was a centre of learning and knowledge. At Nalanda and Takshashila (6th century BC – 12th century AD), India possessed world-class universities. These universities produced world-class intellectuals as students. There was historical evidence that India was a popular study and research destination for international students. When attackers set fire to Nalanda University's nine-story library, which contained 9 million books, it took three months for the fire to entirely burn out. It contained dorms for students, which could accommodate 10,000 students and 2,000 teachers during the school's peak (History and Revival, n.d.).

From Vedic times, India's educational system has a rich history, tradition, and culture. Individual holistic growth was emphasized in the Gurukul system of providing information and skills. Because of world-class learning centres such as Takshashila, Pushpagiri, Nalanda, and others, India was formerly known as Vishwaguru. Following foreign invasions and colonial control, India's dominant status was eroded.

Current Position of Indian Education System: Today, there isn't a single Indian university that ranks among the world's top educational institutions. These are important times for the country, and a fresh look at the educational system is required. There is no doubt that India's post-independence educational achievements are commendable. Despite a population increase of approximately treble, India have nearly full enrolment in schools and universities. However, due to teacher-centric techniques, India's education system has lost its lustre, and Indian classrooms are still dominated by rote learning. In most schools, 'chalk and talk,' or teacher teaching, still reigns supreme. It is unclear what kind of impact in-service teacher training has had on changes in classroom practices after several years of implementation. The Indian government is well aware of the issues in the Indian education system, but it has been slow to address them.

Metamorphic Developments in Indian Education System Post-Independence:

The Indian educational system has seen numerous modifications since independence, with the most significant changes occurring after independence. Since independence, India has

witnessed an increase in literacy rates and the establishment of a number of educational institutions.

Several Industrial Training and Management Institutes, as well as polytechnics, engineering, medical, and dental colleges, have been built by the government in recent decades. The evolution of the education system is overseen by governing bodies such as the 'National Council of Educational Research and Training' (NCERT) and the 'State Council of Educational Research and Training' (SCERT). The 'University Grants Commission' (UGC), which was created as the university regulator in 1956, has the authority to award grants to universities and institutions.

Following are the milestones as the part of development of Education System in the past 70 years

- **Kothari Commission (1964-66):** The Kothari Commission underlined the importance of nondiscriminatory education for all individuals. It proposed a new educational model of 10+2+3 years.
- **National Policy on Education (1968 & 1986):** This policy implemented the Kothari Commission's recommendations. Universal Primary Education was the main objective. It involves, among other things, a new educational model, three language policies, and the adoption of regional languages in higher education.
- **Admission & Institution Growth:** In India, there were just 19 universities and 400 schools, totaling 5000 pupils. By 1980, there were more than 26 million students enrolled in over 1.5 million schools, including 751 universities and 35,539 colleges. (Kumari, 2017).
- **Education for All (2000-01):** *Sarva Shiksha Abhiyan (SSA)* was launched for children from 6 to 14 years, to ensure mandatory elementary education to all.
- **Mahila Samakhya Programme (1989):** Prior to independence, there were no noteworthy educated females. However, according to the government's efforts, there has been a significant improvement since the inception of the 'Mahila Samakhya Programme,' which aims to provide equal education to female and increase their self-esteem.
- **Right to Education Act – RTE:** In India, the RTE is a federal law that emphasises the necessity of free and compulsory education for children aged 6 to 14. As a result, all private schools are required to keep a quarter of their seats reserved for underprivileged children.

- **The National Education Policy (NETP):** On July 29, 2020, the NETP for India was reviewed, updated, and authorised. This is a significant achievement for India's educational system, and it will undoubtedly make India a desirable destination for higher education around the world.

Highlights of the New Education Policy 2020:

The Cabinet has approved the National Educational Policy 2020, clearing the path for significant changes in the country's school and higher education sectors.

- The new policy seeks to universalize education from pre-school to secondary school, with a 100% GER (Gross Enrolment Ratio) in school education by 2030 and a 50% GER in higher education by 2035.
- The new 2020 policy will reintegrate 2 crore out-of-school children and add 3.5 crore spaces in higher education.
- A new 5+3+3+4 school curriculum with 12 years of schooling and 3 years of Anganwadi/pre-schooling.
- Emphasis on foundational literacy and numeracy; there will be no hard division in schools between academic, extracurricular, and vocational streams; vocational education will begin in class 6 with internships.
- Assessment improvements, including the 360° Holistic Progress Card, which tracks student progress toward learning outcomes.
- Higher education curricula should provide for subject flexibility, various entry/exit points, and credit transfer via an academic bank of credits.
- The affiliation structure will be phased out in 15 years, with Graded Autonomy to colleges.
- National Research Foundation to be established to foster a strong research culture.
- Higher Education: Light but Tight Regulation, a single regulator with four distinct verticals with different functions.
- The National Educational Technology Forum will be established as part of NEP 2020, which advocates for expanded use of technology while maintaining equity.
- The new policy encourages multilingualism in both schools and higher education institutions; instruction must be in the mother tongue/regional language until at least Grade 5; and a National Institute for Pali, Persian, and Prakrit, as well as an Indian Institute of Translation and Interpretation, will be established.

- The establishment of a Gender Inclusion Fund and Special Educational Zones for disadvantaged regions and groups is emphasised in NEP 2020.

Paradigm Shift in the Pedagogical Approaches through New Educational Policy 2020:

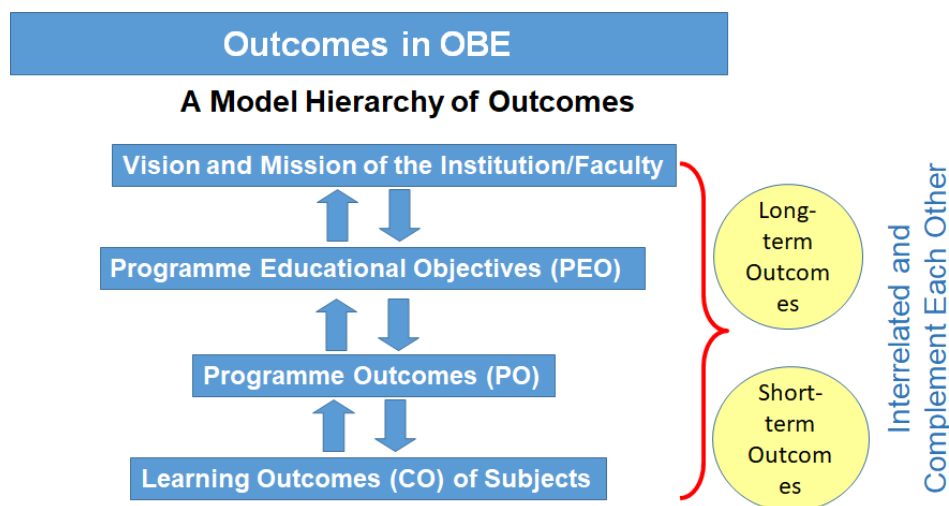
No clear distinction between academic, extracurricular, and vocational streams: From centuries, India has followed the concept of a teacher-centered approach rather than a learning outcome-centered one. Indians were good at theories and notions, but not at putting them into practise. As a result, the educational environment shaped teachers and students to strive for lower-level Bloom's taxonomy skills (Knowledge & Understand) rather than higher-order Bloom's taxonomy skills (Application, Analyse, Evaluate & Create). This is due to an overabundance of attention on acquiring concepts rather than applying those concepts. The NEP is more student-centered, allowing students to follow their passions while still improving their abilities and making them more employable. The syllabus will be simplified to merely core knowledge of a subject, with a greater emphasis on students' practical and application expertise.

Competency Based Education: The New Education Policy strives to provide students with not only knowledge but also skills. After finishing the programme, a bachelor's degree holder should be a practice-ready professional. That is to say, a teacher's responsibility is to ensure that a graduate or post-graduate achieves the competencies demanded by the industry. This can be accomplished by providing instructors with adequate pedagogical training. It is the role of teachers to convey competencies to students rather than to dump knowledge on them. The teacher is no longer regarded as a repository of information, but rather as a facilitator of learning. Teaching is not for the purpose of providing a degree, but rather for the purpose of developing skills and competencies to satisfy industry requirements. The focus is on capability development rather than content covering.

Outcome Based Education: OBE has been around for 15 to 20 years. The Washington Accord is a multilateral agreement was first signed in 1989 involving authorities responsible for certification or recognition of tertiary-level engineering qualifications within their countries who have opted to work together to assist professional engineers' mobility (International Engineering Alliance, 1989)

The New Educational Policy intends to align Indian Professional Engineering Programs with international standards so that engineers can work in such countries without having to take additional exams. With the New Education Policy, India, as a provisional member of this agreement, may become a permanent member in the future.

Instead than focusing on the content that is taught, OBE focuses on what students will have or be able to do after completing a course. The emphasis has shifted from content to outcome. The outcomes of a course or programme should be mapped from the institutional level to the course level so that the educational system's overall activities are aligned and focused on achieving the desired level of skills in students by removing unnecessary diversified efforts from the institution, teachers, and students themselves.



Pic i: A chart showing the flow of the outcomes targeted from an Institution to the Course level

OBE in Course Evaluation

In teaching and learning, it is apparent that the emphasis has switched to Competency-Based Education and Outcome-Based Education. Similarly, in order to achieve this, assessment pedagogy has shifted its attention away from memory-based evaluation methods towards Competency Testing Methods for Evaluation. Memory Based Evaluation Methods have dominated over the Indian Education System for decades. The students were graded on their ability to remember information and comprehend it. This was designed to assess the lower order skills. As the focus has switched to Competency-Based and Outcome-Based Education, evaluation methods have been developed to determine whether students have achieved the higher order skills that were desired during the learning process. This is only achievable with

evaluation systems that can assess pupils' higher-order skills. However, there are situations when case-based questions, problem-based/application-based questions are used. Rather than using traditional memory testing methods, an open book examination can be used to assess higher-order skills.

The New Education Policy highlights assessment innovations, such as the 360° Holistic Progress Card, which tracks student progress toward learning outcomes. Indeed, the assessment is multi-dimensional and multi-level in nature. Rather than having a single end-of-term evaluation, institutions began embracing continuous evaluation. Team-based activities, Assignments, Term Papers, Participation in various events, Paper Presentations, Research Activities and Publications, discussions, practicals, project reports, internships, and so on are all part of a continual evaluation. The use of a variety of sophisticated evaluation methodologies enhances evaluations and aids in the achievement of OBE in course evaluation.

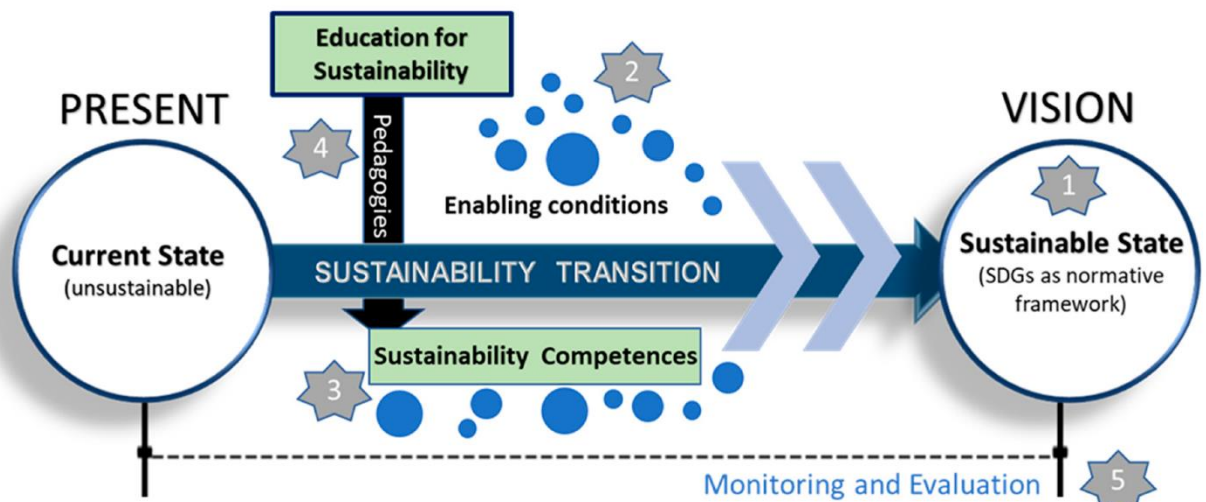
Sustainable Education:

Sustainability Education is often referred to as Education for Sustainable Development (ESD). (UNESCO, 2014) defined Sustainable Education as "Education for Sustainable Development allows every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future. It also requires participatory teaching and learning methods that motivate and empower learners to change their behaviour and take action for sustainable development. Education for Sustainable Development consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way. Education for Sustainable Development requires far-reaching changes in the way education is often practiced today."

"ESD is about the learning needed to maintain and improve our quality of life and the quality of life of generations to come. ESD enables people to develop the knowledge, values and skills to participate in decisions about the way we do things individually and collectively, both locally and globally, that will improve the quality of life now without damaging the planet for the future." (Sterling, 1998).

From the definitions above, it is obvious that Sustainable Growth is the comprehensive development of human beings in terms of obtaining the skills, competencies, attitudes, and values required to design a sustainable future. The term "sustainable future" refers to a higher quality of life for current and future generations.

The New Education Policy assists students in achieving holistic development by strengthening their competences and skills. It leads to Education for a Sustainable Future. Without a paradigm shift in teaching and learning, sustainable development will be impossible. The New Education Policy directs learning and instruction in the direction of achieving sustainable development through education.



Pic ii: Flow chart showing the role of pedagogies, competencies in achieving Sustainable Development in Education (Kioupi & Voulvoulis, 2019)

The above pic. 2 depicts the process of sustainability transition from the current state of unsustainability to the Sustainable State through the achievement of SDGs. The current study have elobotely discussed the role of NEP in achieving SDG 4 aligned with the 21st century education which is characterized with the achievement of Sustainable Development in Education. (Kioupi & Voulvoulis, 2019) advocated a conceptual framework consisting for Education for Sustainability Development (ESD) consisting for three systems thinking techniques viz., vision to generate a participatory sustainable state, back-casting to identify competencies and pedagogies that contribute for sustainability, monitoring and evaluation indicators to ascertain the progress. The paper evaluates the contribution of the NEP towards the SDG 4.0 through the systems thinking techniques.

The New Education Policy serves to reach the UN Sustainable Development Goals:

In a press release by the Union Education Minister, Shri Ramesh Polkhriyal Nishank stated that the Policy proposes that all aspects of the education structure, including regulation and governance, be revised and revamped in order to create a new system that is aligned with the aspirational goals of 21st century education, including SDG 4 of ensuring free, equitable, and

high-quality primary and secondary education for all children, while building on India's traditions and value systems. (PIB Delhi, 2020)

The UN has declared the years 2020-30 as the 'decade of action'. The Indian government has taken a significant and radical step with the introduction of the New Education Policy, which is unprecedented.

The areas where policy reforms intersect with the Sustainable Development Goals, namely SDG 4 on Quality Education, are listed below.

- ***SDG 4.1 – Primary and Secondary Education.***

The NEP assures that all children get a free, equitable, and high-quality primary and secondary education that leads to meaningful and successful learning outcomes. The provision of 12 years of free, government-funded, inclusive, equitable, and high-quality primary and secondary education that leads to certain learning outcomes — of which at least nine years must be compulsory. Everyone, without exception, is entitled to these advantages. (Sustainable Development Goal 4 (SDG 4)).

- ***SDG 4.2 – Equal access to quality pre-primary education.***

The most significant benefit of the NEP is that children aged 3-6 years are given special attention. The Right to Education Act of 2008 had this as a major flaw. The forebearers of Anganwadi education will receive a much-needed boost as a result of this endeavor. There was also a provision for a new Gender Inclusion Fund for schools, as well as proactive assistance for disability schooling (SCCN Team, 2020)

- ***SDG 4.3 – Equal Access to Affordable Technical and Vocational Education.***

Vocational education will be provided at a younger age under the NEP, and technological skills such as coding will be taught starting in the sixth grade. In addition, the Ministry of Human Resources is establishing a National Education Technology Forum to address issues of technology, information sharing, and capacity development.

- ***SDG 4.4 – Increase the number of people with relevant skills for financial success.***

Curriculum design in higher and secondary education has moved from the previous 10+2 approach under the NEP. Clearer benchmarks are defined with a 5+3+3+4 model, which leads to better outcomes. They have provided many exit points for higher education, resulting in improved student signalling abilities. This is a standard procedure in most developed countries. An academic bank of credit has been set up to digitally store academic credits acquired that can be transferred and counted toward a final degree.

Furthermore, by 2035, the NEP aims to achieve a gross enrolment ratio of 50% in higher education. This will ensure that the vast majority of the people under the age of 35 has a good skill set.

- ***SDG 4.5 – Eliminate Discrimination in Education.***

The goal is to ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes. The Digital Divide is intended to bridge under the new unit that deals with Internet-based e-learning under the NEP. Infrastructure, capacity building, and digital learning Infrastructure limitations connected to electricity supply and internet bandwidth are the challenges to overcome in the new education paradigm of online classes, which the policy attempts to avoid.

- ***SDG 4.6 – Universal Literacy and Numeracy.***

A National Foundation of Reading and Numeracy will be established under the NEP to deliver basic literacy and numeracy skills to students by the third grade. This is particularly encouraging news given India's decision to take part in the PISA survey, which assesses Basic English and Mathematics Comprehension. After a poor performance in 2009, India was expected to be a member of Universal Literacy and Numeracy again in 2021. Since 2010, India's enrolment ratio at the age of six has been at 96 percent. However, the dropout rate is also fairly high.

It will undoubtedly be difficult to implement reforms in India, since education is a shared issue between the states and the central government, as stipulated under the Constitution of India's Concurrent List. However, given the initiative and opportunity for public participation provided by the NEP, government shall aim to be proactive in contextualising the NEP's recommendations.

Smart Campus Cloud Network (SCCN) highly encourages all stakeholders to study the document as a source of hope in these trying times. SCCN also completely endorses all of the document's tenets and seeks to incorporate all of these guidelines into its role as an advisor to colleges and universities.

- ***SDG 4.7 – Sustainable Development and Global Citizenship.***

The NEP strives to build and improve child-centered, disability-sensitive, and gender-responsive educational facilities, as well as create safe, non-violent, inclusive, and effective learning environments for all. It also boosts the amount of scholarships available for higher education, including vocational training and ICT, as well as

technical, engineering, and scientific programmes. Through faculty development programmes, the NEP also ensures a significant increase of qualified teachers (SDG 4 and Targets, n.d.).

Table i: Contributions from NEP, 2020 to the SDG 4

SDG	Contribution from NEP, 2020
SDG 4.1 Primary and Secondary Education	12 years of free, inclusive, high-quality elementary and secondary education for all people, without exception.
SDG 4.2 Early Childhood	New Gender inclusion fund for schools for proactive assistance for schooling for all.
SDG 4.3 Technical, Vocational, Tertiary and Adult Education	The technical skills will be taught from the sixth grade. Establishment of National Education Technology Forum to provide assistance with technology, ease of information sharing and capacity development.
SDG 4.4 Skills for Work	The NEP aims to achieve a gross enrolment ratio of 50% in higher education. In addition These shall eventually enhance employability and the
SDG 4.5 Equity	Ascertain that all girls and boys receive a free, equitable, and high-quality primary and secondary education that results in relevant and effective learning outcomes. Under NEP, the Digital Divide shall bridge by establishing a new unit dedicated to Internet-based e-learning.
SDG 4.6 Literary and Numeracy	A National Foundation of Reading and Numeracy shall be established under the NEP to deliver basic literacy and numeracy skills to students by the third grade.
SDG 4.7 Sustainable Development and Global Citizenship	In order to promote sustainable development and global citizenship, the NEP aspires to build and upgrade educational facilities that are child-centered, disability-sensitive, and gender-responsive, as well as providing safe, non-violent, inclusive, and effective learning environments for all.

Conclusion

The NEP 2020 is the first education policy of the twenty-first century to address India's numerous pressing development needs. The NEP 2020 is very promising that it shall bring major changes in the education system in India. To contribute Sustainable Development Goals, all set to bring notable changes through NEP and help achieving Sustainable Education which in turn going to contribute the Sustainable Development. The conceptual relations discussed among the NEP and the SDGs has been established which can be tested with the empirical data to validate the impact.

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ture.

DESIGN AND FABRICATION OF ELECTRO-MAGNETIC CLUTCH

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Abstract

This project introduces/proposes experimental study on Design and fabrication of Electro-magnetic clutch. Electromagnetic grips and electromagnetic brakes are gadgets that control power and revolving development utilizing an electromagnetic power produced by empowering loops. Grasps interface and disengage with power while brakes brake and keep up with rotating development. Attractive grips utilize electric magnets delivered to lock or open the motor and the transmission input shaft, working with or ending the progression of force. Attractive brakes utilize electric magnets to speed up, decelerate or stop pivot. An electronic grasp control (ECC) framework, likewise called electronic grip the executives (ECM) framework, contains a grip which is locked in/separated by an actuator (electric or pressure driven), in light of the place of a grasp pedal (with position sensor) or capability of the control signals send freely by an electronic. Role of Electromagnetic Grips: To Transmit and cutoff Power. Electromagnetic grips are a mechanical component to communicate and cut power on the determined side with an electromagnetic power. Set forth plainly, they can disengage and interface power ceaselessly the power. Electromagnetic grasps are generally reasonable for far off activity since no mechanical linkages are expected to control their commitment, giving quick, smooth activity. Notwithstanding, in light of the fact that the enactment energy scatters as intensity in the electromagnetic actuator when the grasp is locked in, there is a gamble of overheating.

Keywords: Electronically Commutated Motor , Electronic Grasp Control

Introduction

This project introduces/proposes experimental study on Design and fabrication of Electromagnetic clutch. Electromagnetic grips and electromagnetic brakes are gadgets that control power and revolving development utilizing an electromagnetic power produced by empowering loops. Grasps interface and disengage with power while brakes brake and keep up with rotating development. Electromagnetic clutches and electromagnetic brakes are devices that control power and rotary movement using an electromagnetic force generated by energizing coils. Clutches connect and disconnect with power while brakes brake and maintain rotary movement. Magnetic clutches use electric magnets produced to lock or unlock the engine and the transmission input shaft, facilitating or terminating the flow of power. Magnetic brakes use electric magnets to accelerate, decelerate or stop rotation. Attractive grips utilize electric magnets delivered to lock or open the motor and the transmission input shaft, working with or ending the progression of force. Attractive brakes utilize electric magnets to speed up, decelerate or stop pivot. An electronic grasp control (ECC) framework, likewise called electronic grip the executives (ECM) framework, contains a grip which is locked in/separated by an actuator (electric or pressure driven), in light of the place of a grasp pedal (with position sensor) or capability of the control signals send freely by an electronic. Role of Electromagnetic Grips: To Transmit and cutoff Power. Electromagnetic grips are a mechanical component to communicate and cut power on the determined side with an electromagnetic power. Set forth plainly, they can disengage and interface power ceaselessly the power. Electromagnetic grasps are generally reasonable for far off activity since no mechanical linkages are expected to control their commitment, giving quick, smooth activity. Notwithstanding, in light of the fact that the enactment energy scatters as intensity in the electromagnetic actuator when the grasp is locked in, there is a gamble of overheating.

Working principle

The rotor portion of the clutch becomes magnetized and sets up a magnetic loop, which attracts both the armature and friction disks. The attraction of the armature compresses (squeezes) the friction disks, transferring the torque from the in inner driver to the out disks. An electronic clutch control (ECC) system, also called electronic clutch management (ECM) system, contains a clutch which is engaged/disengaged by an actuator (electric or hydraulic), based on the position of a clutch pedal (with position sensor) or function of the control signals send independently by an electronic. Function of transmitting the torque from the engine to the

drivetrain. Smoothly deliver the power from the engine to enable smooth vehicle movement. Perform quietly and to reduce drive-related vibration.

Components

Electromagnetic clutches also called ‘electromechanical’ or ‘E.M.’ clutches, actuate electrically but transmit torque mechanically. The basic design of an E.M. clutch consists of three parts: an electromagnetic coil within a metal housing (stator), a rotor connecting to the input shaft, and an armature that connects to the output shaft, sprocket, or pulley.



Electrically Actuated Clutches



Micro-Clutches



Electromagnetic Tooth Clutches

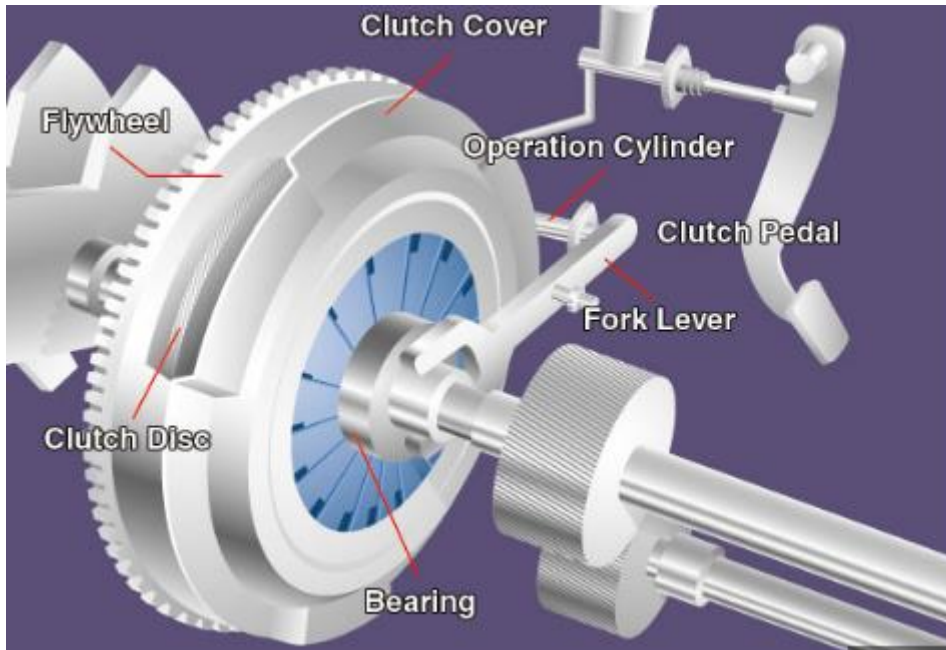


EM Clutch/Brake Combo Units



Function of clutch system

Function of transmitting the torque from the engine to the drivetrain. Smoothly deliver the power from the engine to enable smooth vehicle movement. Perform quietly and to reduce drive-related vibration.



Electromagnetic Particle Clutch Advantages

Torque can be controlled very precisely by a magnetic particle clutch, making it a common solution for tension control applications such as taper tension control, wire winding, or foil and film tension control. In addition to accuracy, they also offer a fast response.

Electromechanical Clutch Sorting & Packing Applications

- Food Processing Equipment.
- Packaging Machinery.
- Conveyor Drives.
- Printing and Copy Machines.
- Automated Manufacturing and Assembly.

Conclusion

Electromagnetic clutches are most suitable for remote operation since no mechanical linkages are required to control their engagement, providing fast, smooth operation. However, because the activation energy dissipates as heat in the electromagnetic actuator when the clutch is engaged, there is a risk of overheating

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STERLING ENGINE

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Abstract

The Stirling Engine was invented by Robert Stirling. This contraption was brought into the world as a expertise to the smoke machine, since a Stirling Engine works with additional unobtrusive strains than the contraption made by Watt and it didn't require a confirmed train engineer. Nowadays the advancement that incorporates the improvement of Robert Stirling is in absolutely improvement because of how now especially significant applications are open .This document goes all through the whole presence of this curious device looking on account of reasons of this astonishing improvement in this called high advancement with its different applications and doing an examination as indicated by the point of view of the economy. This adventure gets a handle on the rule capacity of the engine with a significant assessment. Moreover, we show how the Credible Engine in mix with harmless to the ecosystem power sources can be fundamental for a reasonable energy supply.

Keywords: Astonishing, Ecosystem ,Advancements, Smoke Machine

Introduction

Like any heat engine, the Stirling engine goes through the four essential cycles of pressure, warming, extension, and cooling two or three models from each day life might make this more clear. In this motor a gas-air blend is packed utilizing work put away in the mechanical flywheel from a past cycle. Then, at that point, the gas blend is warmed by lighting it also, permitting it to consume. The higher tension gas combination presently is extended which accomplishes more work than was expected for the pressure and results in net work yield. In this specific motor, the gas blend is cooled very little. In any case, the fumes is disposed of and a cool gas blend is gotten through the carburetor.



Figure 1 sterling Engine

Components

Heat Exchangers

Planning Stirling motor intensity exchangers is a harmony between high intensity move with low thick siphoning misfortunes, and low dead space (unswept inside volume). Motors that work at high powers and tensions expect that heat exchangers on the hot side be made of compounds that hold impressive strength at high temperatures and that don't erode or creep.[citation needed]In little, low power motors the intensity exchangers may basically comprise of the walls of the particular hot and cold chambers, yet where bigger powers are required a more prominent surface region is expected to move adequate heat.

Regenerator In a Stirling motor, the regenerator is an interior intensity exchanger and transitory intensity store put between the hot and cold spaces to such an extent that the functioning liquid goes through it first in one heading then the other, steering heat from the liquid in one bearing, and returning it in the other. It tends to be basically as straightforward as metal cross section or froth, and advantages from high surface region, high intensity limit, low conductivity and low stream grating. Its capability is to hold inside the framework that heat which would somehow

be traded with the climate at temperatures middle of the road to the most extreme and least cycle temperatures, [accordingly empowering the warm effectiveness of the cycle (however not of any reasonable motor to move toward the restricting Carnot productivity.

Heat Sink

The bigger the temperature distinction between the hot and cold segments of a Stirling motor, the more noteworthy the motor's productivity. The intensity sink is regularly the climate the motor works in, at encompassing temperature. On account of medium-to high-drive motors, a radiator is expected to move the intensity from the motor to the encompassing air. Marine motors enjoy the benefit of utilizing cool surrounding ocean, lake, or stream water, which is commonly cooler than encompassing air. On account of joined intensity and power frameworks, the motor's cooling water is utilized straightforwardly or in a roundabout way for the end goal of warming, raising proficiency.

Displacer

The displacer is a specific reason cylinder, utilized in Beta and Gamma type Stirling motors, to move the functioning gas to and fro between the hot and cold intensity exchangers. Contingent upon the kind of motor plan, the displacer could conceivably be fixed to the chamber; i.e., it very well might be a free fit inside the chamber, permitting the functioning gas to pass around it as it moves to possess the piece of the chamber past.

Working Principle

An ideal Stirling cycle comprises of four thermodynamic cycles following up on the functioning liquid:

Isothermal extension. The extension space and related heat exchanger are kept up with at a consistent high temperature, and the gas goes through close isothermal development retaining heat from the hot source. Consistent volume (known as isovolumetric or isochoric) heat-expulsion. The gas is gone through the regenerator, where it cools, moving intensity to the regenerator for use in the following cycle. Isothermal pressure. The pressure space and related heat exchanger are kept up with at a consistent low temperature so the gas goes through close isothermal pressure dismissing intensity to the virus sink. Steady volume (known as isovolumetric or isochoric) heat-expansion. The gas goes back through the regenerator where it recuperates a significant part of the intensity moved in process 2, warming up while heading to the development space.

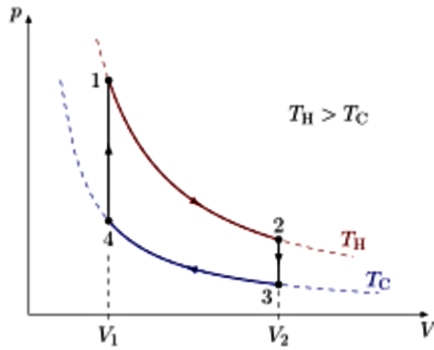


Figure 2 sterling cycle

Types of Stirling Engine

There are three major types of stirling engines that are differ by each other on the basis of movement of air in their hot and cold portions.

The alpha configuration has two power cylinders, one in a hot chamber, one in a chilly chamber, and the gas is driven between the two by the cylinders; it is commonly in a V-development with the cylinders joined at a similar point on a driving rod.

The beta configuration has a solitary chamber with a hot end and a virus end, containing a power cylinder and a 'displacer' that drives the gas between the hot and cold finishes. It is commonly utilized with a rhombic drive to accomplish the stage contrast between the displacer and power cylinders, however they can be joined 90 degrees out of stage on a driving rod.

The gamma design has two chambers: one containing a displacer, with a hot and a virus end, and one for the power cylinder; they are joined to frame a solitary space, so the chambers have equivalent tension; the cylinders are commonly in equal and joined 90 degrees out of stage on a driving rod.

Conclusion

The thermal efficiency of stirling engine is approximately aqual to carnot cycle which is the highest thermal efficiency by any heat engine. Stirling motors are able to perform quiteley and can utilize practically any heat source. The intensity energy source is created outer to the Stirling motor as opposed to by interior ignition similarly as with the Otto cycle or Diesel cycle motors.

The ideal Stirling cycle is unreachable in reality, similarly as with any intensity motor. The effectiveness of Stirling machines is additionally connected to the natural temperature: higher proficiency is acquired when the weather conditions is cooler, hence making this kind of motor less appealing in places with hotter environments. Similarly as with other outside burning motors, Stirling motors can utilize heat sources other than the ignition of powers.

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CLARION CALL: SAVING THE PLANET FROM AIR POLLUTION

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ABSTRACT

Environmental challenges today, include air pollution as an instance of Climate change, which needs urgent attention. It is for this reason that TAKE ACTION GLOBAL(TAG) initiated Climate Action Project as a yearly event to address adaptation and mitigation to climate change, through environmental knowledge sharing, awareness and perception evaluation as well as attitudinal change for a sustainable environment. Therefore, the need to examined air pollution in the light of climate change.

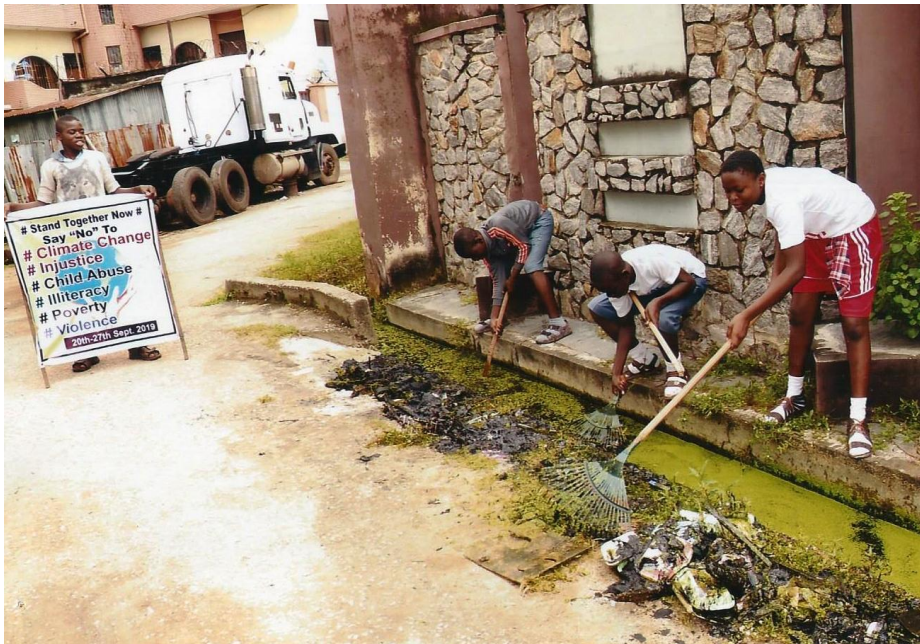
Introduction

Pollution of the air, water, soil and workplace is an important threat to human development. The UN Sustainable Development Goals (SDGs) have a strong focus on reducing environmental pollution (UN, 2015). Specifically, SDG 3.9 seeks to “substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination” by 2030. Many of the other goals are also related to pollution, including SDG 2.4 on improving soil quality, SDG 7 on clean energy, SDG 9.4 on clean technologies and industrial processes, SDG 11 on sustainable cities and communities, SDG 12 on responsible consumption and production, and SDGs 14 and 15 on conservation of water and land. However, the realization of these goals depends solely on goal 13-Tackling Climate change threat.

People do not intentionally seek to cause pollution, but disposing of waste products into the nearby environment is often the most convenient, and inexpensive, form of disposal. Thus, pollution is an example of indirect, or second-order, environmental consequences of human development efforts resulting in climate change. Oh! What a threat to human existence? Air pollution is not in any way environmental friendly. The 195 countries who signed the Paris Climate Agreement in December 2015 have now ratified the treaty. The world’s governments have agreed that we need to listen to the scientists - we really do have to stay under two degrees of global temperature change, but there is no policy in place that gets us to where we need to be, futuristic calamity.

The agreement they signed has no binding targets or penalties. It is basically a statement of intent that has no teeth. How fast can we get off coal, gas and oil? We have about thirty years to move completely away from our old ways. Sooner would be better! So where will this momentous changes come from? Even though they happily signed the agreement, many governments – including our own - are not formulating policy that will get us to where we need to be; they are still building roads, planning new runways and hoping to restart economic growth in the consumer economy. No, this change will have to come from the bottom - up. The emerging generation will be leading the way. It is easier to see past the oil age when you are not personally invested in it. For the emerging generation that simply isn’t going to be their future. They missed that opportunity so they are going to have to invent a new one for themselves. We might not know much about the future, but I am guessing it is going to be low carbon and almost exclusively local as a result of the on-going yearly CLIMATE ACTION PROJECT FOR SUSTAINABLE DEVELOPMENT and GLOBAL ACTION between September and November.

This is not bad news, especially not to the ears of someone who will never have a pension plan paid by Oil firm. The post carbon economy is a land of opportunity, like when they first invented the internet - it is a vast un-occupied space waiting for a new generation to inhabit it. With this bold project we are looking for the leaders who are going to help create a new vision for a post carbon society, with a sense of concern and responsibilities to ensure sustainable development. Therefore, let us 'StandTogetherNow' to say no to climate change in order to save our future.



Field work, 2023.

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**INTEGRATED DATA ANALYSIS FROM UNIVERSITY INFORMATION
SYSTEMS FOR ENHANCING QUALITY OF EDUCATION**

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ABSTRACT

The paper examines the utilization of data from University Information Systems in educational institution. By analysing and leveraging the data generated by these systems, various benefits can be derived. Integrated data analysis enables university to uncover valuable insights, identify patterns, and discover correlations across dimensions. Gathering data on students from the academic information system serves to analyse academic performance, track progress, and identify areas for improvement in the educational process. Monitoring the development of Moodle users and the number of courses help managers adapt ICT to the current situation and make informed decisions to align the ICT infrastructure with the evolving needs of Moodle users.

Keywords: Database System, University Information System, Learning Management System, Learning Analytics, Data Mining.

INTRODUCTION

In today's digital age, universities accumulate huge amounts of data through their information systems. These systems capture valuable information about students, faculties, courses, administrative processes, and various aspects of the university's operations. Extracting meaningful information and using this data has become crucial for improving the quality of education and effective management at universities. In this context, the integration and analysis of data from university information systems offer an effective approach to gain holistic perspectives and support evidence-based decision-making.

By combining and analyzing data from various sources within the university ecosystem, such as academic information systems, learning management systems, financial systems, and research databases, a comprehensive understanding of how the university works can be achieved.

The first definition of Learning Analytics was published by G. Siemens (on his blog) in 2010, which was used in a modified form at the 1st international conference focused on Learning Analytics in 2011. Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs.

Matej Bel University (MBU) provides the following main information systems for study administration and communication with students:

- Academic Information System (AIS)
- Learning Management System (LMS) Moodle
- Collaborative platform MS Teams

AIS is a comprehensive information system designed especially for the management of all three levels of university education and the support of science and research management on university. It integrates students, teachers, and the administration of students.

Moodle is an open-source LMS that is widely used in educational institutions and organizations around the world. Moodle provides a platform for creating online courses, managing course materials, conducting assessments, facilitating communication and collaboration between students and instructors, and tracking student progress. It offers a wide range of features and tools to support online learning.

During the Covid-19 pandemic, LMS Moodle played a significant role in facilitating online learning. It allowed teachers at MBU to ensure the continuity of education despite the closure of school spaces. By providing online courses and materials, students were able to continue

their studies remotely. Moodle provided a platform for teachers to create and manage online courses, making digital learning materials accessible to students. Moodle offered tools for interaction and communication between teachers and students. Discussion forums, chat rooms, and messaging features enabled teachers and students to stay connected, exchange ideas, and engage in educational process.

MS Teams provides a virtual classroom management platform for teachers to plan and organize live online courses, deliver lectures and interact with students in real time via video conferencing. During the Covid-19 pandemic, MS Teams played a key role in facilitating online learning.

LITERATURE REVIEW

In literature review, we explore the field of learning analytics and its focus on examining data from university information systems. By harnessing the vast amount of data generated by university information systems, researchers aim to uncover valuable patterns, trends, and correlations that can inform decision-making and enhance educational practices.

The literature in this domain encompasses studies that employ diverse methodologies, ranging from quantitative analyses of large-scale datasets to qualitative investigations of student experiences. Scholars have investigated various aspects of learning analytics, including predictive modeling, intervention strategies, personalized learning, and the ethical considerations surrounding the use of student data. Additionally, the literature explores the technical challenges of data collection, data integration and privacy concerns.

By reviewing the existing literature on learning analytics and data analysis from university information systems, this study aims to synthesize and evaluate the current state of knowledge in the field. The findings from this review will contribute to a deeper understanding of the applications, methodologies, and implications of learning analytics in higher education settings. The book "Handbook of Learning Analytics" 0 provides a comprehensive overview of the field of Learning Analytics. It covers various topics related to the use of data, educational data mining, and analytical approaches to gain insights into the learning process.

The paper 0 aims to examine the research literature and construct a systematic review of learning analytics. The details of the study are categorized according to their research questions or objectives, the methodology (such as input data, techniques used or software tools for data collection and analysis) and the findings. This paper offers an overview of the emerging field of learning analytics, provides a foundation for exploring this area of educational research, and identifies a series of future challenges.

The objective of the review 0 is to assess the current state of Learning Analytics (LA) in terms of data integration in the context of higher education. The results show that a few data sources (e.g., LMS) appear repeatedly in the research studies; the number of data sources used in LA studies in higher education tends to be limited; when data are integrated, similar data formats are often combined; the research literature tends to lack details about data integration in the implemented systems. In addition, the results indicate a lack of stakeholder (e.g., teachers/instructors, technology vendors) involvement in the research studies.

The systematic literature review 0 maps the current state of implementation of LA to improve feedback practices in technology-mediated learning environments in higher education. Authors used strict inclusion criteria to select relevant studies that have investigated the role of LA on feedback practices.

The application of learning analytics in an online learning environment is increasing among researchers in educational fields because it can assist in providing standard and measurable decision making about student success. Therefore, the systematic review article 0 aims to offer the reader essential details regarding the practical usage of learning analytics techniques in online learning environments to improve the quality of teaching and learning practices.

The aim of the study 0 is to review the most recent research body related to Predictive Analytics in Higher Education. Articles published during the last decade between 2012 and 2022 were systematically reviewed following PRISMA guidelines. The review results can inform educational stakeholders and decision-makers about next prospects and potential opportunities. The study 0 investigates current approaches to learning analytics dashboarding while highlighting challenges faced by education providers in their operationalization. It analyzes recent dashboards for their ability to provide actionable insights which promote informed responses by learners in adjusting their learning habits. The study finds that most LA dashboards merely employ surface-level descriptive analytics, while only few go beyond and use predictive analytics.

Some critical stances claim that learning analytics tends to underplay the complexity of teaching-learning processes. By means of both a bibliometric and a content analysis, the paper 0 examines the publication patterns on learning analytics in higher education and their main challenges. The paper concludes by distinguishing between a practice-based and management-oriented community of learning analytics and an academic-oriented community. Within both communities, though, it seems that the focus is more on analytics than on learning.

During the data processing we followed the recommendations given in the source 0.

METHODOLOGY

In this part, we describe the application of Learning Analytics technology to databases from university information systems. We examined the LMS Moodle Data:

LMS Moodle at MBU runs the relational database system MySQL (version 8.0.29) for data storage. However, we planned to analyze data and prepare SQL queries in MS SQL Server 2019, so we first converted the data from MySQL to MS SQL Server 2019, using the tool MS SQL Server Migration Assistant for MySQL (version 8.17) 0. MS SQL Server Migration Assistant for MySQL is similar as MS SQL Server Migration Assistant for Oracle, and it automate all aspects of migration including migration assessment analysis, schema and SQL statement conversion, data migration as well as migration testing. The investigated database consisted of more than 540 tables and its size was 10.58 GB.

MS Teams Data: MS Teams captures data about student participation in virtual classrooms, communication patterns, and collaboration activities. Learning Analytics tools can analyze this data to understand the level of student engagement during online sessions, assess group dynamics, and measure the impact of collaborative work on learning outcomes. These insights can inform learning strategies, support mutual learning, and increase the effectiveness of online collaboration.

Microsoft Teams utilizes Cosmos DB as its underlying database system. Cosmos DB provides the necessary scalability, global distribution, and high availability features to support the immense data requirements of Teams. With Cosmos DB, Teams can seamlessly handle large volumes of user interactions, chat messages, files, and other data in real-time. The multi-model capabilities of Cosmos DB enable Teams to efficiently store and retrieve data in various formats, ensuring flexibility and adaptability. Additionally, Cosmos DB's automatic indexing and industry-grade planning and billing features further enhance the performance and cost-effectiveness of Teams' data management. Overall, Cosmos DB serves as a robust foundation for Microsoft Teams, empowering users worldwide to collaborate effectively and securely 0.

Providing access to the Cosmos DB cloud database is currently the subject of our negotiations with Microsoft representatives.

In Microsoft Teams, basic statistics about users, courses and teams can be obtained directly, providing insight into their usage and engagement. The downside is that these statistics can only be viewed for the last 90 days.

Analyzing data from the Cosmos DB database is a challenge for us and it will be the goal of our further research.

RESULTS AND DISCUSSION

In this section, we present the results and discussion of the analyzes performed on the Academic Information System and LMS Moodle. The knowledge obtained from these information systems clarifies their respective functions and their influence on the improvement of educational processes.

We used the following tools to prepare and analyze the data:

- SQL Server Management Studio (SSMS)
- SQL Server Data Tools SQL (SSDT)
- MS SQL Server Analysis Services (SSAS)
- MS SQL Server Reporting Services (SSRS)
- MS SQL Server Data Tools (SSDT)
- MS Power BI.

We performed analyzes on the data set from the database of LMS Moodle (Figure 1), where we addressed the following research questions:

RQ3 How did the number of new users in the LMS Moodle system develop during the period 2012 - 2022 at MBU and what factors contributed to the changes in the number of users in the individual monitored years?

RQ4 In what trend did the number of new courses in the LMS Moodle system at MBU develop during the period 2012 - 2022, and what course formats were most often used to create these new courses?

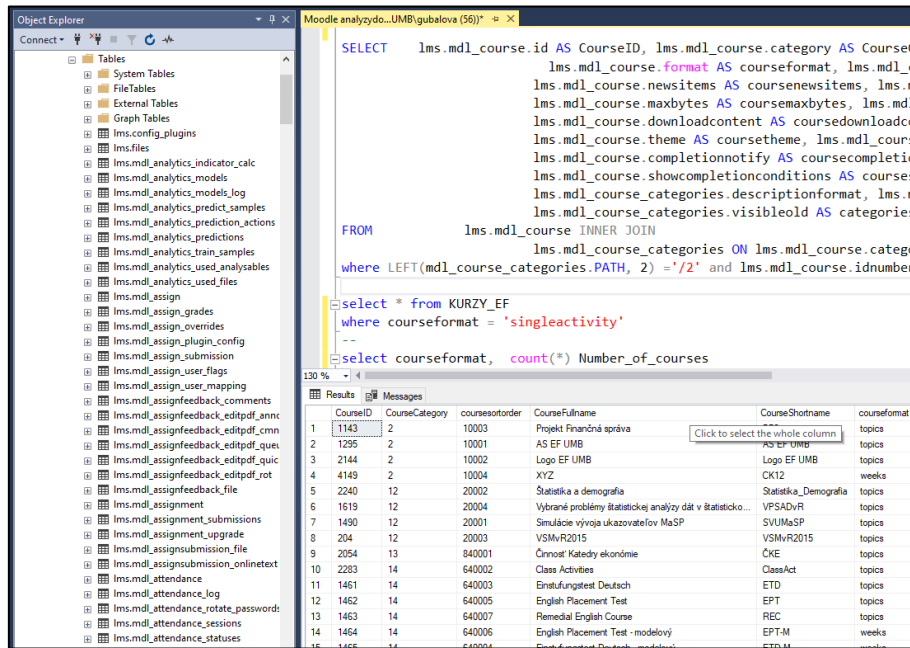


Figure 1. The Moodle database in SQL Server Management Studio

By applying SQL queries to the Moodle database, we found the yearly counts of new users in the LMS Moodle from 2012 to 2022 (Figure 2), which represents the answer to the RQ1:

At the beginning (in the years 2012 and 2013), after the introduction of LMS Moodle, the numbers of new users were high, as students from all academic years were being registered in the LMS. Subsequently, the count of newly registered students gradually declined (years 2014 - 2019) as only newly admitted students were enrolling. Also, during this period, there was a reduction in the number of newly admitted students at MBU. We emphasize that students who complete their studies no longer have access to the information systems of MBU, including Moodle.

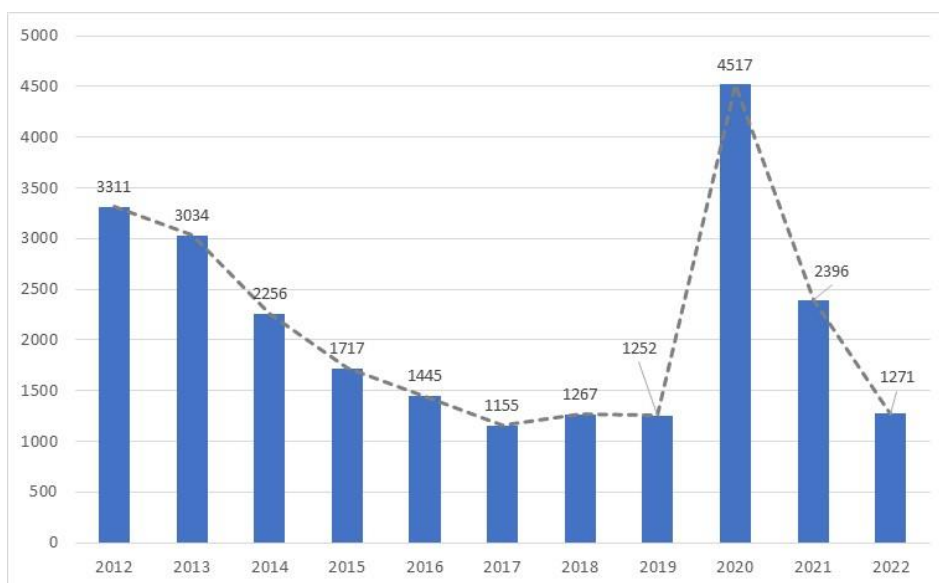


Figure 2. The number of new users of LMS Moodle in the decade 2012-2022 at MBU

In the year 2020, due to the Covid-19 pandemic, education shifted to the online space. Each teacher was required to publish their teaching materials in the Moodle course for their subject. This led to teachers who had not previously used Moodle having to start working with it and lead their students to do the same. Consequently, the number of new users surged to 4 517, which was more than 3.6 times higher compared to the previous year, 2019.

In the year 2021, the impact of the pandemic continued, with a combination of classic and online education depending on the situation. The number of new Moodle users increased by more than 1.9 times compared to the year 2019. However, when compared to the previous pandemic year 2020, there was a decrease of almost half in the number of new users.

After the pandemic, the number of new users stabilized at 1 271, which is approximately the same value as it was before the pandemic.

We also obtained the answer to research question RQ2 by analyzing data from the LMS Moodle data set.

It is clear from the Figure 3 that the curve of the development of the number of courses in the observed 10-year period does not copy the curve of the development of the number of users, as would be expected. At the time of our analysis, there were only 36 courses in the Moodle that were created in 2012. It is possible that some courses have been removed over time, although teachers and course administrators tend to keep older courses as a backup.

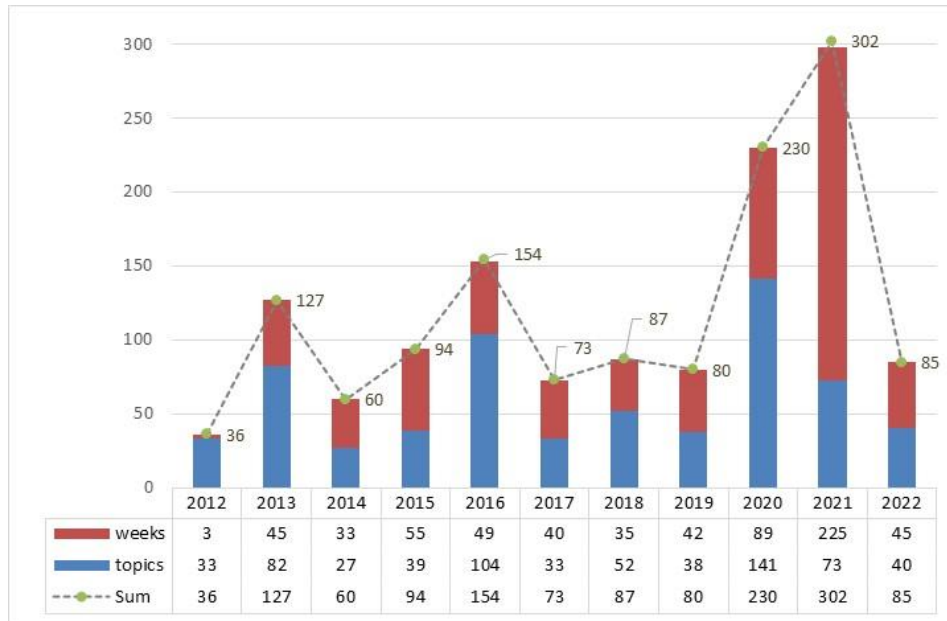


Figure 3. The number of new courses in LMS Moodle in the decade 2012-2022 at MBU

We investigated the relationship between the number of new users and the number of new courses in LMS Moodle. The resulting correlation coefficient was 0.388, indicating a low level of dependence between the two variables (Figure 4).

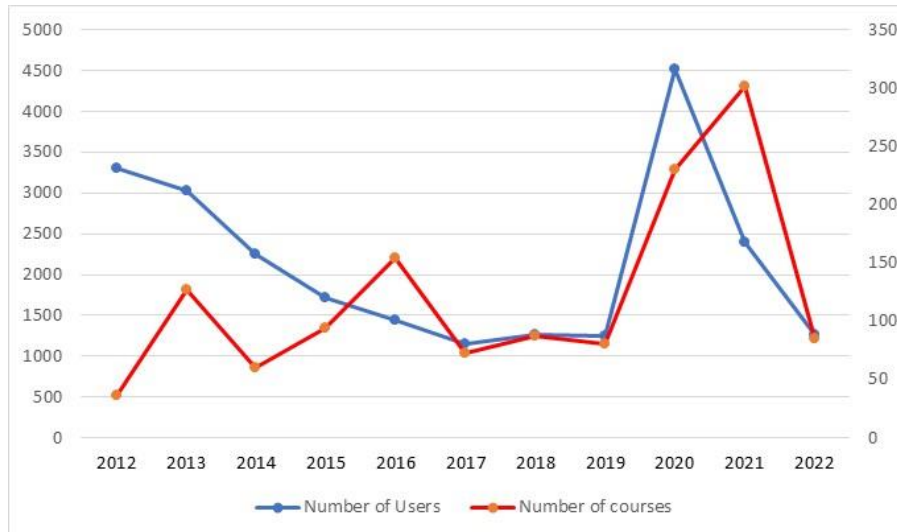


Figure 4. Number of users and Number of courses in the decade 2012-2022 at MBU

During the pandemic years of 2020 and 2021, there was a significant increase in the number of new courses. The year 2021 stood out as courses with the "weeks" format outnumbered the "topics" format by more than three times. In the other observed years, courses with the "topics" format were predominant, though not to such a high extent. In the year 2022, the number of new courses stabilized and reached a value like the pre-pandemic period.

During the COVID-19 period, information systems faced significant challenges due to the rapid shift towards remote work and online education. They needed to be scalable, accessible, and secure to accommodate the increased user volume and data while safeguarding sensitive information. Integrated collaboration tools and a reliable user-friendly interface were essential for remote teamwork and learning. Continuous monitoring, cloud adoption, robust security measures, user training, and feedback collection were recommended practices to enhance system performance and adaptability during such challenging times.

CONCLUSION

Keeping track of how Moodle users and course enrollments are changing helps managers adjust their information and communication technology (ICT) systems to suit the present circumstances. By doing so, they can make well-informed choices on aligning the ICT infrastructure with the ever-changing requirements of Moodle users.

By leveraging data from information systems, university management can make informed decisions, improve institutional processes, raise student outcomes, and optimize the use of resources. Data serves as an asset for strategic planning, compliance, and student support, ultimately contributing to the overall effectiveness and success of the university.

Acknowledgement

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THE USE OF HIGH-TECH MATERIALS IN CLOTHING

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ABSTRACT

Currently, active development of technological clothing is underway. Techwear's influence on the fashion industry is growing every year. High-tech fashion uses the achievements of science and technology for the development and production of fashion products. The methods used in high-tech fashion are borrowed from technologies developed in the fields of chemistry, physics, computer science, aerospace engineering, industrial textiles and sportswear. Scientific progress has led to the fact that requests for clothing and the fabrics from which it is made are constantly growing. So fashion is increasingly inspired and cooperating with technology. Technological clothing is casual clothing with special materials, construction and properties that provide functionality and convenience to a person. Smart clothes can interactively interact with the environment and a person: measure pulse and blood pressure, automatically heat up or warn when it's time to apply sunscreen and not only. Electronic components can be added to such clothes: motion sensors, heartbeat, pressure, light, temperature, as well as antennas, vibration motors, Bluetooth transmitters and microcomputers. These components can be woven into the fabric itself, along with wires that provide power, or simply sewn into special pockets. The main reason for the popularity of technological clothing is that it can make a person's life easier.

Keywords: High-tech clothing, techwear, smart clothes.

INTRODUCTION

Currently, active development of technological clothing is underway. High-tech fashion uses the achievements of science and technology to develop and manufacture fashionable products. The methods used in high-tech fashion are borrowed from technologies developed in the fields of chemistry, physics, computer science, aerospace engineering, industrial textiles and sportswear. High-tech clothing is based on the improvement of the utilitarian properties of clothing and accessories through the use of new materials and fabrics, ergonomic cut and gadgets. In general, everything that was created with a focus on convenience and innovation can be attributed to technological clothing, but often this direction includes completely black clothes with an abundance of pockets, belts and carabiners, in the style of a Japanese ninja.

Of course, the use of technology and new fabrics in clothing to enhance convenience is not new. After all, our distant ancestors did not wear animal skins for self-expression or beauty. The history of fashion knows thousands of innovative solutions, which were often created for the needs of the military, workers or athletes, and then found wide application in everyday life. The largest fashion companies started with the production of unique accessories for a narrow audience, which conquered the market with their practicality and soon became the standard.

the techwear that we know now began to appear in the second half of the 20th century and finally formed as a separate trend a few years ago. the technologies of the 20th century developed by leaps and bounds, and the fashion industry was also influenced by scientific and technological progress. research scientists, military personnel, athletes, travelers and astronauts demanded the most advanced equipment, and at the same time, some developments were moving to the actively growing consumer market. the development of gadgets has created a new segment where wearable electronics are created in close connection with fashion.

CONCEPTUAL FRAMEWORK

There are a great many technologies, each with a different degree of innovation, sophistication and applicability. But they can be divided into several directions:

Heat-retaining

Heated jackets — a lightweight winter jacket with a waterproof coating is fitted with heating plates that are powered by a removable battery. This jacket is lighter and more comfortable than massive down jackets and can be used without heating, protecting from snow and rain, but when it gets cold, you can always turn on the heating up to 65 degrees, which will keep a comfortable temperature even in severe frost. However, for a long stay on the street at -20, such a thing is unlikely to work.

Thermal underwear is the bottom layer of underwear, which performs the function of removing moisture from the body and accumulating heat. This part of the wardrobe has long found popularity in Russia and allows you to wear thermal underwear under ordinary clothes, while staying warm thanks to an invisible layer. High-tech synthetic fabrics and wool are often used to make thermal underwear.

Fleece is a synthetic material from which jackets, sweatshirts and hats are often made. It has a very soft structure, as well as elastic, dries quickly, has a low weight and is very warm at the same time. Fleece is similar in structure to sheep's wool and exists in variations with short and long pile.

Down jackets are another item of clothing that is extremely popular in Russia, but at the same time no less technologically advanced. Down clothing is very light and perfectly protects from the cold, so it is used by professional climbers and Arctic explorers. Synthetic down has weaker thermal insulation properties, but it is protected from getting wet and is more unpretentious.

Graphene is a revolutionary material, for the research of which Russian scientists received the Nobel Prize. The advantage of graphene is that it conducts heat more efficiently than any other material on earth, so when wearing graphene-coated clothing, heat is evenly distributed between body parts. In addition, graphene is very light, breathable, water-resistant and completely bacteriostatic.

Cooling and ventilation

mesh materials are the easiest way to ventilate, but at the same time effective. it can be used everywhere — from shoes to outerwear. as a rule, manufacturers introduce mesh in places with the greatest sweating — in the armpits and on the back, so clothes breathe better, but at the same time they remove moisture and protect from the sun. ultra-thin fabrics - remove heat and moisture from the body and protect against uv radiation, so they seem cool even in hot weather. cotton or synthetic fabrics tactilely similar to silk are most often used for their manufacture. protection from rain, fire and mechanical impact membrane fabrics are one of the foundations of any techwear wardrobe. the membrane is a very thin multi—layered fabric with micro-holes that protects against rain and wind, but at the same time removes steam from the body. thus, you can stay dry both in the downpour and in the heat. water—repellent impregnation - this technology is often used with membrane fabrics. wax or emulsion is applied to the fabric and covers its filaments with a hydrophobic film, thanks to which raindrops are not absorbed, but accumulate as droplets on the surface or roll off. fire protection — a mixture of synthetic fire-resistant fabrics allows you not to worry about the safety of your skin and

clothing during short-term contact with a campfire or incandescent objects. it's not the most useful feature in an urban environment, but it's the best for tourism and outdoor recreation.

dyneema is a material that is several times stronger than steel and is used in the manufacture of body armor and space satellites. it has good thermal conductivity, low weight and is able to withstand a knife blow, therefore it is indispensable in the production of particularly durable clothing.

cordura is a thick nylon fabric used in military and outdoor clothing. ripstop technology is a special method of weaving fabric using reinforced yarns, which prevents the appearance of tears. it is often found in the manufacture of bags, backpacks and workwear.

Improving ergonomics

The cut, taking into account the structure of the body, allows clothes and accessories not to restrict movement and place accessories and pockets in those places where they are most appropriate and comfortable to use. The main task is the convenience of use both in everyday life and in sports.

The cushioning sole is an important part of any shoe, which is responsible for walking comfort and the health of your feet. High-tech soles are made of special materials that absorb impacts on asphalt and return more energy when repelled than conventional EVA soles. Each manufacturer has its own technology, the most famous are Nike React, Adidas Boost and Asics Gel.

Accessories and pockets are an important part when creating practical clothes and accessories. Straps with quick adjustment, using latches and carabiners. Waterproof zippers and deep pockets with an internal organizer are the things without which techwear is impossible.

Integration of electronics

Sneakers with automatic lacing — Nike has released a pair of sneakers, the laces on which tighten automatically as soon as you put them on. Yes, yes, like in "Back to the Future".

Backpacks - there are a huge number of variations using built-in power banks, speakers, solar panels and LED panels. Most modern urban models are equipped with waterproof fabric and theft protection.

The flashlight is not so impressive, but still a useful accessory that is attached to the belt of the jacket and is charged from the sun. a smart watch is more of a gadget than an accessory, but in any case it is one of the elements of fashion using technology. moreover, well-known fashion companies are involved in the production of straps, and the case can be made of precious metals.

CONCLUSION AND DISCUSSION

Already, many achievements in the field of technological clothing have gained widespread popularity. Scientific progress has led to the fact that requests for clothing and the fabrics from which it is made are constantly growing. Thus, fashion is increasingly inspired by technology and collaborates with it. Technological clothing is casual clothing with special materials, construction and properties that provide functionality and convenience for a person. The main reason for the popularity of technological clothing is that it can make a person's life easier.

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**SURVEY ON PARASITIC INFECTION IN 3 ORNAMENTAL FISH FARMS IN
ALBORZ PROVINCE**

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Abstract

Aquaculture is expanding rapidly. The most key determinants of the aquaculture industry are edible and aquarium fish cultivation. Despite being a minor part of the worldwide fish commerce, ornamental fish culture has transformed into one of aquaculture's most significant aspects, and it is acknowledged as one of the most lucrative sectors in Iran and many other countries. The cultivation and propagation of ornamental fish have been increasing in the last few years in Iran and Alborz is one of the provinces where this industry has expanded significantly. The purpose of this study is to investigate parasitic infections in 3 ornamental fish farms. This research was carried out for seven months from March 2022 to September 2022 on 3 different species of referred ornamental fish. Ornamental fish species including Oscar fish, goldfish, discus, were sampled and examined for internal and external parasitic infestation by light microscopy. In the results, external parasites including *Gyrodactylus sp.*, *Dactylogyrus sp.*, *Ichthyophthirius multifiliis*, *Argulus sp.* and internal parasites including *Capillaria sp.* and *Hexamita sp.* were detected. The highest prevalence of parasites was related to *Capillaria sp.* (52%) and the lowest prevalence was related to *argulus* (5%).

Keywords: Internal parasite, External parasite, ornamental fish

Introduction

Aquaculture is expanding rapidly. The most key determinants of the aquaculture industry are edible and aquarium fish cultivation. Despite being a minor part of the worldwide fish commerce, ornamental fish culture has transformed into one of aquaculture's most significant aspects, and it is acknowledged as one of the most lucrative sectors in Iran and many other countries. The main production of ornamental fish is belonging to the south eastern Asia. Also, more than 150 freshwater fish species are currently farmed as ornamental fish in Iran.

The aquarium fish business is an important part of the world trade (Winfree, R.A., 1989) and freshwater aquarium fish are the biggest part of this industry (Helfman, G. S., 2007). In Iran, the export of ornamental fish has been raised as an economic activity with significant foreign exchange earnings over the past few decades (Mousavi HE, Soltani M, Rahmati-Holasoo H, Mirzargar SS, Taheri A, 2011). Although the freshwater ornamental fish industry in Iran has a high potential for development, one of the most important weaknesses observed in this industry is the lack of sufficient understanding of the problems related to the disease and health status of these fish (Mousavi HE, Soltani M, Rahmati-Holasoo H, Mirzargar SS, Taheri A, 2011). In general, younger fish are more susceptible to parasites than mature ones. The number of parasites required to cause damage and effect is different in hosts with low body mass than in hosts with large body mass. Also, the immune responses of adult fish against subclinical contamination may be more developed. In addition, the function of the immuno system plays a fundamental role in the relative resistance of fish against parasite species (Gratzek JB, 1988). The purpose of this study is to investigate the parasitic contamination of ornamental fish farms, that had reported losses in different fish species.

Materials and Methods

In this study, samples of fish from 3 different farms in Alborz province were examined. These samples were referred to our laboratory in the fish's aquarium water and aerated plastic bags. Clinical lesions were recorded. The samples were taken by wet mounts of scrapings of the skin and gills, and internal parasites, by dissection and tissue sampling. First, live fish were examined for skin lesions and parasites visible to the naked eye. The Mucus was scraped from the skin and gills and fresh wet mounts were taken. After examining each sample, in terms of ectoparasites, each fish was dissected under sterile conditions and wet mounts were prepared from their internal organs. 3 ornamental fish species including Oscar fish, goldfish, discus were sampled and their wet mounts were examined by light microscopy.

Results

In total, 40 out of 50 examined fishes (80%) were infected with different parasites and the rest had no parasite infestation. External parasites including *Gyrodactylus sp.*, *Dactylogyrus sp.*, *Ichthyophthirius multifiliis*, *Argulus sp.* and internal parasites including *Capillaria sp.* and *Hexamita sp.* were detected. The highest prevalence of parasites was related to *Capillaria sp.* (52%) and the lowest prevalence was related to *argulus* (5%).

Discussion

Over the past decades, the identification of fish parasites has become increasingly noticeable due to the growth of the freshwater ornamental fish industry worldwide. Parasitic diseases cause economic losses to the ornamental fish industry by affecting physiological and biological characteristics and causing mechanical damage (Jalali B., 1997). In this study, we found a total of 6 parasite species among 3 ornamental fish species.

A significant part of the world trade of aquatic animals is the trade of tropical aquarium fish (Evans BB, Lester RJG, 2001). Therefore, Quarantine measures should be implemented during the trade of live animals, including aquatic animals, to prevent the transmission of pathogens, which lead to disease outbreaks and economic losses (Helfman, G. S., 2007). The risk of parasites entering other countries and their further spread in the future is minimized by treating infected fish before export or after entering the importing country (Koyuncu, C.E., 2009).

In this study, the prevalence of crustaceans was low, which could be because the life cycle of these parasites depends on the water temperature and the duration of their preservation (Rahmati-Holasoo et al., 2022). Most common species of commercial ornamental fish are not kept in farms for more than 2-3 months and are usually sold early, so they have less opportunity to be contaminated with crustaceans. (Rahmati-Holasoo et al. 2022). Adhesion of crustaceans to the surface of the body and fins through haptor for feeding causes lesions, wounds, hemorrhages, desquamation, and a way for secondary pathogens to enter. Some nematodes, such as *Capillaria sp.*, have a direct life cycle and do not need an intermediate host that can be problematic (Wildgoose 2001), as in this study *Capillaria sp.* accounted for the highest rate of parasitic involvement. The results of this study are almost similar to the studies of other researchers in terms of parasite identification in Iran (Meshgi et al. 2006) and report of parasites including *Ichthyobodo sp.*, *Ichthyophthirius multifiliis*, *Trichodina sp.*, *Gyrodactylus sp.*, *Lernaea sp.*, *Dactylogyrus sp.*, *Chilodonella sp.*, *Argulus sp.*, and *Capillaria sp.* in ornamental fish in Turkey by Koyuncu, C.E. (2009) (Koyuncu, C.E., 2009).

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**THE ISSUE OF INTERVIEWS IN TEACHER RECRUITMENT IN TURKEY:
REFLECTIONS FROM THE X PLATFORM**

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Abstract

This study centers on the teacher recruitment processes in Türkiye, with a special focus on the interview stages and the current developments and challenges encountered in these processes. The population of the study consists of tweets shared on the X social media platform, tagged with #öğretmenlermülakatakarşı (teachersagainstinterviews). The research material comprises the last 250 tweets selected through criterion-based sampling, excluding retweets and repeated shares by the same individuals. Data collection was conducted on content shared under this tag on the X platform until September 28, 2023. In the analysis, content analysis methodology was utilized, and the collected data were coded according to codes specifically designed for the research objectives. The coding structure was processed in detail through open coding technique and the findings were organized in tables and interpreted. In preserving the originality of the tweets, grammatical and spelling errors were not corrected during the analysis. The findings indicate that the public response to the teacher appointment processes and interviews is largely critical. User comments reflect a prevalent perception of a lack of transparency and fairness in the process. The research provides valuable data for informing policymakers and administrators about the need for improvements and reforms in the teacher appointment processes. The outcomes of this study have the potential to contribute to shaping future policy changes and strengthening the systems of justice and meritocracy in the field of education.

Keywords: Interview, teacher recruitment, X Platform, tweet

TÜRKİYE'DE ÖĞRETMEN ALIMINDA MÜLAKAT SORUNU: X PLATFORMUNDAN YANSIMALAR

Özet

Bu araştırma, Türkiye'de öğretmen atama süreçlerini, özellikle mülakat aşamalarını ve bu süreçteki güncel gelişmeler ile karşılaşılan sorunları odak noktasına almaktadır. Çalışmanın evreni, X sosyal paylaşım platformunda kullanıcılar tarafından paylaşılan, #öğretmenlermulakatarşı etiketiyle etiketlenmiş tweet'leri kapsamaktadır. Araştırma materyali, ölçüt bazlı örnekleme yöntemi ile seçilmiş son 250 tweet'ten oluşmaktadır. Bu tweet'ler içinde 'retweet'ler ve aynı kişiler tarafından yapılan tekrar paylaşımlar dikkate alınmamıştır. Veri toplama süreci, X platformunda etiket altında 28 Eylül 2023 tarihine kadar paylaşılan içerikler üzerinden yürütülmüştür. Veri analizinde, içerik analizi yöntemi kullanılmış ve toplanan veriler spesifik araştırma amaçları doğrultusunda tasarlanan kodlarla kodlanmıştır. Oluşturulan kodlama yapısı, açık kodlama tekniği ile detaylı bir şekilde işlenmiş ve elde edilen bulgular tablolar halinde düzenlenip yorumlanmıştır. Araştırmada, tweet'lerin orijinalliğini korumak adına dilbilgisi ve yazım hataları düzeltilmeden analiz edilmiştir. Bulgular, öğretmen atama süreçleri ve mülakatlar hakkındaki kamusal tepkinin büyük ölçüde eleştirel olduğunu göstermektedir. Kullanıcı yorumları, sürecin şeffaflık ve adillikten yoksun olduğuna dair yaygın bir kanıyı yansıtmaktadır. Araştırma, bu içerikler üzerinden eğitim politikası yapımcılarının ve yöneticilerinin, öğretmen atama süreçlerinin iyileştirilmesi konusunda bilgilendirilmesi ve ilgili süreçlerde reform ihtiyacının vurgulanması açısından değerli veriler sunmaktadır. Çalışmanın sonuçları, gelecekteki politika değişikliklerinin şekillendirilmesine ve eğitim alanındaki adalet ve liyakat sistemlerinin güçlendirilmesine katkıda bulunma potansiyeline sahiptir.

Anahtar Sözcükler: Mülakat, öğretmen atamaları, X platformu, tweet

GİRİŞ

Eğitim, toplumun sürekli evriminin ve refahının anahtarıdır. Bu süreç, toplumsal yapıyı dönüştüren ve toplumun uzun dönemli gelişimini destekleyen bir dinamo olarak işlev görmektedir. Eğitimin bu önemli rolü, tarihsel bir perspektifte, dünya genelindeki kalite artırma çalışmalarının sürekliliğini de açıklamaktadır (Güven ve Dak, 2017; Toprakçı vd., 2010; Sezgin ve Duran, 2011).

Bireyin ilk eğitim deneyimleri ailede başlar; aile, bireyin dünya görüşünü ve değerlerini şekillendirir. Ancak formal eğitimin başlangıcından itibaren, bu sorumluluk kısmen öğretmenlere geçer. Öğretmenler, bireyin bilgi ve beceri kazanmasında merkezi bir rol oynarlar (Turan ve Bozkurt, 2010). Bu, onları eğitim sürecinde vazgeçilmez kılar, çünkü eğitim kurumlarındaki öğretmenler, genç nesilleri yetiştiren anahtar unsurlardır. Öğretmenlerin varlığı ve yetkinliği, eğitimin amacına uygun öğrencilerin yetiştirilmesi için kritik bir öneme sahiptir (Recepoğlu vd., 2016; Özden, 2003). Bu bağlamda, öğretmen seçimi ve yetiştirilmesi süreçleri eğitimdeki kalitenin belirleyicisidir.

Eğitim, toplumsal ilerleme ve bireysel gelişimin temel taşıdır. Birçok ülke, eğitim kalitesini artırma amacıyla nitelikli öğretmenlerin yetiştirilmesine büyük bir önem atfetmektedir (Karataş ve Güleş, 2013). Ancak, Türkiye'nin eğitim politikaları bu konuda farklı sonuçları beraberinde getirebilecek bazı özgün uygulamalara sahiptir. Özellikle son dönemlerde işsizlik sorunu, küresel bir mesele olarak karşımıza çıkmaktadır. Türkiye'de bu sorun, eğitim fakültelerinden mezun olan ve atanmayı bekleyen birçok öğretmen adayı için belirgin bir hal almıştır. Öğretmenlerin atanması konusundaki süreçlerde, Millî Eğitim Bakanlığının (MEB) ve üniversitelerle Yükseköğretim Kurulunun eşgüdümlü hareket etmekte zorlandığı gözlemlenmektedir (Şahin, 2011). Eğitim fakültelerine kabul edilen öğrenci sayısının artması, mezunların iş bulmada yaşadığı zorlukları artırmış ve işsizlik oranlarında yükselmeye sebep olmuştur (Yıldırım ve Koca, 2015; Şahin ve Adıgüzzelli, 2016). Ayrıca, Fen-Edebiyat fakültelerinden mezun olan bireylerin eğitim alanına dahil edilmesi, kalite ve nitelik konularında sorunlara yol açmıştır (Sezgin Nartgün, 2008).

Öğretmen istihdamı Türkiye'de özel ve kamu okullarında farklı dinamiklere sahiptir. Özel okullarda öğretmenlik yapabilmek için, belirli genel ve özel kriterlere uygunluk esastır. Ancak, kamu okullarında öğretmen istihdamı daha katı kurallara bağlıdır ve kadrolu, sözleşmeli, ücretli ve vekil olmak üzere dört farklı biçimde gerçekleştirilmektedir. Kamu okullarında öğretmenlik yapabilmek için öğretmen adaylarının Kamu Personeli Seçme Sınavına (KPSS) katılmaları ve belirli bir puanı geçmeleri gerekmektedir. Bu sınavın puanlandırması çeşitli kriterlere

dayanmaktadır ve sınav Öğrenci Seçme ve Yerleştirme Merkezi (ÖSYM) tarafından yıllık olarak düzenlenmektedir. Bu sınav sonuçları, öğretmenliğe atanma sürecinde bir yıl boyunca geçerli sayılmaktadır (Çinkır, 2013).

Türkiye'de öğretmen olma yolunda adım atan bireyler, dört yıllık bir lisans eğitiminin ardından Kamu Personeli Seçme Sınavına (KPSS) tabi tutulmaktadır. KPSS'yi başarı ile tamamlayan adaylar, aday öğretmen olarak atanıp, kurumlarına bağlı olarak bir yıl süresince hizmet içi eğitim almaktadırlar (Recepoglu, vd., 2016). Ancak, KPSS'nin öğretmen adaylarını devlet okullarına atanabilme ölçütü olarak kullanılmasının yarattığı belirsizlik, adayların endişe duymalarına neden olmaktadır (Karataş ve Güleş, 2013). Sınav puanının atanma için yeterli seviyede olup olmadığı konusundaki bu belirsizlik, öğretmen adaylarında kaygı yaratmaktadır (Erdem ve Soylu, 2013; Sezgin ve Duran, 2011).

Öğretmenliğin kapsamlı bilgi ve beceri gereksinimleri dikkate alındığında, bu mesleğin sadece bir sınavla değerlendirilmesi yetersiz kalabilir (Toprakçı, 2009). KPSS'nin genel kültür, genel yetenek ve eğitim bilimleri konularında odaklanması, adayların eğitim süreçlerinde bu konulara aşırı derecede odaklanmalarına sebep olmakta ve böylece lisans eğitimleri boyunca yüksek düzeyde kaygı yaşamalarına neden olmaktadır (Şahin, 2011). KPSS'nin öğretmen adaylarının alan bilgisini tam anlamıyla test edememesi, adayların lisans eğitimleri sırasında konuyla ilgili derslere yeterince odaklanmamaları sonucunu doğurmaktadır. Bu da mesleki hayatta bilgi eksikliklerine yol açabilmektedir (Erdem ve Soylu, 2013). Atav ve Sönmez (2013) yaptıkları bir çalışmada, öğretmen adaylarının lisans eğitimlerinin KPSS'ye yeterince hizmet etmediğini belirtmişlerdir. Bu çalışmada, genel kültür derslerinin artmasına rağmen yetersiz kaldığına dair bir görüş ortaya konmuştur.

Türkiye'de eğitim sistemine ve öğretmen atama süreçlerine dair sürekli değişiklikler ve gelişmeler yaşanmıştır. 2016 yılından itibaren KPSS sürecine mülakat (sözlü sınav) aşaması eklenmiştir (Güven ve Dak, 2017). Mülakat sınavının asıl uygulanma nedeninin 15 Temmuz 2016 darbe girişimi terör örgütüyle ilişkilendirilen öğretmen adaylarının tespiti ve bu şekilde sızmalara engel olma amacı olduğu düşünülebilir. 29783 sayılı ve 27.07.2016 tarihli Resmî Gazetede duyurulan bir uygulama ile sözlü sınavın düzenlenmesi ve uygulama esaslarına dair detaylar Millî Eğitim Bakanlığının yetkisine bırakılmıştır. Bu, sözlü sınavın nasıl yürütüleceği, hangi konularda olacağı ve sınavın genel usul ve esasları hakkında bakanlığın bir yönetmelik hazırlayarak belirleyici olacağı anlamına gelir. Yönetmelikle oluşturulan standardizasyonun, süreklilik arz eden bir yapıda olması ve uzman kişilerin bu sürece dahil edilerek objektif bir değerlendirme ortamının sağlanmasının önemi büyüktür.

Öğretmen atamalarındaki mülakat sürecine dair literatür incelendiğinde, görüşmelerin bireyler arasında gerçekleşen, belirli bir amaca yönelik konuşma olarak tanımlandığına dair Eren (2010) tarafından yapılmış bir tanım bulunmaktadır. Bu amacın, adayların yeteneklerini objektif bir şekilde değerlendirmek olduğunu Tortop ve diğerleri (2010) çalışmalarında vurgulamışlardır. Uzmanların bu tür mülakatlarda, önceden hazırlanmış soruları kullanarak adaylarla etkili bir diyalog kurdukları bilinmektedir. Fear ve Jordan (1943) ise mülakatlarda adayın önceki deneyimleri, bilgi seviyesi, eğitimi ve diğer özelliklerini ortaya koyan soruların sorulmasının gerekliliğini belirtmiştir. Ancak, mülakat sürecinin tam anlamıyla objektif olduğu ve önyargılardan uzak yürütüldüğüne dair bir uzlaşma bulunmamaktadır. Tortop ve diğerleri (2010), mülakat sürecinin renk, ırk veya siyasi görüşlerden etkilenmemiş bir şekilde, tamamen adayın yeteneklerine ve bilgisine odaklanarak yürütülmesi gerektiğini belirtmişlerdir. Türkiye'de öğretmen atamaları ve bu sürece dair yaşanan sorunlar hakkında öğretmen adaylarının görüşleri üzerine birçok araştırma gerçekleştirilmiştir. Abu ve diğerleri (2016), Epçaçan (2016), Kartal (2013), Kiraz ve Kurul (2018), Köybaşı ve diğerleri (2018), Memduhoğlu (2017), Odabaş (2010), Özcan ve diğerleri (2014), Şahin (2011), Toprakçı ve Ofluoğlu (2021) ve Uygun (2012) gibi yazarların çalışmaları bu konudaki literatürü zenginleştiren önemli kaynaklardır.

Son dönemdeki gelişmelere bakıldığında ise, öğretmen atamalarındaki mülakat uygulamasının kaldırılma ihtimali, 2023 genel seçimlerine yaklaşırken öğretmen adayları için bir umut kaynağı olmuştur. Ancak, son gelişmeler mülakatın devam edeceğini ve hatta önemini artırdığını göstermektedir. 23 Eylül 2023 tarihinde Türkiye Cumhuriyeti Milli Eğitim Bakanı tarafından yapılan beyanat, öğretmen atama süreçlerine dair yeni düzenlemeleri ve yaklaşımları ortaya koymaktadır. Bu beyanatta belirtilenler şunlardır:

- Öğretmen atamalarında sadece KPSS puanı dikkate alınmayacak, mülakat puanının yüzde 50'si, KPSS puanının yüzde 50'si etkili olacak.
- Öğretmen alımı için belirlenen kontenjanın üç katı kadar aday, KPSS puan sıralamasına göre mülakata çağrılacak. Bu mülakatta başarılı olan adaylar, kontenjan sınırları dahilinde atanacak.
- Mülakat komisyonları, ilgili alanda bilgi ve deneyime sahip öğretmenlerle oluşturulacak.
- Hem adayların mülakatta değerlendirecekleri jüri üyelerinin, hem de jüri üyelerinin değerlendirecekleri adayların isimlerine erişimleri önceden engellenecek.
- Mülakatta, adayların 45 dakika boyunca ders anlatma, iletişim yeteneği, problem çözme becerisi ve değer aktarımı yeteneklerini sergilemeleri beklenmekte olup, bu süreç kamera kaydına alınacak ve komisyonun aldığı kararlara itiraz hakkı tanınacaktır (Anadolu Ajansı, 2023).

Bu yeni düzenlemelerin ve yaklaşımların kamuya nasıl yansıdığına dair bir perspektif kazanabilmek adına bu araştırmanın temel amacı, X platformunda aktif olan kullanıcıların, KPSS ile birlikte mülakat sürecinin öğretmen atamalarına etkisine dair tepkilerini analiz etmektir. X, eski adıyla Twitter, günümüzde kullanımı en yüksek sosyal medya platformlarından biri olup, bireyler burada günlük hayatlarına, deneyimlerine ve görüşlerine dair içerikler paylaşmaktadırlar. Bu sebeple, X platformundaki paylaşımlar, öğretmen atama sürecinin toplum nezdinde nasıl algılandığına dair derinlemesine bir bakış sunabilir. Bu bağlamda, araştırma süreci şu soruları yanıtlamayı hedeflemiştir:

1. X platformunda öğretmen atamalarında KPSS puanının yanı sıra gerçekleştirilen mülakat uygulaması hakkında tweet atmış kullanıcıların mesleki anlamda genel dağılımı nasıldır?
2. X platformunun kullanıcıları, öğretmen atamalarında KPSS puanının yanı sıra gerçekleştirilen mülakat uygulamasını nasıl değerlendirmektedirler?

Bu araştırma, X platformundaki paylaşımları içerik analizi yöntemiyle detaylı bir şekilde inceleyerek, öğretmen atama süreçlerindeki mülakat uygulamasının kamuoyunda nasıl bir yankı uyandırdığını ve kullanıcıların bu konuya nasıl yaklaştıklarını değerlendirmeyi amaçlamaktadır. Araştırma sonuçları, mülakat uygulamasının toplumsal algısına dair kapsamlı bir anlayış sağlamasıyla birlikte, bu konuda alınacak kararların ve yapılacak düzenlemelerin yönünü belirleyebilir.

Araştırmanın bulguları, eğitim politikalarının oluşturulması ve revize edilmesi süreçlerinde karar vericilere önemli bir rehber olabilir. Ayrıca, bu sonuçlar; öğretmen adayları, öğretim üyeleri, eğitim yöneticileri ve genel kamuoyu için de bilgilendirici olabilir. Bu bilgiler, konunun daha şeffaf ve katılımcı bir şekilde ele alınmasına yardımcı olacak, taraflar arasında daha sağlıklı bir diyalogun oluşmasına katkıda bulunabilecektir.

YÖNTEM

Bu bölümde, araştırmanın modeli, çalışmanın odaklandığı grup, veri toplama süreçleri ve bu verilerin analiz yöntemleri ele alınmıştır.

Araştırma Modeli

Bu çalışmada, Türkiye'de öğretmen atama süreçlerine, mülakatlara ve bu süreçte yaşanan yeniliklere ve sorunlara dair insan davranışlarının ve olguların ardındaki nedenlerin derinlemesine anlaşılması amacıyla nitel araştırma modeli benimsenmiştir (Gürbüz & Şahin, 2014). Nitel araştırma, araştırmacıların doğal ortamda gerçekleşen olguları, bireylerin bu

olgulara yüklediği anlamlar üzerinden değerlendirme ve yorumlama sürecidir (Creswell, 2014). Bu çalışma, öğretmen atama süreçlerine, mülakatlara ve bu süreçteki yeniliklere ve sorunlara dair etmenlerin (X üzerindeki paylaşımlar, bireylerin yorumları, olaylar, süreçler, vb.) atama sürecini nasıl etkilediği, paydaşların bu süreçten nasıl etkilendiği hakkında farklı meslek gruplarının algılarını bütüncül bir perspektiften belirlemeyi amaçladığından bu araştırmada nitel araştırma modellerinden fenomenoloji deseni tercih edilmiştir (Merriam, 2015; Yıldırım ve Şimşek, 2018). Bu bağlamda, öğretmen adaylarının ve atanmış öğretmenlerin atama sürecine dair görüşleri, X platformu üzerinden derinlemesine incelenerek belgelenmiştir. Elde edilen verilere bütüncül bir bakış açısıyla yaklaşarak, farklı konular ve durumlar arasındaki ilişkiler irdelenmiştir.

Evren ve Örneklem

Bu çalışmanın evrenini, sosyal paylaşım platformu olan X üzerinde kullanıcılar tarafından paylaşılan, Türkiye'de öğretmen atama süreçleri, mülakatlar ve bu sürece dair yaşanan yenilikler ve sorunlarla ilgili X platformunda yer alan tweet'ler oluşturmaktadır. Araştırmanın veri seti, amaçlı örnekleme yaklaşımlarından biri olan ölçüt bazlı örnekleme yöntemi ile oluşturulmuştur (Patton, 2014). Bu inceleme, X platformu üzerinden gerçekleşen paylaşımları kapsamlı bir içerik analizi ile ele alarak, öğretmen mülakat süreçlerine dair kamusal tepkinin ne yönde olduğunu ve kullanıcıların bu sürece olan tutumlarını aydınlatmayı hedeflemektedir. Bu kapsamda, veri seçim kriteri olarak X üzerindeki #öğretmenlermulakatakarşı etiketine başvurulmuştur. Analiz edilen veri seti, 28 Eylül 2023 tarihine dek X platformunda kullanılan #öğretmenlermulakatakarşı etiketiyle paylaşılan son 250 içerikten oluşmaktadır. Örnekleme daha önce başka kullanıcıların yazdığı içeriklerin tekrar paylaşılmasına olanak tanıyan retweet'ler ve aynı kişilerin tekrar paylaştığı tweet'ler dahil edilmemiştir. Araştırmanın etiği gereği, paylaşımları yapan kullanıcıların kişisel bilgileri ve kimliklerine dair herhangi bir ayrıntı raporda belirtilmemiştir.

Verilerin Toplanması ve Analizi

Çalışmanın veri toplama sürecinde doküman inceleme tekniğine başvurulmuştur. Bu yöntem, resmi veya özel kaynaklardan elde edilen bilgilerin toplanması, sistemli bir şekilde analiz edilmesi ve değerlendirilmesi sürecini kapsar (Ekiz, 2009). Doküman inceleme hem yazılı hem de görsel materyallerin analizini içermekte olup, bu süreçte incelenen olgular hakkında detaylı bilgi sağlar (Yıldırım ve Şimşek, 2018). Veri toplama sürecinde öğretmen atama süreçlerindeki mülakat uygulaması hakkında X platformunda atılmış olan son 250 tweet'in içeriği detaylı olarak incelenmiştir. Elde edilen bu verileri derinlemesine analiz etmek adına nitel veri analizi

tekniklerinden içerik analizi tekniđi tercih edilmiştir (Bilgin, 2006). İçerik analizi, bir metni inceleyerek insan doğasını ve davranışlarını anlamak amacıyla kullanılan bir analiz tekniđidir. Bu yöntem, metindeki sözcükleri belirli kurallara dayalı kodlamalarla daha küçük içerik kategorilerine sistematik olarak özetler. Araştırmacı, metindeki kelimelerin varlığını, anlamlarını ve ilişkilerini tespit ederek çıkarımlarda bulunur (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz ve Demirel, 2012). Bu araştırmanın içerik analizi yapılırken belirli aşamalar halinde gerçekleştirilmiştir. Öncelikle elde edilen veriler meslek gruplarına göre ayrıştırılmıştır. Kişisel bilgilerin korunması gerekliliđince her meslek grubunun tweet'leri farklı kısaltmalar kullanılarak numaralandırılmıştır. Eğitim fakültesi öğretim üyeleri ÖÜ1, ÖÜ2; siyasetçiler S1, S2; öğretmen adayları ve atanmayı bekleyen öğretmenler ÖA1, ÖA2; MEB'e bađlı kurumlarda çalışan kadrolu öğretmen ve yöneticiler KÖY1, KÖY2; mesleđi belirlenemeyen diđer katılımcılar ise D1, D2 şeklinde numaralandırılmıştır. Daha sonra örnekleme dahil edilen veriler araştırmacılar tarafından birkaç kez okunduktan sonra fikir birliđine varılarak kodlar oluşturulmuştur. Bu kodlama esnasında, araştırmanın spesifik amacı göz önünde bulundurularak ilgili kod yapıları tasarlanmıştır. Oluşturulan kodlardan yola çıkılarak benzerliklerine göre kategoriler yorumlanmıştır. Bulguların sunulmasında orijinal tweet'lerden örneklere yer verilmiş ve bu örnekler sunulurken dilbilgisi ve yazım yanlışları düzeltilmemiş, X platformunda yayınlandıđı şekliyle yer verilmiştir.

BULGULAR VE TARTIŞMA

Bu bölümde, araştırma sorularına cevap arayışı doğrultusunda elde edilen bulgulara ve bulgulara ilişkin yorumlara yer verilmiştir. Araştırmada, sosyal paylaşım platformu X üzerinde, öğretmen mülakat süreçleriyle ilgili yapılan paylaşımların analizine dair sonuçlar sunulmuştur. Özellikle hangi meslek grubundan kaç kişinin bu sürece dair ne tür paylaşımlarda bulunduđuna dair detaylı bilgiler aşağıda tablo halinde sunulmaktadır.

Tablo 1: Öğretmen Mülakat Süreçleri Hakkında X Platformunda Yapılan Paylaşımların Meslek Gruplarına Göre Dağılımı ve Mülakata İlişkin Görüşleri

Meslek Grubu	Tweet		Mülakat		Mülakat	
	sayısı (n)	%	Yanlısı (n)	%	Karşıtı (n)	%
Eğitim fakültesi öğretim üyeleri	25	10	3	12	22	88
Siyasetçiler	18	7,2	3	16,7	15	83,3
Öğretmen adayları ve Atanmayı Bekleyen Öğretmenler	156	62,4	0	0	156	100
Kadrolu Öğretmen ve Yöneticiler	19	7,6	1	5,3	18	94,7
Diğer	32	12,8	8	25	24	75
Toplam	250		15		235	

Tablo 1 incelendiğinde, öğretmen atama süreçleri hakkında X platformunda yapılan paylaşımların meslek gruplarına göre dağılımı detaylı bir şekilde gözler önüne serilmektedir. Öğretmen adayları ve atanmayı bekleyen öğretmenlerin bu sürece dair en aktif grup olduğu anlaşılmaktadır. 250 tweet'in 156'sı bu gruptan gelmekte olup, bu değer yüzde olarak %62,4'e karşılık gelmektedir. Bu durum, öğretmen adaylarının ve atamayı bekleyen öğretmenlerin mülakat süreçleriyle doğrudan ilgili oldukları ve bu süreçten en çok etkilenen grup oldukları için bu kadar aktif olduklarını göstermektedir. Eğitim fakültesi öğretim üyeleri tarafından atılan 25 tweet, toplam tweet sayısının %10'unu oluşturmaktadır. Bu grup, öğretmen adaylarını yetiştiren ve onların mesleki becerilerini geliştiren kişiler oldukları için mülakat süreçlerinin nasıl işlediğine dair derinlemesine bilgilere sahip olabilirler. Kadrolu öğretmen ve yöneticilerin paylaştığı tweetler toplamda 19 adettir ve bu, toplam tweet sayısının %7,6'sını temsil etmektedir. Kadrolu öğretmenler ve yöneticiler, atama sürecini daha önce deneyimlemiş oldukları için bu sürecin avantajlarını ve zorluklarını bilmekte ve bu nedenle paylaşımda bulunmaktadır. Siyasetçilerin paylaştığı 18 tweet ise toplamın %7,2'sini oluşturmaktadır. Siyasetçiler, eğitim politikalarının belirlenmesinde söz sahibi oldukları için mülakat süreçlerine dair yorumlarda bulunabilirler. Bu gruptaki bireylerin, öğretmen atama süreçleri üzerinde direkt bir etkisi olabileceği ve bu nedenle platformda paylaşımda bulunduğunu düşünebiliriz. "Diğer" kategorisi, X platformunda yer alan ve profillerinden hangi meslek grubu içinde yer aldıklarının net olarak anlaşılamadığı kullanıcıları kapsamaktadır ve bu grubun paylaşımları 32 adetle

toplaminin %12,8'ini oluşturmaktadır. Bu grup, öğretmen atama süreçleriyle doğrudan ilgili olmayabilir, ancak bu süreçten dolayı etkilenen aile üyeleri, arkadaşlar veya sadece konu hakkında bir görüş belirtmek isteyen bireylerden oluşabilir. Bu nedenle, bu grubun da mülakat süreçleri hakkında paylaşımda bulunma sebepleri, diğer meslek gruplarına göre daha çeşitli olabilir.

Eğitim Fakültesi Öğretim Üyelerinin Mülakat Uygulamasına İlişkin Görüşleri

Eğitim Fakültesi Öğretim Üyelerinin mülakat sürecine ilişkin görüşleri, X platformu üzerinden paylaşılan tweetler incelendiğinde çarpıcı bir biçimde ağırlıklı olarak mülakat karşıtı tutumlar sergiledikleri gözlemlenmiştir. İncelenen 25 tweet'in yalnızca üçünde mülakata destekleyici ifadeler bulunurken, geriye kalan 22'sinde mülakatın adaletsizliğine, uygulamanın doğurabileceği nepotizm ve torpil sorunlarına vurgu yapılmıştır. Öğretim üyeleri, mezun adaylarının ve mezunların endişe ve eleştirilerine dair duyarlılık göstererek, onların yanında olduklarını ifade etmişlerdir.

Tweet örneklerinde, #ÖÜ1, #ÖÜ5, #ÖÜ6, #ÖÜ8, #ÖÜ11, #ÖÜ15, #ÖÜ18 ve #ÖÜ22 gibi öğretim üyeleri, mülakat uygulamasının teorik bir değerlendirme aracı olarak etkin olabileceğini kabul etmekle birlikte, uygulamanın mevcut durumunun ve yapılış biçiminin ciddi endişeler yarattığına dikkat çekmişlerdir. Mesela, #ÖÜ1'in ifadesi mülakat sürecinin teorik olarak doğruluğunu kabul ederken, pratikteki uygulamanın rüşvet, torpil ve nepotizm gibi sorunlarla lekelendiğini ve bu durumun mülakatın güvenilirliğini azalttığını vurgulamaktadır. Bu ifadeler, mevcut mülakat uygulamasının şeffaf ve adil bir temel üzerine inşa edilmesi gerektiği gereksinimini ortaya koymaktadır.

Öğretim üyesi #ÖÜ15 ve #ÖÜ18 gibi eleştirmenler, mülakat sürecinin subjektifliğini ve standartlaşmış uygulamaların eksikliğini eleştirmiş, bu durumun adayların eşit koşullarda değerlendirilmesini zorlaştırdığını belirtmişlerdir. Özellikle #ÖÜ18, farklı komisyonların ve puanlama sistemlerinin varlığının bile adil bir sürecin gerçekleşmesini engellediğine dikkat çekerek, mülakat yerine mevcut KPSS ve aday öğretmenlik süreçlerinin yeterli olduğunu savunmuştur. Öğretmen alımlarında Milli Eğitim Bakanlığı'nın mülakat uygulaması getirmesine karşıt görüş bildiren öğretim üyelerinin tweet'lerine örnekler aşağıdaki gibi sıralanabilir:

ÖÜ1: "Öğretmen alımında istihdamı yapan kurumun kişinin teorik bilgisinin yanında pratikte yeterliliğini, iletişim becerisini, alan uzmanlığını ve bu uzmanlığını sınıfa yansıtıp yansıtamayacağını görmek istemesi kadar doğal bir şey yok. Özel okulların tamamına yakını öğretmen alımlarını benzer şekilde gerçekleştiriyorlar. Ölçme ve değerlendirme açısından da

aslında bilimsel olarak yöntem doğru... MEB öğretmen alımında yapılabilecek en doğru mülakatı planlıyor ama mülakat ile ilgili sorun içeriği veya yapılış şekli değil. Sorun TORPİL, RÜŞVET, NEPOTİZM... BU SORUNLARI KAMERA AŞAR MI? BEKLEYİP GÖRECEĞİZ. Her atama döneminde meclisten bakanlığa akan referans mektuplarını biliyoruz."

ÖÜ5: "Mülakat konusunda en temel sorun kişilerin devlete olan güvenlerinin zayıflamasıdır. Bu noktada çözüm mülakatsızlık değil mülakat için gerekli şartların sağlanması, itiraz ve mahkeme yollarının doğru işlemedir. Bugün vatandaşta oluşan algı "devlette torpille olmayacak iş yok" algısıdır. Bunu Sn. @Yusuf__Tekin yıkabilir mi, bekleyip göreceğiz. Kendisi hak yemek, beddua almak istemediğini söylemiş ama buna kimseyi inandıramaz."

ÖÜ6: "Atanma ihtimali olan öğretmenler "mülakata hayır" derken, KPSS sıralamasında geride olan ve atanma ihtimali görece daha zayıf olanlar konu hakkında hiç tivit atmıyorlar, "Belki torpil bulup atanırız!" diyerek."

ÖÜ8: "Dersi çok iyi anlatan bir öğretmen komisyondan 70 alırken, başka bir komisyonda ders anlatamayan 75 alabilir. Yüzlerce komisyonu ve binlerce öğretmen adayını nasıl standardize edeceksiniz?"

ÖÜ11: "Mülakat, doğru ve adil yapıldığı zaman en iyi seçim yöntemidir ama maalesef ülkemizde işlerin doğru ve adil yürümediğini herkes biliyor. Bu yüzden mülakata hayır diyoruz."

ÖÜ15: "Objektif olmayacağına inandığım için öğretmenlerin mülakatla atanmasına karşıyım. Kimse sen de mi hocam demesin, torpilin bu kadar yaygın olduğu bir toplumda böyle atama olmaz. Bu çocuklar zaten Alan Yeterlilik Sınavı'na girdi, daha fazla zorlamayınız lütfen."

ÖÜ18: "En az 300 komisyon, farklı puanlamalar. Ne kadar torpil olmasa bile adil süreç olmaz. Virgüllerle dahi binler oynuyor. Öğretmen yeterliliği mülakatla ölçülmez, kpss ve aday öğretmenlik süreci ile ölçülüyor. Halihazırda zaten aday öğretmenlik süreci varken mülakata gerek yok."

ÖÜ22: "Eğitim fakülteleri zaten pratik eğitim veriyor. Mezun olan bir öğretmen adayının yeterliliğini bir mülakatla ölçmek, onun 4 yıllık emeğini hiçe saymak olur."

Bunun yanı sıra, mülakat sürecini destekleyen az sayıdaki öğretim üyesi de mevcuttur. Örneğin #ÖÜ19, #ÖÜ10 ve #ÖÜ21 gibi öğretim üyeleri, öğretmen adaylarının yalnızca bilgi bazlı yeterliliklerine değil, aynı zamanda iletişim becerileri, karizma ve insan ilişkileri gibi niteliklere de sahip olmaları gerektiğini savunarak, mülakatın bu becerilerin ölçülmesinde etkili bir araç olabileceğini ifade etmişlerdir. Ancak bu pozitif görüşlerin, mülakat sürecinin şeffaflık ve adil oluş gibi ön koşullarla sağlıklı bir şekilde yürütülmesi gerektiğine vurgu yaparak, sürecin ideal

çalışma şartlarını da göz ardı etmedikleri anlaşılmaktadır. Öğretmen alımlarında Milli eğitim Bakanlığı'nın mülakat uygulaması getirmesini uygun bulan 3 öğretim üyesinin tweet'leri aşağıdaki gibidir:

ÖÜ19: "Öğretmenlik gibi mesleklerde mülakat gereklidir, çünkü öğretmenlikte öğretme becerilerinin yanı sıra insan ilişkileri, insan sevgisi, iletişim, hitabet ve daha pek çok özellik aranır. Ancak bu sürecin şeffaf, adil ve objektif olması esastır. Sorun mülakat değil, sistemin doğru işletilmemesidir."

ÖÜ10: "Eğitim alanı pratik ve teorik bilginin birleştiği bir alan. Bir öğretmen adayının sadece yazılı sınavla değerlendirilmesi, onun sahip olduğu diğer önemli becerileri göz ardı etmek olur."

ÖÜ21: "Mülakat aslında bir fırsattır. Adayın sadece bilgisi değil, duruşu, karizması, iletişimi gibi faktörler de önemlidir ve bu sadece yazılı sınavla ölçülemez."

Bu bağlamda, öğretim üyelerinin görüşlerinin, öğretmen adaylarının ve kamuoyunun algısını şekillendirmede önemli bir rol oynadığı anlaşılmaktadır. Genel olarak, mülakat sürecine yönelik eleştirilerin yoğunluğu ve endişe verici doğası, bu uygulamanın mevcut haliyle yeniden gözden geçirilmesi gerekliliğini öne çıkarmaktadır. Bu süreçte daha şeffaf, adil ve objektif bir değerlendirme metodolojisinin benimsenmesi hem öğretim üyelerinin hem de adayların beklentilerini karşılayacak bir adım olarak değerlendirilebilir.

Siyasetçilerin Mülakat Uygulamasına İlişkin Görüşleri

Eğitim sistemi, bir toplumun geleceğini şekillendiren en önemli yapıtaşlarından biridir ve bu sistem içerisinde öğretmen atamaları kritik bir rol oynar. Öğretmenler, genç zihinleri bilgi ile buluşturan, düşünmeye teşvik eden ve toplumun genel ahlaki ve kültürel değerlerini aktaran temel aktörlerdir. Dolayısıyla, öğretmen seçim süreci, sadece eğitim kalitesini değil, aynı zamanda toplumsal gelişimi de etkiler. Bu sebeple, siyaset kurumunun bu süreçteki yaklaşımı son derece önemlidir. Türkiye'deki öğretmen atama sistemine dair mülakat uygulaması, siyasetçiler arasında yoğun tartışmalara yol açmıştır. Toplam 18 siyasetçi tarafından atılan tweet'lerde bu konu, mülakatın gerekliliği ve etkinliği açısından farklı perspektiflerden ele alınmıştır.

Siyaset sahnesinde mülakat uygulamasına karşı çıkanların genel itiraz noktaları, eğitimde adaletsizliğe yol açacak bir mekanizma olarak algılanan bu sürecin, çeşitli sosyoekonomik ve kişisel engeller nedeniyle öğretmen adaylarını mağdur edebileceğini vurgulamaktadır. Özellikle #S1, #S2, #S6, #S7, #S9, #S11, #S14, #S15 ve #S17 numaralı tweet'lerde bu konu

üzerinde durulmuştur. Bu görüşlerde, öğretmen seçiminde objektif kriterlerin göz ardı edilmesi, mülakat sürecinin masrafları, öznel değerlendirmeler ve torpil iddiaları gibi hususlar eleştirilmektedir. #S1, veli ve öğretmen seçiminde mülakatın doğru olmadığını belirtirken, #S2, mülakat sürecinin ekonomik ve kişisel zorluklar yarattığını vurgulamıştır. #S6, kontenjanın üç katı kadar adayın mülakata çağrılmasının yanlışlığına dikkat çekerken; #S7, kameraya rağmen mülakat sonuçlarına itiraz edilememesini eleştirmiştir. #S9, mülakatın öğretmenlik yeterliliklerini artırmadığını; #S11, yeterli ve nitelikli jüri sayısını; #S14, farklı jürilerin öznel değerlendirmelerini; #S15, jüri üyelerinin seçimi ve baskıya maruz kalma durumunu; ve #S17, mülakatların siyasi çıkarlar için kullanıldığı iddiasını ortaya atmıştır. Milli Eğitim Bakanlığı'nın uygulamaya koymayı düşündüğü mülakat uygulamasına karşı fikir sunan siyasetçilerin atmış oldukları tweet'lere örnekler aşağıda sunulmuştur:

S1: "Ne bir velinin çocuğunu okula yazdırırken 'öğretmen seçme' arzusu doğrudur, ne de öğretmeni mülakatla 'seçme' uygulaması doğrudur!"

S2: "Mülakatla sadece metropollerdeki gençler mağdur olacak. O gün HASTA, HAMİLE, REGL, BEBEKLİ, ENGELLİ OLANLAR, PANİK ATAK GEÇİRENler ne olacak?"

S6: "Mülakata kontenjanın 3 katı kadar öğretmen çağrılacak olması başarısız ama torpillilerin öne geçeceğini resmen ilan etmektir."

S7: "Mülakatlarda kamera olacak deniyor ancak mülakat komisyonu ben bu notu uygun gördüm dedikten sonra itirazın bir karşılığı olmaz."

S9: "Öğretmen istihdamında mülakat uygulaması kaldırılmalıdır..."

S11: "Yüzbinlerce adayı değerlendirecek yetkinlikte jüri sayımız var mı? Alanının uzmanı olmak iyi bir mülakatçı olmayı garantilemiyor."

S14: "Farklı jürilerin farklı değerlendirmeleri kişilerin hayatlarını farklı şekillerde etkileyebilir."

S15: "Jüri üyelerine torpil baskısını kaldırabilecek özgüvene sahip olup olmadıkları sorulmalı."

S17: "Seçimlerden önce 'Mülakatları kaldıracağız' sözü vardı, şimdi bu söz tutulmuyor."

Öte yandan, mülakat uygulamasının gerekliliğini savunan siyasetçiler, aşağıda belirtilen #S3, #S5 ve #S18 numaralı tweet'lerinde mülakatın adayların kişisel ve profesyonel uygunluklarını ölçmede bir araç olduğuna dikkat çekmektedirler.

S3: "Ben okulda X dersini okutsun diye bir öğretmen istihdam edeceğim ama 4 yıllık lisans programı sonunda öğretmenimizin alan bilgisi testinde öğretmen adayı kendisine sorulan sorulardan yüzde 35'ine doğru cevap veriyor... Mülakat gereklidir."

S5: "Çok özür dilerim de, bir dershaneye girebilmek için müdüründen patronuna bir sürü kişiyle görüşme yapılıyor da, devlet okuluna girmek için yapılacak mülakata neden itiraz ediliyor ki?..."

S18: "Sorsan sabıkası yok... Merak ediyorum. Çocuğunuzun derslerine girsin ister misiniz böyle bir öğretmen?..."

Mülakat uygulamasının öğretmen atamalarındaki yerini değerlendirirken, siyasi liderlerin görüşleri Türkiye'deki eğitim politikalarının şekillenmesinde ve uygulanmasında kritik bir etkiye sahiptir. Tartışmanın her iki tarafı da geçerli argümanlar sunmakta ve bu durum, konunun karmaşıklığını gözler önüne sermektedir. Mülakata karşı olan siyasetçilerin endişeleri, özellikle şeffaflık, adalet ve eşitlik ilkelerine vurgu yaparken; mülakatı savunanlar ise bireysel yeterlilik ve mesleki uygunluğun doğru değerlendirilmesinin önemini öne sürmektedir. Kapsamlı bir değerlendirme ve toplumsal konsensüs gerektiren bu mesele, eğitim sisteminin kalitesini ve adil işleyişini sağlamak adına titizlikle ele alınmalıdır. Öğretmen atama süreçlerinde mülakatın rolü, bilimsel verilere ve kapsayıcı bir yaklaşıma dayanarak yeniden düşünülmelidir.

Öğretmen Adayı ve Atanmayı Bekleyen Öğretmenlerin Mülakat Uygulamasına İlişkin Görüşleri

Eğitim, bir toplumun geleceğini şekillendiren en kritik unsurlardan biridir ve bu sürecin kalbi olan öğretmenler, nitelik ve adanmışlık bakımından en yüksek standartlarda olmalıdır. Bu bağlamda, öğretmen adayları, yani eğitim fakültelerinde veya öğretmenliğe kaynak teşkil eden diğer akademik disiplinlerde öğrenim gören lisans öğrencileri, ve atanmayı bekleyen öğretmenler, yani öğretmenlik mesleğine adım atmak üzere gerekli fakülteleri bitirmiş ve Milli Eğitim Bakanlığı bünyesinde öğretmen olarak atanabilmek için Kamu Personeli Seçme Sınavı'na (KPSS) giren adaylar, profesyonel meslek hayatlarının başlangıcında önemli bir aşama olan mülakat süreciyle karşı karşıya gelmektedirler. İncelenen 156 öğretmen aday ve atanmayı bekleyen öğretmen örnekleminin tamamı, mevcut mülakat uygulamasının eğitimde fırsat eşitliğini bozduğuna ve liyakat esasına dayanmadığına inanarak, bu uygulamaya karşı çıkışlarını belirgin bir şekilde ifade etmiştir.

Öğretmen adayları ve atanmayı bekleyen öğretmenler, mülakat uygulamasına çeşitli nedenlerle karşı çıkmaktadır. Birincisi, adil bir atama sürecinin sadece KPSS puanlarıyla mümkün olacağına ve "#Torpil = Mülakat" denklemini oluşturduğuna inanmalarıdır (#ÖA 17). Liyakat ve adaletin sağlanamayacağı bir sistemde, "yetersiz insanların mülakat adı altında torpille atanmasını engellemek" (#ÖA 36) gerektiği düşünülmektedir. Öğretmen adayları, mülakat sürecinin standardizasyon eksikliğine (#ÖA 60, #ÖA 132), öznel değerlendirme (#ÖA 133) ve

adil olmayan yönetmelik değişikliklerine (#ÖA 78) işaret ederek, birçok branş için uygun mülakat komisyonlarının nasıl oluşturulacağına dair endişelerini dile getirmişlerdir. Ayrıca, uzun süreler ders anlatma ve akademik onaylara rağmen mülakatla yeniden değerlendirilmeye tabi tutulmanın kabul edilemez olduğunu (#ÖA 90, #ÖA 112) ve mülakatın aslında bir nevi "adam kayırmaca" (#ÖA 118) olduğunu savunmaktadır. Öğretmen adaylarının, hazırlıksız olarak mülakat performansı sergilemelerinin (#ÖA 44, #ÖA149) veya puanlama sürecinin şeffaflık ve güven eksikliğinin (#ÖA 150, #ÖA152) mesleklerini icra etmelerine gölge düşürdüğüne inanmaları, bu sürece karşı olan direncin temel nedenlerini oluşturmaktadır. Öğretmen adayları ve atanmayı bekleyen öğretmenlerin tweet'lerine ilişkin örnekler aşağıda sıralanmıştır:

ÖA17: "Torpil =Mülakat

ADİL OLANI YANİ %100 KPSS PUANIMIZLA ATANMAK İSTİYORUZ"

ÖA36: "Mülakatın liyakat getireceğini düşünsek itiraz etmezdik zaten. Amaç yetersiz insanların mülakat adı altında torpille atanmasını engellemek. Ha siz çocuğunuzu ders çalışmaktan kaçıp torpil arayanlara teslim etmek istiyorsanız, siz bilirsiniz."

ÖA44: "45 dakika mülakatta ders anlatmak için materyal hazırlayamam ki"

ÖA59: "Özel eğitim öğretmenleri bep hazırlar öyle ders anlatırlar. Özel eğitim öğretmenleri ve benzeri birçok branş için nasıl komisyon kuracaksınız?"

ÖA60: "Aynı mülakat performansını farklı komisyonlarda sergilediğimde aynı puanı alabileceğimin garantisi var mı?"

ÖA78: "Meb de her iş torpille dönüyor neredeyse, sonra da vay niye güvenmiyorsunuz. Niye güvenelim kişilere? kurumlar güvenilir olmalı kanunlar herkes için eşit işletilmeli. Habire yeni yönetmelik boyna değişiklik sana ayrı bana ayrı işleyen bir sistem sıkıttı artık"

ÖA90: "Öğretmenler onlarca ödev, vize ve finalden sonra lisans diploması almıştır. Akademisyenlerden onay alıp mezun olmuştur. Onlarca akademisyenin onayının üstüne mülakat uygulaması kabul edilemez."

ÖA93: Beni fakülteye alıp senelerce öğretmenlik hayali kurdurun, okullara gönderip ders anlattirin daha da heveslendirin. KPSS'ye sokup yıllarca emek verdirip derece yapmamı sağlayın. Sonra mülakatta 45 dk'da "olmazmış senden ya" diyin. Bakın bu öldürmekten beterdir!

ÖA106: Kaçınıcı oldun diyorlar 41. Diyorum. E derdin ne senin tuzun kuru kızım diyorlar, ah bir bilsen diyorum.. Önüme geçebilirler, hakkımı yiyebilirler..

ÖA112: *Bu benim stajımdan bir video. 45 dk değil "iki dönem boyunca" ders dinleyip ders anlattık. Hocalarımız tarafından puanlandık. Yetmedi KPSS yaptınız, girip onda da derece yaptık. Yetmedi mi, canımızı da mı istiyorsunuz?*

ÖA118: *Atama bekleyen öğretmenler mülakatla mağdur olmak istemiyor. Mülakat bir nevi güvenlik soruşturması değildir. A dan Z ye güvenlik soruşturması zaten yapılıyor. Mülakat işin bahanesi. Mülakat = adam kayırmaca*

ÖA132: *Deney yapsak, 30 gün 30 farklı komisyon karşısında mülakat olayını gerçekleştirsem, 30 komisyon da bana aynı puanı verebilir mi? Bunun imkansızlığı ortadayken neden bu ısrar?*

ÖA133: *Neden karşıyız! Çünkü sözlü sınavlar Güvenirliği en düşük ölçme aracıdır. Özel değerlendirme olacağından Nesnel sonuç alınamaz. Bundan dolayı da belkide binlerce insanın hakkına girilmiş olacak. Buna değer mi?*

ÖA145: *Kontenjana giremezsem geçen yıl yaptığım gibi bir yıl daha çalışır çok çok iyisini yaparım ama mülakatta elenirsem neye çalışacağım nasıl çalışacağım kendimi nasıl motive edeceğim ?*

ÖA149: *Ben özel eğitim öğretmeniym ben böp hazırlamadan, elime materyali vermeden ne yapmamı bekliyorlar kaldiki özel gereksinimli bir bireye kim 45 dk ders anlatmış?*

ÖA150: *Benim ismim e harfiyle başladığı için geçen yıl mülakata erken giren gruptaydım buna rağmen saatlerce güneş altında bekledim. 7000 sınıf öğretmeni aldınız 21000 kişiye 45 dakika verdiğinizde kaç ay sürecek bu mülakatlar?*

ÖA152: *Dil öğretmenleri kime neyi anlatacak?Materyal olmadan hazırlık olmdan plan yada program yapılmadan ders işlendiği nerede görülmüş? 45 dk 35 dk ders son 10 dk yazılı beyan. Devletimiz bünyesinde 35 dk kesintisiz ders anlatan bir öğretmen mi var?Konular branşlara nasıl dağıtılacak?*

ÖA155: *Madem mülakatla alan bilgimiz ölçülmek isteniyor MEB'de görevli öğretmenler de alan sınavına tabi tutulsun. Niçin bu mülakat zulmü bize yapılıyor sadece? Komisyon üyelerinin alan bilgisinin yeterliliği de ölçülecek mi?*

Öğretmen adayları ve atanmayı bekleyen öğretmenlerin mülakat uygulamasına dair eleştirileri, eğitim alanındaki atama süreçlerinde adalet, şeffaflık ve liyakat gibi temel ilkelerin önemini vurgulamaktadır. Uygulanan mülakatlar, adayların geçmiş eğitim ve akademik başarılarını göz ardı ederek gerçekleştirilmekte ve bu durum onların profesyonel kariyerlerine ve özgüvenlerine zarar verebileceği gibi (#ÖA 93, #ÖA 145), mülakat sürecindeki bu öznel ve standardizasyon eksikliği, eğitim sistemi içerisindeki güven sorunlarını derinleştirmekte ve potansiyel olarak binlerce adayın haklarının ihlal edilmesine yol açabilecek bir atmosfer yaratmaktadır (#ÖA 133,

#ÖA 155). Bu bağlamda, eğitim fakülteleri ve ilgili kurumlar arasında, adil ve liyakat esaslı bir atama sürecinin sağlanması konusunda acil ve derinlemesine bir diyalog ve reform ihtiyacı açıkça ortaya çıkmaktadır.

Millî Eğitim Bakanlığı'nda Kadrolu Öğretmen ve Yöneticilerin Mülakat Uygulamasına İlişkin Görüşleri

Millî Eğitim Bakanlığı bünyesinde görev yapan kadrolu öğretmen ve yöneticilerin, eğitim alanının deneyimli aktörleri olarak politikaların ve uygulamaların sahada nasıl tezahür ettiğini en iyi bilebilecek kişiler olduğu düşünülebilir. Bu grup, eğitim sisteminin iç işleyişi, öğrenci başarısı ve öğretmen yetkinliği üzerinde doğrudan etkiye sahip oldukları için, mülakat uygulamaları konusundaki görüşleri, özellikle de öğretmen atamaları gibi kritik süreçlerde, önemli bir perspektif sunabilir. Kadrolu öğretmen ve yöneticilerin görüşleri, atama süreçlerinin adalet, şeffaflık ve liyakat ekseninde iyileştirilmesine yönelik politika yapıcılar için değerli içgörüler sağlayabilir ve aynı zamanda meslektaşlarıyla empati kurarak eğitim ekosisteminin daha sağlıklı işlemesine katkıda bulunabilirler.

Araştırmaya katılan kadrolu öğretmen ve yöneticilerin mülakat uygulamasına dair görüşleri, genel olarak mülakatın gerekli bir araç olduğuna işaret etmekle birlikte, uygulamanın mevcut formatının ve ağırlığının gözden geçirilmesi gerektiğini düşündüklerini göstermiştir. Örnekleme dahil edilen 19 tweet'ten 18'inin mülakata karşı bir tutum sergilemesi, mevcut sistemin adaletsizlik ve verimsizlik yarattığına dair güçlü bir konsensüs olduğunu ortaya koymaktadır. Mülakatların %50 ağırlık taşıması ve kaygı, endişe, stres gibi subjektif faktörlerin sonuçları etkilemesi, bu uygulamanın güvenilirliğinin tartışmalı olduğunu belirginleştirirken, sözlü sınavların objektiflikten uzak olduğu ve yanlı hatalara açık olduğu belirtilmiştir. X platformundaki profilleri incelendiğinde Millî Eğitim Bakanlığı bünyesinde kadrolu öğretmen ve yönetici olduğu anlaşılan kullanıcıların örneklem dahilindeki tweet'lerinden örnekler aşağıda sunulmuştur:

KÖY8: "Kamu özel farketmez, mülakat gereklidir. Yoksa işine son veremeyeceğin bir ruh hastasını işe alabilirsin. Senelerce yöneticilik yaptım. Tecrübem bu. Mülakat gereklidir."

KÖY12: "50 bin kontenjan için 150 bin kişi mülakata çağrılırsa ve 100 bin kişi mülakat notuna itiraz ederse ne olacak?"

KÖY14: "0,1 puan fark bile bu kadar önemliyken mülakatın %50 ağırlığa sahip olması mantık dışıdır."

KÖY3: "Uzmanlar, yüksek puan alarak derece yapmış bir adayın, mülakatsız bir alımda atanma ihtimali olmayan bir adaya göre çok daha fazla heyecanlanacağı ihtimaline dikkat çekiyorlar. Bu da başarılı öğretmen adayını mülakat sonucu başarısız kılabilir."

KÖY7: "Mülakat için jürinin karşısına çıkan bir öğretmen adayı, ilgili bölümü kazanmış, derslerini başarıyla vermiş ve staj eğitimini tamamlamıştır. Bu kişi, KPSS Genel Kültür-Genel Yetenek Testi, Eğitim Bilimleri Testi ve Öğretmenlik Alan Bilgisi Testi'nden yüksek puan alarak jürinin karşısına çıkmıştır. Bu aday öğretmen 25 ila 30 dersten sınava tabi tutulmuş gereken başarıyı göstermiştir. Tüm bu süreçlerden geçen bir aday öğretmenin sonuç üzerinde yüzde 50 oranında etkili olacak bir mülakata tabi tutulması hakkaniyete uygun değildir."

KÖY19: "Sözlü uygulamalar tesadüfi hataların en fazla karıştığı uygulamalardır. Bundan dolayı güvenilirliği en düşük sınav türüdür. Kaygı, endişe, stres, gelecek korkusu ve hiç tanımadığın üç kişi de eklenince kesinlikle en kötü değerlendirme olacaktır."

Elde edilen bulgulara göre, Millî Eğitim Bakanlığı'nda görevli kadrolu öğretmen ve yöneticiler, mesleğe yeni adım atacak olan öğretmen adaylarının karşılaştığı mülakat sürecine dair ezici bir çoğunlukla eleştirel bir tutum sergilemektedir. Bu, öğretmen ve yönetici grubunun, adayların karşılaştıkları zorlukları ve mülakat sürecinin mevcut haliyle adil olmadığını düşündüklerini göstermektedir. Bununla birlikte, bu çalışmada ele alınan toplam örneklemin yalnızca %7,6'sını (n=19) temsil eden tweet sayısı, kadrolu öğretmen ve yöneticilerin öğretmen adayları ve atanmayı bekleyen öğretmenlere yeterli desteği sağlamadığına dair bir görüş oluşturabilir. Bu durum, mülakat sistemine yönelik geniş çaplı bir memnuniyetsizlik olduğunu, ancak sistemi değiştirmek için gerekli kolektif eylemin oluşmadığını gösterebilir.

X platformundaki Profillerinden Mesleki Bilgilerine Ulaşamayan Kullanıcıların Mülakat Uygulamasına İlişkin Görüşleri

X platformundaki profillerinden mesleki bilgilerine ulaşamayan kullanıcıların mülakat uygulamasına ilişkin görüşleri, mesleki camia içerisindeki yaygın kanının bir kesiti olarak ele alınabilir. Bu kullanıcılar, belki de doğrudan eğitim sektöründe çalışmıyor veya mesleki kimliklerini gizli tutmayı tercih ediyor olabilirler; ancak, mülakat sürecine dair yorumları öğretmen adaylarının ve mevcut öğretmenlerin görüşleriyle karşılaştırmalı bir perspektif sunar. Öğretmen adayları üzerindeki baskıyı ve kamuoyundaki genel algıyı daha iyi anlamak için bu türden anonim veya yarı-anonim katılımcıların görüşleri önemli olabilir. Analiz edilen 32 tweet'ten %75'inde (24 tweet) mülakat uygulamasına karşı bir duruş sergilenirken, %25'inde (8 tweet) mülakat uygulamasının faydalı olduğuna işaret edilmiştir. Bu, X platformu üzerinde

mesleki bilgileri gizli olan kullanıcıların büyük bir kısmının mevcut mülakat sistemine eleştirel yaklaştığını göstermektedir.

Mülakat sürecine ilişkin bu karışık görüşler, toplumun çeşitli kesimlerinden insanların, öğretmen alımlarındaki sözlü sınavları değerlendirme biçimlerinde büyük bir çeşitlilik olduğunu ortaya koymaktadır. Bu veriler, bazı kullanıcıların mülakatın objektiflikten uzak, adaletsiz ve hatta torpil ile ilişkilendirildiği konusunda endişeler taşıdığını gösterirken, diğer kullanıcılar mülakatın terörle mücadele ve liyakat gibi konularda önemli bir araç olduğunu savunmaktadır. X platformundaki profillerinden mesleki bilgilerine ulaşamayan kullanıcıların mülakat uygulamasına ilişkin görüşlerini yansıtan tweet'lerden örnekler aşağıda listelenmiştir:

D1: *"Öğretmenler neye karşı değil ki? Özel sektörde işe girerken kaç mülakattan geçiyorlar. Devlete gelince mülakata karşıyız. Çocuklarımızı emanet ettiğimiz öğretmenler mülakat istemiyor. Şaka gibi"*

D6: *"Fetö ve diğer terör örgütlerinin devlet kadrolarına sızmalarını engellemek için mülakat gereklidir."*

D7: *"Öğretmenler neden mülakattan korkuyor? özel sektör çalışanları bir işe girmek için onlarca mülakattan geçiyor..."*

D13: *"Bu konuda eğitim fakültelerine dokunulmaması da ilginç. Öğretmenlik uygulaması dersinin yetersiz olduğunu herkes biliyor..."*

D14: *"Bugün Anadolu'da her evde bir öğretmen adayı var. Hiçbir anne-baba binbir emekle öğretmen olarak yetişen evladının hakkının yenilmesine rıza göstermez..."*

D19: *"Mülakat nedir??? Mülakat haksızlıktır, emeğe saygısızlıktır, torpildir, liyakatsizliktir, yılların çöpe gitmesidir ama LİYAKAT değildir!!!"*

D25: *"Nisa 58; 'Allah size kesinlikle görevleri ehil ve layık olanlara vermenizi, insanlar arasında bir yargılama yaptığınızda adaletle yargılama yapmanızı emrediyor.'"*

D27: *"Öğretmenlerin gönlüne girmek yerine karşınıza alıyorsunuz, sınava giren 600 bin öğretmen var..."*

D26: *"Sınavları tüm Türkiye'de aynı jüri yapamayacağı için belli bir standart yakalanamayacaktır..."*

D29: *"Kamuda işe alımlarda mülakat meselesi çokça tartışılıyor..."*

D32: *"Kimse kusura bakmasın da mülakat kamuda işe alımlarda bu devletin sigortasıdır..."*

Tweet #D25 ve #D27, mülakat sürecinin adalet ve liyakat açısından eleştirildiği görüşleri dile getirmiştir. #D25'te, dini referanslar kullanılarak, işlerin ehil insanlara verilmesi gerektiği vurgulanırken, #D27, mülakatın politik sonuçlar doğurabileceğini ve bu durumun toplumsal bir

tepkie yol açabileceğini işaret etmektedir. #D19 ve #D26, mülakatın adaletsizlik, torpil ve liyakatsizlik gibi olumsuz yönlerini öne çıkaran görüşlerdir. #D19'un keskin ifadesi ve #D26'nın, mülakat sürecindeki subjektif değerlendirmeleri eleştirmesi, mülakat sistemine olan genel güvensizliği yansıtmaktadır. Özellikle #D19 ve #D25 numaralı tweetler dikkat çekicidir çünkü bu yorumlar mülakatın adalet ve liyakat ile çeliştiği görüşünü güçlü bir dini ve etik çerçevede dile getirmektedir. Bu, mülakatın sadece bir işe alım süreci değil, aynı zamanda toplumun temel değerleriyle de ilişkilendirildiğini göstermektedir. #D26'daki endişe, mülakat sürecinin subjektif doğasını ve potansiyel olarak uygulamada tutarsızlıkları vurgulamakta, bu da sistemin adil olmadığı algısını güçlendirmektedir. #D27, mülakat karşıtı görüşün toplumda geniş bir yankı bulabileceğini ve bu durumun siyasi sonuçlar doğurabileceğini belirtmekte, bu da politik risk analizi yapılmasının gerekliliğine dikkat çekmektedir.

Tweetlerden elde edilen bulgular, mülakat sürecinin toplumda bölünmeye yol açabilecek bir konu olduğunu ortaya koyuyor. Bir yandan, mülakatın gerekli bir güvenlik önlemi olarak görüldüğü, diğer yandan adaletsizlik ve liyakatsizliğin bir simgesi olarak algılandığı anlaşılıyor. Bu görüş ayrılığı, mülakat sistemini yeniden değerlendirmeye ve olası iyileştirmelere açık bir alan olarak tanımlıyor. İyileştirme yönünde adımlar atılması, hem işe alım sürecinin adil olmasını hem de toplumun genel kabulünü sağlayabilir. Bu, politikacılar, eğitim uzmanları ve politika yapıcılar için önemli bir çalışma alanı oluşturmakta ve geniş toplumsal katılımı teşvik etmek için bir fırsat sunmaktadır.

SONUÇ VE ÖNERİLER

Bu çalışmada, öğretmen atama süreçlerindeki mülakat uygulamasına dair X platformu üzerinden yapılan paylaşımlar, meslek gruplarına göre incelenmiştir. Çalışmanın sonuçları, farklı meslek gruplarından bireylerin bu sürece dair çeşitli görüş ve eleştirilerini ortaya koymaktadır. Ayrıca, bu görüşlerin meslek grupları arasında önemli farklılıklar gösterdiği gözlemlenmiştir.

Eğitim fakültesi öğretim üyeleri tarafından yapılan 25 paylaşımda, mülakat uygulamasına karşıt bir tutum baskın çıkmıştır. Bu grup içindeki eleştiriler esas olarak mülakat sürecinin potansiyel adaletsizliklerine, nepotizm ve torpil sorunlarına odaklanmıştır. Öğretim üyeleri, teorik olarak mülakatın etkin bir değerlendirme aracı olabileceğini kabul etmekle birlikte, pratikteki uygulamanın güvenilirliği ve adilliği konusunda ciddi endişeler taşımaktadır. Öğretim üyelerinin mülakata yönelik eleştirileri, daha şeffaf, adil ve standardize edilmiş bir değerlendirme sürecinin önemini vurgulamaktadır.

Siyasetçilerin mülakat uygulamasına yönelik tutumları ise, eğitimde adalet ve etkinlik temaları etrafında şekillenmiştir. Eleştiriler genellikle mülakatın sosyoekonomik ve kişisel engeller oluşturduğu, öznel değerlendirmeler içerdiği ve siyasi çıkarlar için manipüle edilebileceği yönündedir. Ancak, mülakatı savunan siyasetçilerin de argümanları bulunmakta olup, bu argümanlar öğretmen adaylarının kişisel ve profesyonel yeterliliklerini ölçmede mülakatın etkili bir araç olabileceğine işaret etmektedir.

Öğretmen adayları ve atanmayı bekleyen öğretmenlerin bakış açısı, analiz edilen verilerde en belirgin şekilde karşıt görüş olarak öne çıkmıştır. Bu grup, mülakat uygulamasını eğitimde fırsat eşitliğini bozan ve merkezi sınavlar (KPSS) gibi daha objektif olan süreçlerin önüne geçen bir mekanizma olarak değerlendirmektedir. Bu görüşler, mevcut mülakat uygulamasının adil olmadığı, şeffaf ve objektif bir temel üzerine oturtulması gerektiği yönünde kuvvetli bir mutabakat sergilemektedir.

Kadrolu öğretmenler ve yöneticiler ile diğer meslek gruplarından gelen paylaşımlar da, genel olarak mülakata karşıt bir duruş sergilemektedir. Bu grupların eleştirileri, mülakat sürecinin öğretmen adaylarının mesleki ve akademik yeterliliklerini tam olarak değerlendirememesi, öznel karar verme süreçleri ve mülakatın yarattığı ekonomik yük gibi konuları içermektedir.

X platformunda mesleki bilgileri belirsiz olan kullanıcılar arasında yapılan incelemede, mülakat sürecine yönelik görüşlerin büyük bir bölümünün olumsuz olduğu görülmektedir. Bu kullanıcıların %75'i mülakat uygulamasına karşı çıkarken, sadece %25'i mülakatın olumlu yanlarını vurgulamıştır. Eleştiriler genellikle mülakat sürecinin subjektif, adil olmayan ve kişisel bağlantılara açık bir yapıda olduğuna yönelikken, destekleyen azınlık, mülakatın terörle mücadele ve liyakatin saptanmasında önemli bir araç olarak görüldüğünü belirtmiştir. Bu bulgular, mülakat sürecine toplumun farklı kesimlerinden insanların bakış açılarının çeşitlilik gösterdiğini ve bu konudaki kamuoyu algısının daha geniş bir spektrumda olduğunu göstermektedir.

Sonuç olarak, bu çalışma, öğretmen atama süreçlerinde uygulanan mülakatların, farklı meslek gruplarından bireyler tarafından genel bir hoşnutsuzlukla karşılandığını ortaya koymaktadır. Eğitim fakültesi öğretim üyelerinden siyasetçilere, öğretmen adaylarından kadrolu öğretmenlere kadar geniş bir yelpazede, mülakat sürecinin adil ve etkin bir şekilde yeniden düzenlenmesi çağrısında bulunan güçlü bir görüş birliği bulunmaktadır. Bu, politika yapıcılar için önemli bir geri bildirim olarak kabul edilebilir ve ileriki atama süreçlerinde bu tür endişeleri ele almak için reformların düşünülmesi gerektiğini işaret etmektedir. X platformunda paylaşılan

tweet'lere ait bulgulardan yola çıkılarak paydaşlara ve gelecekteki araştırma konularına ilişkin bazı öneriler sunulabilir.

Eğitim fakülteleri, öğretmen adaylarının seçimi ve yetiştirilmesi süreçlerinde önemli değişiklikler yapmalıdır. Öğrenci kabul aşamasında, öğretmen olmaya engel olabilecek ciddi ruhsal veya fiziksel rahatsızlıkların belirlenmesi amacıyla, kontenjana giren adayların kapsamlı bir mülakat sürecinden geçirilmesi önerilmektedir. Bu mülakatlar, öğretmenlik mesleği için gerekli olan kişilik özellikleri, tutumlar ve davranışlar hakkında derinlemesine bilgi edinmeyi amaçlamalıdır. Bunun yanı sıra, öğrencilerin eğitimleri boyunca her akademik yılın sonunda, öğretim üyelerinden oluşan bir jüri tarafından değerlendirilmesi ve öğretmenlik mesleğine dair bilgi, beceri, tutum ve davranışları yönünden kriterlere uygun olup olmadıklarının tespit edilmesi gerekmektedir. Bu süreçler, hem öğrencilerin mesleki yeterliliklerinin sürekli olarak izlenmesini sağlayacak hem de öğretmenlik mesleğine aday olan bireylerin en başından itibaren mesleğe uygunluğunun değerlendirilmesine olanak tanıyacaktır. Bu yaklaşım, eğitim fakültelerinin mezun ettiği öğretmenlerin kalitesini artıracak ve toplumun eğitim sistemine olan güvenini pekiştirecek bir adımdır.

Eğitim Bakanlığı ve ilgili kurumlar mülakat süreçlerinde şeffaflığı sağlamak için net kriterler belirleyip, bu kriterlerin uygulanışını açıkça kamuoyu ile paylaşmalıdır ki adaylar sürecin adillik ve ölçülebilirliğini görebilsinler. Öğretmenlik meslek birlikleri, üyelerinin ve adayların haklarını korurken mülakat süreçleriyle ilgili toplanan geri bildirimleri politika değişikliklerine yön vermek için kullanılmalıdır. Siyasi karar vericiler, mülakat süreçlerinde yaşanan toplumsal rahatsızlığı dikkate alarak, adil ve objektif reformları uygulamaya koymalıdır.

Geleceğe yönelik araştırmalar kapsamında, mülakat süreçlerinin öğretmen adaylarının yeterliliklerini objektif olarak değerlendirip değerlendirmedini belirleyecek bağımsız çalışmalar, adayların psikolojisi üzerindeki etkilerini inceleyecek niteliksel araştırmalar yapılmalıdır. Ayrıca, mülakat süreçlerinde tutarlılığı artırabilecek teknolojik araçlar ve metodolojiler üzerine pilot projeler geliştirilmeli, farklı ülkelerdeki öğretmen alım süreçleri karşılaştırmalı olarak analiz edilerek yerel bağlamda en iyi uygulamaların nasıl uyarlanabileceğine dair çalışmalar yürütülmelidir.

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SEÇMEN DAVRANIŞLARINI ETKİLEYEN BİR FAKTÖR OLARAK CİNSİYET

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ÖZET

Cinsiyet farklılıkları bireylerin sosyolojik, fizyolojik ve psikolojik anlamda birbirinden ayrılmasına yol açar. Ülkemizde ve dünyanın değişik yerlerinde cinsiyete bağlı olarak erkek ve kadına yüklenen toplumsal statüler farklılaşabilmektedir. Yapılan bazı saha çalışmalarından elde edilen veriler ışığında ülkemizde istisnai durumlar hariç, kadınlara genellikle itaat, ev işleri, annelik ve saygı gibi roller atfedilirken, erkeklere ise güç, başarı, babalık gibi sosyal statüler atfedilmektedir (Alkan,1989:124). Fizyolojik farklılıklardan ötürü ilk çağdan modern çağa kadar kadın ve erkekler için biçilen işbölümü de doğal olarak farklılaşmaktaydı. Ancak günümüz modernleşme ve küreselleşme çağında bu işbölümü farklılaşmaları önemli ölçüde ortadan kalkmıştır. Bu çalışmada; kadın ve erkek arasındaki cinsiyet farklılıklarının seçmen tercihleri üzerinde etkisinin olup olmadığı, bir farklılık var ise bu etkinin yönü ve etki düzeyini belirlemeye dönük çalışılacaktır. Lipset, seçmenlerin kadın ya da erkek olması durumuna göre bir farklılaşma olduğunu ifade etmiştir. Lipset'e göre cinsiyetin oy verme davranışı üzerindeki etkisinin temel sebebi erkeklerin sosyal hayattaki belirleyiciliği ve baskın karakteridir. Bu farklılaşma hem siyasal katılımı hem de oy verme tercihi üzerinde belirleyici bir etkiye yol açtığını ifade etmektedir(1963:206). Benzer biçimde bir görüş Çaha tarafından ifade edilmektedir. Çaha'ya göre kadın seçmenler erkek seçmenlere nazaran siyasal sisteme daha az oranda ve miktarda entegre olduklarını ifade etmektedir(2008:68-69).Kadınların siyasal katılımında bulunma durumu ve katılma kararı aldıktan sonra oy verme tercihinin cinsiyet bağlamında değerlendirmek için bir saha çalışması yapılacaktır. Bu çalışmadan elde edilen veriler SPSS veri analiz programı yardımıyla analize tabi tutulacak ve yorumlanacaktır.

Anahtar Kelimeler: Cinsiyet, Katılım, Seçmen, Davranış

GENDER AS A FACTOR AFFECTING VOTER BEHAVIOR

ABSTRACT

Gender differences lead to sociological, physiological and psychological separation of individuals from each other. In our country and in different parts of the world, the social statuses given to men and women may differ depending on gender. In the light of the data obtained from some field studies, in our country, except for exceptional cases, women are generally attributed roles such as obedience, housework, motherhood and respect, while social statuses such as power, success and fatherhood are attributed to men (Alkan, 1989:124). Due to physiological differences, the division of labor for men and women naturally differed from ancient times to the modern age. However, in today's age of modernization and globalization, these divisions of labor have significantly disappeared. In this study; Efforts will be made to determine whether gender differences between men and women have an effect on voter preferences, and if there is a difference, the direction and level of this effect. Lipset stated that there is a differentiation depending on whether the voters are male or female. According to Lipset, the main reason for the effect of gender on voting behavior is the decisiveness and dominant character of men in social life. He states that this differentiation leads to a decisive effect on both political participation and voting preference (1963:206). A similar view is expressed by Çaha. According to Çaha, female voters state that they are less integrated into the political system than male voters (2008:68-69). A field study will be conducted to evaluate women's political participation and their voting preferences after deciding to participate in the context of gender. The data obtained from this study will be analyzed and interpreted with the help of SPSS data analysis program.

Keywords: Gender, Participation, Voter, Behavior

Seçmen tercihlerinin cinsiyet bağlamında değerlendirilebilmesi için sahada veri toplanmıştır. Bu kapsamda Siirt il merkezinde yer alan 21 mahallede yerleşik seçmenler arasından tabakalı rastgele örneklem yöntemiyle 983 denekten veri toplanmıştır. Veriler toplanırken deneklerin gerçek durumu yansıtacak özelliklere sahip olmasına riayet edilmiştir. Bu kapsamda Siirt il düzeyinin sosyo-ekonomik yapısı, yaş dağılımı ve cinsiyet dengesi gibi faktörler bağlamında saha çalışması gerçekleştirilmiştir. Siirt ilinin toplumsal yapısından kaynaklı olarak kadınları erkeklere nazaran daha az sosyalizasyon alanlarına sahip olması ve daha ziyade e işleri ile meşgul olmalarından dolayı kadın- erkek eşitliği dengesi sağlanamamıştır. Ancak hatayı minimize edecek sayıya ulaşılmıştır.

İdeal örneklem sayısının belirlenmesine dönük yapılan akademik çalışmalarda kesin bir yargıya varılamamıştır. Dolayısıyla evrenin belli bir oranına tekabül edecek bir örneklem sayısı söz konusu olamamakla birlikte, Balcı örneklemin evreni temsil edebilme kabiliyetine göre tolere edilebilir bir örneklem büyüklüğünü ifade etmektedir. Buna göre 100.000 seçmen için tolere edilebilir örneklem sayısı % 5'lik hata payı için en az 382 olması gerektiğini ifade etmektedir. Sayı arttıkça hata payı azalacaktır. Ancak belli bir doyumdan sonra sayısının artması hata payını arttıracaktır. Siirt il merkezinde ikamet eden seçmen sayısı yaklaşık 100.000'dir. Yaklaşık %2 hata payına denk gelecek şekilde seçmen sayısının yaklaşık %1'i örneklem olarak seçilmiştir(Balcı,107:2001). Aşağıdaki tabloda sayısal verilere yer verilmiştir.

Cinsiyetiniz hakkında bilgi verir misiniz?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Kadin	438	44,6	44,6	44,6
	Erkek	545	55,4	55,4	100,0
	Total	983	100,0	100,0	

Tablo 1: Cinsiyet Durumu

Kadın seçmenlerin yaklaşık olarak %4'ü seçimlere katılmayacağını dolayısıyla siyasal katılımında bulunmama yönünde karar vermektedir. Bu sayıya, % 11 olan kararsız seçmenler de eklendiğinde kadın seçmenlerin yaklaşık % 15'i siyasal sistemin dışında kalmaya yatkın oldukları ortaya çıkmaktadır. Buna mukabil erkek seçmenlerin yaklaşık % 6,4'ü siyasal katılımında bulunmayacağını ifade etmektedir. Bu sayıya, yaklaşık % 8,3 olan kararsız seçmenler de eklendiğinde erkek seçmenlerin de yaklaşık % 15'i siyasal sistemin dışında kalmaya yatkın oldukları ortaya çıkmaktadır. Türkiye'de gerçekleşen seçimlerde sandığa katılmama düzeyi

ortalama olarak % 15'lere tekabül etmektedir(<https://tr.wikipedia.org, 07/12/2023>). Dolayısıyla sahadan elde edilen verilerle gerçekleşen sonuçlar arasında bir ilişki kurulabilmektedir.

Siyasal katılım konusunda kararını veren seçmenin hangi doğrultuda tercihte bulunacağı değişik faktörlerin etisiyle netleşir. Bu faktörlerin her biri farklı bir etki düzeyine sahip olabilmektedir. Söz konusu faktörlerden biri de “cinsiyet” faktörüdür. Seçmenlerin “kadın” ya da “erkek” olma durumunun seçmen tercihinin etkilediği varsayılmaktadır. Bu varsayım kimi zaman siyasi partiler tarafından uygulanan politikalar neticesinde ortaya çıkarken, kimi zaman da toplumsal yapının kadın ve erkeğe yüklediği sorumluluk veya tanıdığı etki alanına bağlı olarak değişmektedir. Çalışmamıza katılan seçmenlerden 438'i kadın ve 545'i ise erkek seçmenlerden oluşmuştur.

Aşağıdaki tabloda siyasi katılımında bulunup bulunmama ve katılımında bulunma halinde katılımın boyunun cinsiyet bağlamında değerlendirilebilmesine olanak tanıyan istatistiklere yer verilmiştir.

Cinsiyetiniz hakkında bilgi verir misiniz? * 14 Mayıs 2023 Pazar günü yapılacak olan Milletvekiliği genel seçimlerinde hangi partiye oy vermeyi düşünüyorsunuz?														TOPLAM
Cinsiyetiniz hakkında bilgi verir misiniz?		Ak Parti	CHP (Saadet+De va+Gelecek)	HDP (Yeşiler ve Sol)	MHP	İyi Parti	Memleket Partisi	Yeniden Refah	Bağımsız - Edip Eker	Bağımsız - Fatih Cantürk	Oy kullanmaya çağım	Kararsızım	Diğer	
Kadın	Count	136	35	191	3	2	0	1	3	1	18	48	0	438
% within Cinsiyetiniz hakkında bilgi verir misiniz?		31,1%	8,0%	43,6%	0,7%	0,5%	0,0%	0,2%	0,7%	0,2%	4,1%	11,0%	0,0%	44,6%
% within 14 Mayıs 2023 Pazar günü yapılacak olan Milletvekiliği genel seçimlerinde hangi partiye oy vermeyi düşünüyorsunuz?		46,6%	40,2%	44,7%	33,3%	50,0%	0,0%	33,3%	50,0%	33,3%	34,0%	51,6%	0,0%	44,6%
% of Total		13,8%	3,6%	19,4%	0,3%	0,2%	0,0%	0,1%	0,3%	0,1%	1,8%	4,9%	0,0%	545
Erkek	Count	156	52	236	6	2	5	2	3	2	35	45	1	100,0%
% within Cinsiyetiniz hakkında bilgi verir misiniz?		28,6%	9,5%	43,3%	1,1%	0,4%	0,9%	0,4%	0,6%	0,4%	6,4%	8,3%	0,2%	55,4%
% within 14 Mayıs 2023 Pazar günü yapılacak olan Milletvekiliği genel seçimlerinde hangi partiye oy vermeyi düşünüyorsunuz?		53,4%	59,8%	55,3%	66,7%	50,0%	100,0%	66,7%	50,0%	66,7%	66,0%	48,4%	100,0%	55,4%
Total	% of Total	15,9%	5,3%	24,0%	0,6%	0,2%	0,5%	0,2%	0,3%	0,2%	3,6%	4,6%	0,1%	983
	Count	292	87	427	9	4	5	3	6	3	53	93	1	100,0%
% within Cinsiyetiniz hakkında bilgi verir misiniz?		29,7%	8,9%	43,4%	0,9%	0,4%	0,5%	0,3%	0,6%	0,3%	5,4%	9,5%	0,1%	100,0%
% within 14 Mayıs 2023 Pazar günü yapılacak olan Milletvekiliği genel seçimlerinde hangi partiye oy vermeyi düşünüyorsunuz?		100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
% of Total		29,7%	8,9%	43,4%	0,9%	0,4%	0,5%	0,3%	0,6%	0,3%	5,4%	9,5%	0,1%	100,0%

Tablo 2: 14 Mayıs Milletvekiliği Seçimlerinde Oy Kullanacakların Cinsiyet İlişkisi

Siirt'te esas olarak iki partili bir yapı söz konusudur. Ak Parti ve HEDEP(HDP)/Yeşil-Sol dışındaki diğer partiler almış oldukları oy miktarı ve oranları düşük düzeyde olduğundan dolayı çalışmamızda sadece istatistiksel düzeyde verileri verilecek olup, değerlendirme dışı tutulacaklardır. Tablo 2' de yer alan istatistiklere bakıldığında, kadın seçmenlerin yaklaşık %31'inin mevcut iktidar partisi lehinde oy kullanacaklarını beyan ederken erkek seçmenlerin

yaklaşık 29'unun Ak Parti lehinde oy kullanacaklarını beyan etmişlerdir. Bu veriler ışığında kadın katılımcıların erkek katılımcılardan daha fazla oranda Ak Partiyi destekledikleri görülmektedir. Dolayısıyla cinsiyet bağlamında oy verme yönü konusunda bir farklılık olduğu görülmektedir. Yapılan gözlemler ve görüşmeler neticesinde; kadın seçmenlerin erkek seçmenlere nazaran daha fazla Ak Partiyi desteklemelerinin temel sebebinin iktidar partisi tarafından uygulanan sosyal politikalar olduğu ortaya çıkmaktadır. Ak Parti iktidarı döneminde özellikle ev kadınlarının kişisel hesaplarına yatırılan sosyal yardımlar ve çocukları için yine kadınların hesabına yatırılan Şartlı Nakit Transferi (ŞNT) gibi uygulamalarla kadınlar bir nebze olsun ekonomik bir kaynağa sahip olmuşlardır. Dolayısıyla kadınlar bu durumlarını kaybetmemek adına bir miktarda olsa erkeklerden ayrılarak daha fazla oranda Ak Parti'yi desteklemektedir. Bu durum seçmen davranışlarını açıklayan modellerden, Sosyolojik ve Psikolojik oy verme modellerinden ziyade Rasyonel Tercih Modelinin kadın seçmenin davranışını açıklamada daha fazla yetkinliği bize göstermektedir. Zira Rasyonel Tercih Modeline göre seçmenler oy verirken fayda maksimizasyonuna göre hareket ettikleri varsayılır. Ancak söz konusu fayda maddi olabileceği gibi gayri maddi de olabilir. Ve nihayet hedeflenen amacın gerçekleşmesi zorunlu değildir, önemli olan bir amaç uğruna ve o doğrultuda hareket etmektir. Seçmen oy verme tercihinde bulunurken iktidar partisinin geçmişte uygulamış olduğu sosyo-ekonomik politikalarını göz önünde bulundurur ve geçmişe oy verir. Ancak muhalefet partisine oy verirken geçmişe değil geleceğe dönük açıklanan politikalara göre oy kullanılmaktadır. Dolayısıyla kadın seçmenler Ak Partinin geçmişe doğru politikaları doğrultusunda oy kullandıkları görülmektedir. Sosyolojik Modele göre seçmenler ailelerinin, aşiret ya da tarikat gibi ilişkilerin tesirinde kalarak oy kullanırlar. Bu çalışmada kadınların ailelilerinden bağımsız hareket ettiklerini dolayısıyla eski toplumsal yapının günümüz için geçerli olmadığını göstermektedir (Özhan,11-18:2019).

HDP'ye oy veren kadın ve erkek seçmenler analiz edildiğinde; kadın ve erkek seçmenlerin yaklaşık olarak aynı oranda destekledikleri görülmektedir. Bu oranlara ve oy verme yönüne bakıldığında HDP' ye oy verme ile cinsiyet arasında doğrudan bir ilişki kurulamadığı görülmektedir. Burada seçmen davranışlarını açıklayan modellerden Psikolojik Oy Verme Modelinin pratikte karşımıza çıktığı görülmektedir. Bu modelin temel savı seçmenler ile siyasal partiler arasında kurulan parti aidiyetine ilişkindir. Dolayısıyla bu partiye oy veren seçmenler oy verdikleri parti ile kendilerini özdeşleştirerek bir tercih ortaya koymaktadırlar.

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TÜRKİYE'DE KURU BAKLAGİLLER ÜRETİMİNDE KENDİNE YETERLİLİĞİN DEĞERLENDİRİLMESİ

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ÖZET

Türkiye iklim ve toprak yapısı bakımından özellikle kuru baklagiller üretiminde önemli bir potansiyele sahiptir. Yaklaşık 900 bin hektar alanda 1 milyon 295 bin ton kuru baklagil üretilmiş olup mercimek ve nohut üretiminde dünyada dördüncü sırada, kuru fasulye üretiminde ise 19. sırada yer almaktadır. Türkiye kuru baklagiller dış ticaretinde miktar bakımından dış ticaret açığı, değer bakımından ise dış ticaret fazlası vermektedir. Bunun sebebi Türkiye'de üretilen kuru baklagillerin yüksek fiyattan ihraç edilmesi, ithalatın ise daha düşük fiyattan gerçekleşmesidir. Bu çalışmada Türkiye İstatistik Kurumu (TÜİK), Birleşmiş Milletler Gıda ve Tarım Örgütü (FAO) veri tabanından elde edilen verilerle Türkiye tarımı için önemli gıda grubu olan kuru baklagillerde kendine yeterlilik derecesi ortaya koyulmuş olup kendine yeterlilik derecesini artırmak için öneriler geliştirilmiştir. Sonuçlar Türkiye'nin kuru fasulye ve mercimek üretiminde kendine yeterli olmadığını, nohut üretiminde ise kendine yeterli olduğu göstermiştir. Kuru baklagiller grubu açısından değerlendirildiğinde ise kendine yeterli olmadığı tespit edilmiştir. Araştırma bulgularından hareketle Türkiye'de kuru baklagillerde kendine yeterliliğin artırılması için kaliteli ve verimli yeni çeşitlerin geliştirilmesi, sulu tarım alanlarında kuru baklagil üretimi için arazilerin suya eriştirilmesi ve modern sulama sistemleri kullanılması gibi altyapı olanaklarının iyileştirilmesiyle verim ve üretim artışının sağlanması gerekmektedir. Dolayısıyla kuru baklagil üretiminde kendine yeterlilik derecesi istenilen seviyelere gelecektir.

Anahtar Kelimeler: Dış ticaret, Kendine yeterlilik, Baklagiller, Beslenme

EVALUATING SELF-SUFFICIENCY IN DRY LEGUMES PRODUCTION IN TÜRKİYE

ABSTRACT

Türkiye has an important potential, especially in producing dry legumes in terms of climate and soil structure. Approximately 900 thousand hectares of land produced 1 million 295 thousand tons of dry legumes and ranks 4th in the world in lentil and chickpea and 19th in dry bean production. Türkiye has a foreign trade deficit in terms of quantity and a foreign trade surplus in terms of value in the foreign trade of dry legumes. This is because legumes produced in Türkiye are exported at high prices, while imports are realized at lower prices. In this study, with the data obtained from the Turkish Statistical Institute (TurkStat) and the Food and Agriculture Organization of the United Nations (FAO), the degree of self-sufficiency in dry legumes, which is an important food group for Turkish agriculture, was revealed and recommendations were developed to increase the degree of self-sufficiency. It was determined that Türkiye is not self-sufficient in dry bean and lentil production, while it is self-sufficient in chickpea production. When evaluated in terms of the dry legumes group, it was determined that it is not self-sufficient. Based on the findings of the research, in order to increase self-sufficiency in dry legumes in Türkiye, yield and production will be increased by improving infrastructure facilities such as the development of quality and productive new varieties, access to water for dry legume production in irrigated agricultural areas and the use of modern irrigation systems. Therefore, the self-sufficiency in dry legume production will reach the desired levels.

Keywords: Foreign trade, Self-sufficiency, Legumes, Nutrition

Giriş

Türkiye’de bitkisel üretim içerisinde tahıl üretiminden sonra baklagil üretimi gelmektedir (Gündüz vd., 2009). Baklagiller içerdikleri protein ve aminoasitler sayesinde besin değeri yüksek olması sebebiyle tüketiciler tarafından, kazık kökleri sayesinde toprak verimliliğini artırması ve ekim nöbetine uygun olması sebebiyle üreticiler tarafından tercih edilen önemli temel gıda grubudur (Kadakoğlu ve Karlı, 2022).

Türkiye’de Toprak Mahsulleri Ofisi (TMO) ilk kez 1941 yılında nohut, kuru fasulye, kırmızı ve yeşil mercimek alımı gerçekleştirmiş olup bu alımlar 1994 yılına kadar piyasanın ihtiyaçları doğrultusunda devam etmiştir (Kadakoğlu ve Karlı, 2022). Bu tarihler arasında çeşitli projeler (kırsal kalkınma, baklagil-tahıl sistemi, nadas alanlarının daraltılması) uygulanarak kuru baklagil ekim alanları ve üretimi artmıştır (Gül ve Işık, 2002). 1994 yılından 2018 yılına kadar TMO kuru baklagil alımı yapmamıştır. 2018 yılından sonra ise tekrardan kuru fasulye, mercimek ve nohut alımına başlamıştır (Resmî Gazete, 2018).

Gıdada kendine yeterlilik ülkeleri savaş veya siyasi gerginlikler, diğer ülkelerdeki üretim eksiklikleri veya gıda fiyatlarındaki ani ve keskin artışlar sonucunda ortaya çıkabilecek uluslararası arz kesintilerinden koruyabilir (FAO, 1996; Clapp, 2017). Bu bağlamda ülkeler açısından tarım sektöründe kendine yeterliliğin sağlanması kaçınılmazdır. Tarım sektörü desteklendiğinde sadece bu sektörde çalışanların gelirleri değil aynı zamanda ülkelerin kendine yeterlilik dereceleri de artacaktır.

Bu çalışmanın amacı Türkiye tarımı için önemli gıda grubu olan kuru baklagillerde kendine yeterlilik derecesinin belirlenmesidir. Ayrıca kendine yeterlilik derecesini artırmak için öneriler geliştirilmiştir.

Materyal ve Metot

Çalışmanın ana materyalini Türkiye İstatistik Kurumu (TÜİK), Birleşmiş Milletler Gıda ve Tarım Örgütü (FAO) ve ulusal sektör raporlarından elde edilen ikincil veriler oluşturmaktadır. Ayrıca literatürdeki ulusal ve uluslararası konuyla ilgili bilimsel yayınlardan da yararlanılmıştır. Dünya ve Türkiye’de kuru baklagil ekim alanı, üretim miktarı ve verime ait verilere basit indeks hesabı yapılarak yıllar itibarıyla incelenmiştir.

Araştırma Bulguları ve Tartışma

Dünya kuru baklagiller ekim alanı 2007/2008 piyasa yılında 44 milyon 513 bin hektar iken %26,95 artarak 2021/2022 piyasa yılında 56 milyon 511 bin hektar olarak gerçekleşmiştir. 2021/2022 piyasa yılında 35 milyon 921 bin hektar alanda fasulye, 15 milyon 5 bin hektar

alandanda nohut ve 5 milyon 586 bin hektar alanda mercimek üretilmiştir. Bu ürünlerin toplam kuru baklagil ekim alanı içerisindeki payları sırasıyla %63,6, %26,5 ve %9,9'dur. Dünya kuru baklagil ekim alanları incelenen yıllarda 41 milyon hektar ile 58 milyon hektar arasında dalgalı bir seyir izlemiştir. Aynı dönemde kuru fasulye ekim alanı %21,68, nohut ekim alanı %33,18 ve mercimek ekim alanı %49,95 artmıştır (Çizelge 1).

Çizelge 1. Dünyada kuru baklagiller ekim alanları (ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Mercimek	Toplam
2007/08	29.521.573	11.266.332	3.725.201	44.513.106
2008/09	26.977.246	11.069.550	3.337.466	41.384.262
2009/10	25.774.280	11.552.815	3.681.234	41.008.329
2010/11	31.087.466	12.011.683	4.375.018	47.474.167
2011/12	30.761.528	12.809.877	4.118.896	47.690.301
2012/13	29.464.117	12.369.037	4.162.332	45.995.486
2013/14	29.731.983	12.434.651	4.084.325	46.250.959
2014/15	30.998.608	13.736.839	4.079.508	48.814.955
2015/16	31.604.515	11.819.315	4.709.640	48.133.470
2016/17	35.422.500	12.915.145	5.463.000	53.800.645
2017/18	37.163.941	14.567.096	6.156.884	57.887.921
2018/19	36.303.277	16.189.864	5.512.261	58.005.402
2019/20	33.086.417	13.840.338	4.863.292	51.790.047
2020/21	34.466.620	13.561.629	4.958.876	52.987.125
2021/22	35.920.593	15.004.885	5.585.879	56.511.357
İndeks (2007/08=100)	121,68	133,18	149,95	126,95

Kaynak: FAO, 2023.

Dünya kuru baklagiller üretim miktarı 2007/2008 piyasa yılında 34 milyon 716 bin ton iken %41,71 artarak 2021/2022 piyasa yılında 49 milyon 197 bin ton olarak gerçekleşmiştir. 2021/2022 piyasa yılında 27 milyon 715 bin ton fasulye, 15 milyon 872 bin ton nohut ve 5 milyon 610 bin ton mercimek üretilmiştir. Bu ürünlerin toplam kuru baklagil üretimi içerisindeki payları sırasıyla %56,3, %32,3 ve %11,4'tür. Dünya kuru baklagil üretimi incelenen yıllarda 33,4 milyon ton ile 51,5 milyon ton arasında dalgalı bir seyir izlemiştir. Aynı

dönemde kuru fasulye üretimi %28,03, nohut üretimi %62,85 ve mercimek üretimi %68,82 artmıştır (Çizelge 2).

Çizelge 2. Dünyada kuru baklagiller üretim miktarı (ton)

Piyasa Yılı	Kuru Fasulye	Nohut	Mercimek	Toplam
2007/08	21.646.545	9.746.059	3.323.139	34.715.743
2008/09	21.889.992	8.621.558	2.835.380	33.346.929
2009/10	21.962.688	10.416.680	3.937.491	36.316.859
2010/11	24.780.792	10.836.652	4.980.911	40.598.355
2011/12	24.155.058	11.721.522	4.382.445	40.259.025
2012/13	24.622.426	11.630.712	4.431.590	40.684.728
2013/14	25.106.810	13.038.219	5.298.706	43.443.735
2014/15	25.409.165	13.303.959	4.781.395	43.494.519
2015/16	26.291.935	10.940.449	5.547.490	42.779.874
2016/17	27.108.373	11.623.457	6.693.339	45.425.169
2017/18	29.170.468	15.152.266	7.130.548	51.453.282
2018/19	27.487.537	16.940.225	6.580.219	51.007.980
2019/20	25.553.122	14.219.491	5.787.579	45.560.192
2020/21	27.412.686	15.065.906	6.471.039	48.949.631
2021/22	27.715.024	15.871.846	5.610.104	49.196.973
İndeks (2007/08=100)	128,03	162,85	168,82	141,71

Kaynak: FAO, 2023.

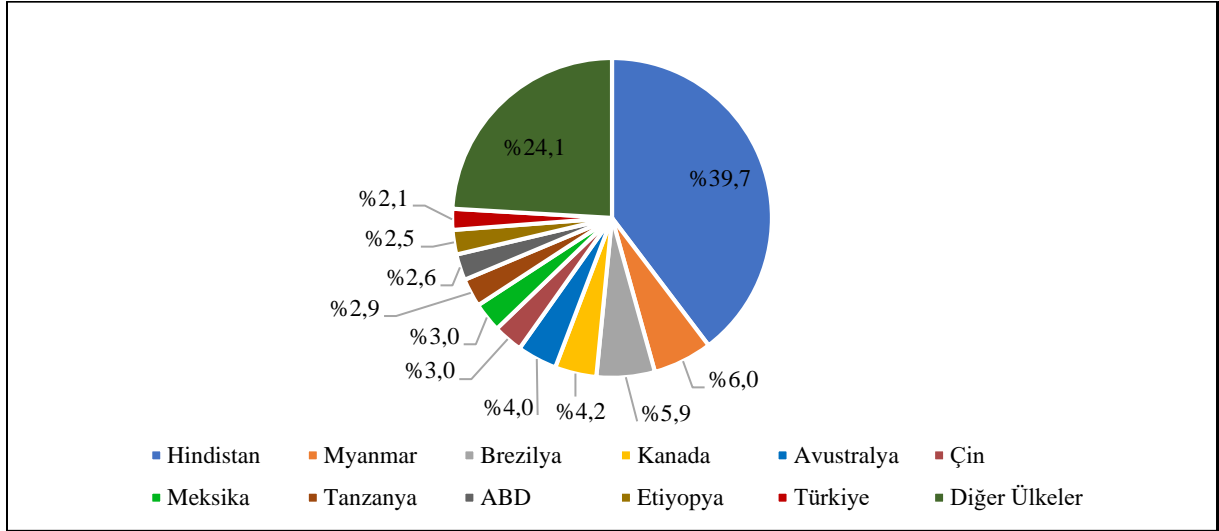
Dünyada hektara kuru fasulye verimi 772 kg, nohut verimi 1.058 kg, mercimek verimi 1.004 kg olmak üzere kuru baklagiller verim ortalaması 871 kg'dır. İncelenen 15 yıllık dönemde kuru fasulye verimi %5,24, nohut verimi %22,27, mercimek verimi %12,58 artmıştır. Kuru baklagiller ortalama verimi ise %11,63 artmıştır. Dünya kuru fasulye verimi incelenen 15 yıllık dönemde yatay seyretmiştir. Nohut ve mercimek verimleri ise dalgalı artan bir seyir izlemiştir (Çizelge 3).

Çizelge 3. Dünyada kuru baklagiller verimi (kg/ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Mercimek	Toplam
2007/08	733	865	892	780
2008/09	811	779	850	806
2009/10	852	902	1.070	886
2010/11	797	902	1.139	855
2011/12	785	915	1.064	844
2012/13	836	940	1.065	885
2013/14	844	1.049	1.297	939
2014/15	820	969	1.172	891
2015/16	832	926	1.178	889
2016/17	765	900	1.225	844
2017/18	785	1.040	1.158	889
2018/19	757	1.046	1.194	879
2019/20	772	1.027	1.190	880
2020/21	795	1.111	1.305	924
2021/22	772	1.058	1.004	871
İndeks (2007/08=100)	105,24	122,27	112,58	111,63

Kaynak: FAO, 2023.

Dünya kuru baklagil üretimi 49 milyon 197 bin ton olup kuru baklagil üretiminde önde gelen ülkeler ve payları sırasıyla Hindistan %39,7, Myanmar %6,0, Brezilya %5,9, Kanada 4,2, Avusturalya %4,0, Çin %3,0, Meksika %3,0, Tanzanya %2,9, ABD %2,6, Etiyopya %2,5 ve Türkiye %2,1'dir. Diğer ülkelerin payları toplamı ise %24,1'dir (Şekil 1). Türkiye dünya kuru fasulye üretimindeki payı %1,1 olup dünyada 19. sırada yer almaktadır. Nohut üretimindeki payı %3,0 olup dünyada dördüncü sırada ve mercimek üretimindeki payı ise %4,7 olup dünyada dördüncü sıradadır (FAO, 2023).



Şekil 1. Kuru baklagil üretiminde önemli ülkeler (%)

Türkiye kuru baklagiller ekim alanı 2007/2008 piyasa yılında yaklaşık 1 milyon hektar iken yıllar itibariyle azalarak 2022/2023 piyasa yılında yaklaşık 900 bin hektar olarak gerçekleşmiştir. Bu dönemler arasında kuru baklagiller ekim alanları %10,57 azalmıştır. Kuru fasulye ekim alanı 109 bin 250 hektardan %11,17 azalarak 97 bin 52 hektara, nohut ekim alanı 503 bin 674 hektardan %9,30 azalarak 456 bin 834 hektara, kırmızı mercimek ekim alanı ise 357 bin 233 hektardan %16,07 azalarak 299 bin 812 hektara gerilemiştir. İncelenen yıllar arasında kuru baklagiller içerisinde sadece yeşil mercimek ekim alanları artış göstermiştir. Yeşil mercimek ekim alanı 32 bin 308 hektardan %32,55 artarak 42 bin 825 hektara yükselmiştir (Çizelge 4).

Çizelge 4. Türkiye’de kuru baklagiller ekim alanları (ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Toplam
2007/08	109.250	503.674	357.233	32.308	1.002.465
2008/09	98.233	505.165	290.977	27.698	922.073
2009/10	94.928	455.934	189.378	25.553	765.793
2010/11	103.381	455.690	211.600	22.892	793.563
2011/12	94.625	446.413	192.323	22.525	755.886
2012/13	93.174	416.242	214.788	22.690	746.894
2013/14	84.763	423.557	260.500	20.678	789.498
2014/15	91.110	388.518	232.446	17.048	729.122
2015/16	93.584	359.304	207.469	16.388	676.745
2016/17	89.820	359.529	235.474	16.762	701.585
2017/18	89.722	395.310	269.318	23.220	777.570
2018/19	84.805	514.416	243.065	34.163	876.449
2019/20	88.939	520.595	242.776	39.612	891.922
2020/21	102.986	511.561	209.821	37.844	862.212
2021/22	107.797	487.886	260.199	48.159	904.041
2022/23	97.052	456.834	299.812	42.825	896.523
İndeks (2007/08=100)	88,83	90,70	83,93	132,55	89,43

Kaynak: TÜİK, 2023a.

Türkiye kuru baklagiller üretimi 2007/2008 piyasa yılında yaklaşık 1 milyon 195 bin ton iken 2022/2023 piyasa yılında %8,39 artarak 1 milyon 295 bin tona yükselmiştir. İncelenen yıllarda kuru fasulye üretimi %75,05 artarak 270 bin ton, nohut üretimi %14,77 artarak 580 bin ton ve yeşil mercimek üretimi %67,89 artarak 45 bin ton olarak gerçekleşmiştir. Kırmızı mercimek üretimi ise %21,32 azalarak 400 bin tona gerilemiştir (Çizelge 5). Kuru fasulye ve nohut ekim alanları azalmasına rağmen üretim miktarlarının artmasının sebebi verimdeki artıştır.

Çizelge 5. Türkiye’de kuru baklagiller üretim miktarı (ton)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Toplam
2007/08	154.243	505.366	508.378	26.803	1.194.790
2008/09	154.630	518.026	106.361	24.827	803.844
2009/10	181.205	562.564	275.050	27.131	1.045.950
2010/11	212.758	530.634	422.000	25.400	1.190.792
2011/12	200.673	487.477	380.000	25.952	1.094.102
2012/13	200.000	518.000	410.000	28.000	1.156.000
2013/14	195.000	506.000	395.000	22.000	1.118.000
2014/15	215.000	450.000	325.000	20.000	1.010.000
2015/16	235.000	460.000	340.000	20.000	1.055.000
2016/17	235.000	455.000	345.000	20.000	1.055.000
2017/18	239.000	470.000	400.000	30.000	1.139.000
2018/19	220.000	630.000	310.000	43.000	1.203.000
2019/20	225.000	630.000	310.000	43.631	1.208.631
2020/21	279.518	630.000	328.418	42.397	1.280.333
2021/22	305.000	475.000	228.000	35.000	1.043.000
2022/23	270.000	580.000	400.000	45.000	1.295.000
İndeks					
(2007/08=100)	175,05	114,77	78,68	167,89	108,39

Kaynak: TÜİK, 2023a.

Türkiye kuru baklagiller verim miktarı 2007/2008 piyasa yılında 1.192 kg/ha iken 2022/2023 piyasa yılında %21,14 artarak 1.444 kg/ha olarak gerçekleşmiştir. İlgili yıllar itibariyle kuru baklagiller üretimi dalgalı artan bir seyir izlemiştir. Kuru fasulye verimi %97,03 artarak 2.782 kg/ha, nohut verimi %26,62 artarak 1.270 kg/ha ve yeşil mercimek verimi %26,63 artarak 1.051 kg/ha yükselmiştir. Kırmızı mercimek verimi ise 6,25 azalarak 1.334 kg/ha olarak gerçekleşmiştir (Çizelge 6). Birim alandan verim artışının en önemli kriteri iyi ve kaliteli tohum kullanılmasıdır. İyi ve kaliteli tohum kullanımının verimi %25-30 oranında artırdığı belirlenmiştir (Anonim, 2019). Türkiye’de çeşit geliştirme çalışmalarının temel amaçları tüketici isteklerinin farklılaşması, dengeli ve sağlıklı beslenme istekleri, yüksek verimlilik, yüksek adaptasyon kabiliyet ve hastalıklara-zararlılara dayanıklılıktır (Şener, 2021). Türkiye’de yemeklik tane baklagillerde ıslah çalışmaları 1965 yılında başlamış olup bugüne kadar milli

çeşit listesine kayıtlı 55 adet nohut, 45 adet kuru fasulye ve 35 adet mercimek olmak üzere toplamda 135 adet çeşit geliştirilmiştir. Bunun yanı sıra 2 adet nohut, 6 adet kuru fasulye ve 4 adet mercimek üretim izinli olmak üzere tescillenmiştir (Anonim, 2023).

Çizelge 6. Türkiye’de kuru baklagiller verimi (kg/ha)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Ortalama
2007/08	1.412	1.003	1.423	830	1.192
2008/09	1.574	1.025	366	896	872
2009/10	1.909	1.234	1.452	1.062	1.366
2010/11	2.058	1.164	1.994	1.110	1.501
2011/12	2.121	1.092	1.976	1.152	1.447
2012/13	2.147	1.244	1.909	1.234	1.548
2013/14	2.301	1.195	1.516	1.064	1.416
2014/15	2.360	1.158	1.398	1.173	1.385
2015/16	2.511	1.280	1.639	1.220	1.559
2016/17	2.616	1.266	1.465	1.193	1.504
2017/18	2.664	1.189	1.485	1.292	1.465
2018/19	2.594	1.225	1.275	1.259	1.373
2019/20	2.530	1.210	1.277	1.101	1.355
2020/21	2.714	1.232	1.565	1.120	1.485
2021/22	2.829	974	876	727	1.154
2022/23	2.782	1.270	1.334	1.051	1.444
İndeks (2007/08=100)	197,03	126,62	93,75	126,63	121,14

Kaynak: TÜİK, 2023a.

Türkiye’de 2007/2008 piyasa yılında kuru baklagiller üretim kayıpları yaklaşık 22 bin ton olup kullanılabilir üretim 1 milyon 173 bin tondur. 2022/2023 piyasa yılında ise üretim kayıpları %26,21 azalarak yaklaşık 16 bin ton, kullanılabilir üretim ise %12,45 azalarak yaklaşık 1 milyon ton olarak gerçekleşmiştir. Yurt içi kuru baklagil kullanımı %12,99 artarak 1 milyon 228 bin ton olup bunun %9,96’sı tohumluk olarak geri kalan %90,04’ü ise insan tüketimi için kullanılmaktadır. Kişi başına kuru baklagil tüketimi incelenen dönemler arasında 10,9 kg ile

15,6 kg arasında deęişmekle birlikte ortalama 14,1 kg'dır. 2007/2008 piyasa yılına göre 2021/2022 piyasa yılında kiři bařına kuru baklagil tüketimi %11,03 azalarak 12,9 kg olarak gerekleşmiştir (Çizelge 7).

Çizelge 7. Türkiye’de kuru baklagiller denge durumu

Piyasa Yılı	Ekim Alanı (ha)	Üretim Miktarı (ton)	Üretim Kayıpları (ton)	Kullanılabilir Üretim (ton)	Kullanım (Arz) (ton)	Yurt İi Kullanım (ton)	Tüketim (ton)	Kiři Bařına Tüketim (kg)
2007/08	1.002.465	1.194.790	22.182	1.172.608	1.317.591	1.086.654	956.959	14,5
2008/09	922.073	803.844	11.846	791.998	1.069.573	849.209	732.042	10,9
2009/10	765.793	1.045.950	17.162	1.028.788	1.329.215	1.071.883	963.685	14,0
2010/11	793.563	1.190.792	20.870	1.169.922	1.472.833	1.223.066	1.108.707	15,6
2011/12	755.886	1.094.102	19.099	1.075.003	1.371.760	1.114.933	1.006.840	13,9
2012/13	746.894	1.156.000	20.322	1.135.678	1.345.871	1.128.437	1.021.961	13,9
2013/14	789.498	1.118.000	19.565	1.098.435	1.470.476	1.240.243	1.127.440	15,0
2014/15	729.122	1.010.000	17.185	992.815	1.406.846	1.180.663	1.075.454	14,2
2015/16	676.745	1.055.000	17.925	1.037.075	1.464.931	1.194.972	1.094.715	14,2
2016/17	701.585	1.055.000	17.990	1.037.010	1.550.954	1.251.973	1.148.369	14,7
2017/18	777.570	1.139.000	19.919	1.119.081	1.619.693	1.302.241	1.189.873	15,0
2018/19	876.449	1.203.000	19.788	1.183.212	1.719.501	1.298.432	1.156.843	14,4
2019/20	891.922	1.208.631	19.859	1.188.772	1.752.251	1.251.214	1.108.982	13,6
2020/21	862.212	1.280.333	20.906	1.259.427	1.927.923	1.328.758	1.188.367	14,5
2021/22	904.041	1.043.000	16.368	1.026.632	1.683.219	1.227.759	1.074.811	12,9
İndeks (2007/08=100)	90,18	87,30	73,79	87,55	127,75	112,99	112,32	88,97

Kaynak: TÜİK, 2023b.

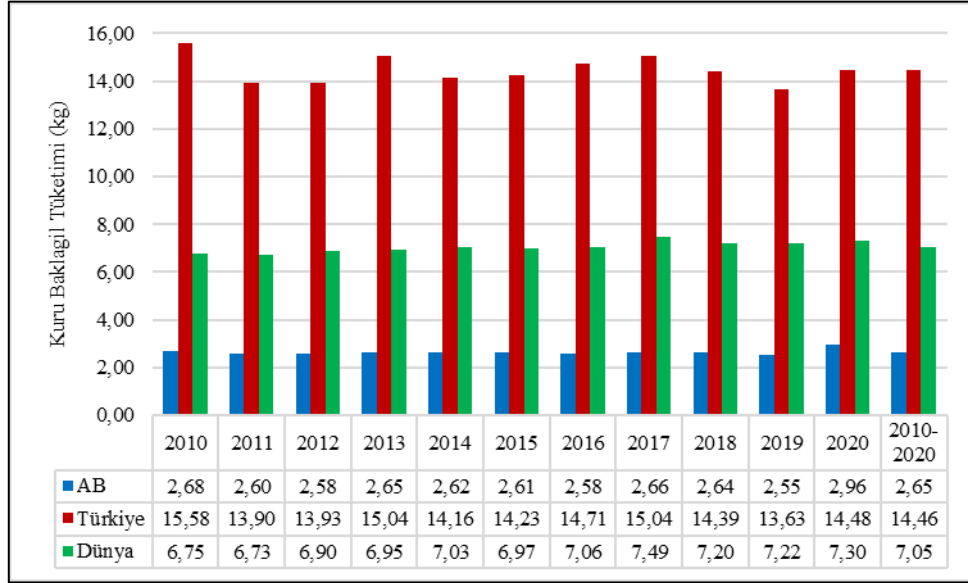
Türkiye’de incelenen dönemler ortalamasına göre kuru baklagiller yurt ii kullanımının %7,7’si tohumluk olarak %92,3’ü ise insan tüketimi iin kullanılmaktadır. Tohumluk kullanım oranı %5,78 ile %11,30 arasında deęişmekte olup 2021/2022 piyasa yılında %9,96 olarak gerekleşmiştir. Kuru fasulyenin tohumluk kullanımı 10 bin 780 ton, nohudun tohumluk kullanımı 68 bin 304 ton, kırmızı mercimek tohumluk kullanımı 36 bin 428 ton ve yeřil mercimek tohumluk kullanımı 6 bin 742 ton olup kuru baklagillerin toplamda tohumluk kullanımı 122 bin 254 tondur (Çizelge 8).

Çizelge 8. Türkiye’de kuru baklagillerin tohumluk kullanımı

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı	Yeşil	Toplam	Tohumluk
			Mercimek	Mercimek		Kullanım Oranı
			Ton		(%)	
2007/08	10.925	60.441	28.579	2.585	102.530	9,44
2008/09	9.823	60.620	23.278	2.216	95.937	11,30
2009/10	9.493	54.712	15.150	2.044	81.399	7,59
2010/11	10.338	54.683	16.928	1.831	83.780	6,85
2011/12	9.463	53.570	15.386	1.802	80.221	7,20
2012/13	9.317	49.949	17.183	1.815	78.264	6,94
2013/14	8.476	50.827	20.840	1.654	81.797	6,60
2014/15	9.111	46.622	18.596	1.364	75.693	6,41
2015/16	9.358	43.116	16.598	1.311	70.383	5,89
2016/17	8.982	43.143	18.838	1.341	72.304	5,78
2017/18	8.972	47.437	21.545	1.858	79.812	6,13
2018/19	9.329	66.874	29.168	3.758	109.129	8,40
2019/20	9.783	67.677	29.133	4.357	110.950	8,87
2020/21	11.328	66.503	25.179	4.163	107.173	8,07
2021/22	10.780	68.304	36.428	6.742	122.254	9,96
İndeks (2007/08=100)	98,67	113,01	127,46	260,81	119,24	105,51

Kaynak: TÜİK, 2023b.

Kişi başına kuru baklagil tüketimi 2010-2020 yılları ortalamasına göre Avrupa Birliği (AB)’nde 2,65 kg/yıl, Türkiye’de 14,46 kg/yıl, dünyada ise 7,05 kg/yıl olarak gerçekleşmiştir. İncelenen dönemlerde kişi başına kuru baklagil tüketimi AB’de %10,45 ve dünyada %8,15 artmış, Türkiye’de ise %7,08 azalmıştır (Şekil 2). İncelenen yıllar ortalamasına göre Türkiye’de kişi başına 5,47 kg/yıl nohut, 4,84 kg/yıl kırmızı mercimek, 3,23 kg/yıl kuru fasulye ve 0,56 kg/yıl yeşil mercimek tüketilmiştir (TÜİK, 2023b).



Şekil 2. Kişi başına tüketilen kuru baklagil miktarları (kg/yıl)

Türkiye’de kuru baklagiller ihracat miktarı ve değeri 2021 yılında 650 bin ton ve 608 milyon dolar olarak, ithalat miktarı ve değeri ise 735 bin ton ve 574 milyon dolar olarak gerçekleşmiştir. Türkiye 2021 yılında 86 bin ton kuru baklagil dış ticaret açığı verirken 33,5 milyon ton dış ticaret fazlası vermiştir (Çizelge 9). Türkiye kuru baklagiller dış ticaretinde miktar bakımından dış ticaret açığı vermesine rağmen değer bakımından dış ticaret fazlası vermektedir. Bunun sebebi olarak Türkiye’de üretilen kuru baklagiller yüksek fiyattan ihraç edilirken, ithalat daha düşük fiyattan gerçekleşmektedir. Nitekim yurt içinde tüketimin önemli bir bölümü ithal kuru baklagiller ile karşılanmakta olup yurt içinde üretilen kaliteli kuru baklagiller ihraç edilmektedir.

Çizelge 9. Türkiye’de kuru baklagiller dış ticareti

Dış Ticaret	2007-2009	2010-2012	2013-2015	2016	2017	2018	2019	2020	2021	İndeks (2007/2009=100)
İhracat Miktarı (ton) (1)	219,2	239,8	218,9	269,4	291,8	436,8	639,3	743,6	649,5	296,30
İthalat Miktarı (ton) (2)	174,9	279,8	353,5	401,8	504,7	487,0	661,2	867,7	735,4	420,47
Denge (ton) (1-2)	44,3	-40,0	-134,6	-132,4	-212,9	-50,2	-21,9	-124,1	-85,9	-193,91
İhracat Değeri (milyon dolar) (3)	196,1	236,1	235,3	313,9	277,6	322,1	441,2	566,2	607,7	309,89
İthalat Değeri (milyon dolar) (4)	188,2	226,4	297,3	354,0	415,0	318,0	364,1	523,9	574,2	305,10
Denge (milyon dolar) (3-4)	7,8	9,6	-62,0	-40,1	-137,4	4,2	77,2	42,4	33,5	429,49

Kaynak: FAO, 2023a.

Gıda için kendine yeterlilik kavramı bir ülkenin gıda ihtiyaçlarını kendi yerli üretiminden karşılayabilme derecesidir (Thomson ve Metz, 1999). Türkiye’de kuru baklagiller üretiminde kendine yeterlilik derecesi 2007/2008 piyasa yılında %107,2 iken 2022/2023 piyasa yılında

%22,2 azalarak %83,4 olarak gerekleşmiştir. İncelenen dönemlerde kendine yeterlilik dereceleri %82,9 ile %107,2 arasında deęişmekle birlikte ortalama %92,1'dir. Ortalama yeterlilik dereceleri kuru fasulyenin %82,7, nohudun %107,3, kırmızı mercimeęin %83,5 ve yeşil mercimeęin %56,6'dır. Türkiye nohut üretiminde kendine yeterli olup kuru fasulye üretiminde özellikle son yıllarda kendine yeterlilięi yükselmiştir. Kırmızı mercimek ve yeşil mercimek üretiminde kendine yeterli deęildir. Özellikle kırmızı mercimek üretiminde yeterlilik derecesi yıllar itibariyle düşüş eğilimindedir (Çizelge 10).

Çizelge 10. Türkiye'de kuru baklagiller üretiminde kendine yeterlilik düzeyleri (%)

Piyasa Yılı	Kuru Fasulye	Nohut	Kırmızı Mercimek	Yeşil Mercimek	Kuru Baklagiller
2007/08	71,0	121,0	121,6	50,0	107,2
2008/09	83,7	127,7	45,2	65,7	93,6
2009/10	78,8	118,2	82,9	51,3	96,1
2010/11	81,9	110,5	91,3	58,5	95,8
2011/12	83,4	101,7	102,0	61,7	96,5
2012/13	83,2	99,5	122,4	54,2	100,5
2013/14	78,5	96,6	90,3	41,7	88,9
2014/15	86,2	96,5	74,7	39,0	84,3
2015/16	82,6	98,1	81,6	43,1	86,7
2016/17	81,8	92,1	76,7	46,1	82,9
2017/18	82,7	87,5	89,6	56,5	86,0
2018/19	72,1	114,0	74,9	86,8	91,0
2019/20	76,0	127,5	71,7	85,3	94,7
2020/21	92,0	122,3	71,2	58,7	94,3
2021/22	106,7	96,0	57,0	50,9	83,4
Ortalama	82,7	107,3	83,5	56,6	92,1
İndeks (2007/08=100)	150,28	79,34	46,88	101,80	77,80

Kaynak: TÜİK, 2023b.

Sonuç

Türkiye mercimek ve nohut üretiminde dünyada 4. sırada, kuru fasulye üretiminde ise 19. sırada yer almaktadır. Kuru fasulye üretiminde kendine yeterlilik derecesi son yıllarda artmasına karşın henüz istenilen düzeyde deęildir. Nohut üretiminde kendine yeterlilik derecesi yıllar itibariye dalgalı bir seyir izlemekte olup kendine yeterli olduęu söylenebilir. Ancak mercimek üretiminde kendine yeterli deęildir. Tüm kuru baklagiller için deęerlendirildięinde ise

Türkiye'nin kendine yeterli olmadığı belirlenmiştir. Türkiye'de kuru baklagiller açısından kendine yeterliliğin artırılması için aşağıdaki öneriler sıralanabilir.

Kuru baklagiller için kalite standartlarını belirleyerek sertifikalı üretim yapılabilir. Bu sayede Türkiye'nin dünya pazarına rekabet gücü artacaktır. Kuru baklagil üretimi çoğunlukla kuru tarım ile üretilmektedir. Kuru arazileri suya erişirmek, mevcut sulama sistemlerini modernize etmek, depolama olanaklarını iyileştirmek ve kapasitesini artırmak gibi altyapı olanaklarının iyileştirilmesi üreticilerin daha fazla ürün üretmelerini ve ürünlerini korumalarına yardımcı olacaktır. Kuru baklagillerde kaliteli ve verimli yeni çeşitlerin geliştirilmesi için ilgili kurum ve kuruluşlara araştırma ve geliştirme yatırımları yapılabilir. Böylece kaliteli ve verimli çeşitler sayesinde ekstrem geçen yıllarda verimde ve üretimde sert düşüşlerin önüne geçilmiş olacaktır. Tüm bu öneriler ile Türkiye'de kuru baklagil üretiminde kendine yeterliliğin istenilen seviyelere geleceği düşünülmektedir.

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TARIMSAL UYGULAMALARIN EN ÖNEMLİ PARAMETRESİ TOPRAK ORGANİK MADDESİ MİDİR?

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ÖZET

Dünyada her geçen gün ekolojik sorunlar artarken, toprak kalitesi de düşmektedir. Her yıl dünyadaki tarım alanları artan nüfusun ihtiyaçları doğrultusunda giderek azalmaktadır. Buna ilaveten küresel iklim değişikliğinin de etkisiyle yıldan yıla daha fazla erozyon, orman yangınları ve toprak kayıpları meydana gelmektedir. Özellikle Türkiye’de mevcut olan tarım alanlarında yapılan bazı yanlış uygulamalar ve aşırı kimyasal kullanımı gibi hatalı alışkanlıklar sonucunda topraktaki organik madde azalmaktadır. Akabinde bitkilere yararlı olan besin maddeleri de azalarak tarımsal üretimde miktar ve kalite düşerken, üreticilerin gelirleri de azalmaktadır. Toprakların bitki besleme ve buna bağlı olarak verimlilik kapasitelerinin azalması karşısında çevre dostu üretim için toprak kalitesini artıran, organik atıkları değerlendiren sürdürülebilir tarım uygulamaları önemli hale gelmiştir. Bu doğrultuda toprak analizlerine bağlı olarak oluşturulacak ve uygulanacak gübreleme programlarında organik gübre olan kompost, vermikompost, mikrobiyolojik gübrelerin yer alması bir tercih değil zorunluluk haline gelmiştir. Kimyasal gübre kullanımı ile toprak organik maddesinin artması mümkün olmayıp, aksine azaldığı bilinen bir gerçektir. Geleneksel tarımın getirdiği olumsuzlukların çözümü organik gübre kullanımına geçiş ile olanaklıdır. Toprakta organik madde azalması, toprağın verimsizleşmesi ve tarımsal kaynaklı gıda krizine kapıların açılması anlamına gelmektedir. Türkiye’de son yapılan akademik çalışmalarda ortaya çıkan acı gerçek, ülke tarım topraklarının %70-80’indeki toprak organik madde miktarının %1’ler seviyesinde olmasıdır. Bu bir kader olmayıp, bilinçli ve akademik temelli çalışmalar ile engellenebilecek ve hatta düzeltilebilecek bir sonuç olmalıdır. Öyleyse gübreleme programlarında mutlaka toprak organik maddesini artırma özelliğine sahip organik ve organo-mineral gübre yer almalıdır. Bu derleme çalışmada toprak organik maddesinin sürdürülebilir tarımsal uygulamalar için önemi üzerinde durulmuştur.

Anahtar Kelimeler: Toprak analizi, organik madde, gübre, toprak verimliliği, sürdürülebilir tarım.

IS SOIL ORGANIC MATTER THE MOST IMPORTANT PARAMETER OF AGRICULTURAL PRACTICES?

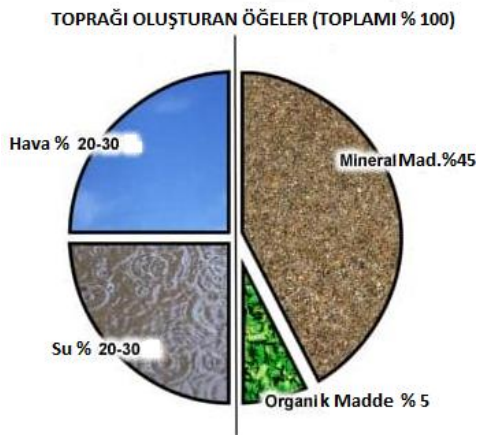
ABSTRACT

While ecological problems are increasing day by day in the world, soil quality is also decreasing. Every year, agricultural areas are decreasing in line with the needs of the increasing population in the world. In addition, due to the effect of global climate change, more erosion, forest fires and soil losses occur from year to year. Some wrong practices, excessive use of chemicals etc., especially in agricultural areas in Turkey. Organic matter in the soil decreases as a result of some wrong practices and bad habits such as excessive use of chemicals, especially in agricultural areas in Turkey. Subsequently, the available plant nutrients decrease and the quantity and quality of agricultural production decreases, while the income of producers also decreases. Sustainable agricultural practices that improve soil quality and utilize organic waste for environmentally friendly production have become important in the face of decreasing plant nutrition and therefore productivity capacities of soils. In this regard, the inclusion of organic fertilizers such as compost, vermicompost and microbiological fertilizers in the fertilization programs to be created and applied based on soil analysis has become not a choice but a necessity. It is a known fact that it is not possible to increase soil organic matter with the use of chemical fertilizers, on the contrary, it decreases. The solution to the negativities brought by traditional agriculture is possible by switching to the use of organic fertilizers. The decrease in organic matter in the soil means that the soil becomes poor soil and opens the doors to an agricultural food crisis. The harsh reality revealed in recent academic studies in Turkey is that the amount of soil organic matter in 70-80% of the country's agricultural lands is at the level of 1%. This is not a fate, but should be an outcome that can be prevented and even corrected through conscious and academic-based studies. Therefore, fertilization programs must include organic and organo-mineral fertilizers that have the ability to increase soil organic matter. In this review study, the importance of soil organic matter for sustainable agricultural practices is emphasized.

Keywords: Soil analysis, organic matter, fertilizer, soil productivity, sustainable agriculture.

GİRİŞ

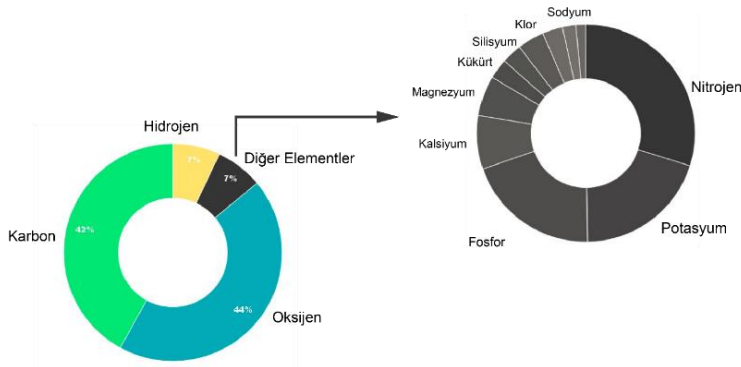
Toprak, tarımın temelini oluşturan; canlılar için besin ve durak yeri olan, canlı ve katı-sıvı-gaz fazlarından oluşan yaşamın temel taşlarından birisidir. Toprak; uygarlıkların gelişmesinde aynı zamanda yaşamın sürekliliğinde önemli rol oynayan, elde edilmesi zor ancak kaybedilmesi kolay olan doğal bir kaynaktır (Bellitürk, 2012). Bir toprağı oluşturan 4 ana öge vardır: Hava (%25), su (%25), mineral madde (%45) ve organik madde (%5) bu öğeleri oluşturmaktadır (Şekil 1). Toprak canlıları (makro ve mikro canlılar, solucanlar vs.) toprağın %5'lik dilimi içindedirler. Ancak yoğun tarımsal uğraşlar neticesinde, organik gübrelerin kullanılmamasından ve diğer yanlış uygulamalardan dolayı bugün sahip olduğumuz tarım topraklarımızın organik madde içerikleri %1'in bile altına gerilemiş, ülkemiz genelin ise %1'den daha düşük organik madde içeren tarım topraklarının oranı %90'lar düzeyinde seyretmektedir (Bellitürk ve Eryüksel, 2018). Toprağın içindeki canlı ve cansız biyolojik varlıkların bütünü ile, bunlardan çeşitli etkinliklerle ortaya çıkan ürünlere "organik madde" ismi verilir (Bellitürk, 2017). Başka bir tanıma göre, toprak organik maddesi (TOM), çeşitli şekillerde toprağa karışmış bitkisel ve hayvansal artıklarla, bunların parçalanma ve ayrışma ürünlerinin çeşitli kimyasal reaksiyonlar sonucunda oluşturduğu kompleks bileşiklerden meydana gelir (Okur, 2021). Şekil 1'den de görüleceği üzere, %5 olması gereken toprak organik maddesi, bugün birçok tarım toprağının analiz sonuçlarına bakıldığında maalesef %1 bile değildir. O nedenle hiçbir kimyasal gübrenin organik madde içermediği, aksine organik gübrelerin içindeki organik maddenin topraklarla buluşması ve toprakların verimliliklerinin artırılması gerekmektedir (Bellitürk ve Goldmann Benardete, 2020).



Şekil 1. Toprağı oluşturan öğeler.

Yıllardır sadece yüksek verim alma uğruna yapılan tarımsal faaliyetler neticesinde toprakların içerisi adeta boşalarak, verimlilik kapasiteleri de düşmüştür. Bugün bu durumu net

olarak yapılan toprak analiz sonuçlarına baktığımızda, özellikle organik maddenin %1'in bile altına düşmüş olması ile görmekteyiz. Tarımla uğraşanların çoğu organik maddedeki bu azalmaya dikkat etmeden, sadece N, P ve K içeren mineral (kimyasal) gübreleri ihtiyaçtan fazla olarak kullanmakta ve hem gübreleme maliyetleri artmakta hem de toprak, yeraltı suları ve hatta üründeki kalıntılar ile çeşitli diğer kirlilik problemlerini oluşturmaktadırlar. Bitkiler bu 3 element ile değil, bunun dışındaki C, H, O, Ca, Mg, S, Fe, Mn, Zn, Cu ve B gibi elementlere de ihtiyaç duymaktadırlar (Şekil 2). Dolayısıyla organik gübrelerin birçoğunda N, P, K dışında diğer yararlı elementler de bulunmakta olup, organik gübre uygulanan toprak ve bitkiler ihtiyaç duyduğu besin maddelerine rahatlıkla sahip olabilmektedirler.



Şekil 2. Bitkilerin ortalama bileşimi.

Bugün, çevresel bozulma, dünyanın karşı karşıya olduğu büyük bir tehdittir ve mineral gübrelerin yaygın olarak kullanımı, fosil yakıtların tükenmesi, karbondioksit (CO₂) oluşumu ve su kaynaklarının kirlenmesi yoluyla çevrenin bozulmasına büyük ölçüde katkıda bulunur. Tarımsal verimliliği olumsuz yönde etkileyen ve toprağın bozulmasına neden olan dengesiz gübre kullanımı nedeniyle toprak verimliliği kaybına yol açar (Büyükfiliz ve ark., 2023).

Mevcut birim alandan daha fazla ürün elde etme ihtiyacı her geçen gün nüfus artışıyla beraber daha da artmaktadır. Bunun sağlanması da yüksek oranda gübre uygulamalarını gerektirmektedir (Fernández-Escobar ve ark., 2004). Toprakların organik maddesi üzerinde olumlu etkiye sahip olan mineral gübreler değil, organik ve kısmen de organo mineral gübrelerdir. Özellikle kompost, vermikompost, biyolojik (mikrobiyal) ve yeşil gübreler son yılların en popüler organik gübreleri arasında gelmektedir.

Bitkisel üretimde vermikompost kullanımının artırılması toprakların sürdürülebilirliğinin sağlanmasına yönelik pek çok eksikliği de tamamlamaktadır. Vermikompost, ısı işlem görmüş

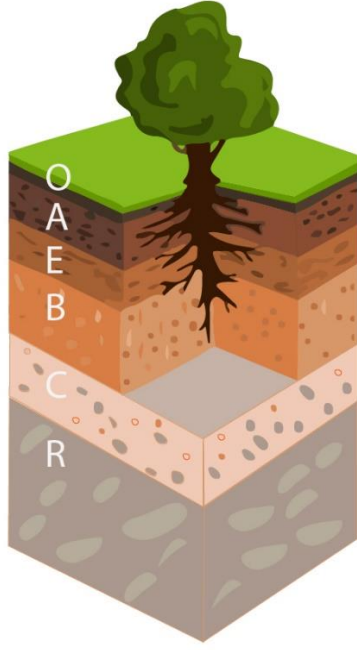
olmasından dolayı hijyen, yavaş salınımlı ve kullanıldığı toprakta sağladığı fiziksel, kimyasal ve biyolojik iyileşmeler sebebiyle son zamanların en gözde organik gübresidir (Bellitürk ve ark., 2013). Organik ürünleri işleyen fabrikaların birçoğunda her yıl önemli miktarlarda atıklar ortaya çıkmaktadır. Bu atıklar hayvansal veya bitkisel kaynaklı olabilmektedir. Organik kökenli bu atıkların tarımsal amaçlı olarak kullanılabilirliğine yönelik yapılan çeşitli araştırmalarda iyi özellikler taşıyan söz konusu atıkların topraklar için organik madde kaynağı olarak kullanılabilmesine yönelik önemli sonuçlar elde edilmiştir (Bellitürk, 2016; Kacar ve ark., 1996; Bellitürk ve ark., 2013).

Sürdürülebilir tarımın oluşturulması ve ileriye dönük tarımsal planlamaların doğru yapılabilmesi için ilk önce toprağın çok iyi tanınması gerekmektedir. Artık toprak verimliliğinin artırılması zorunluluğunun yanı sıra, verimde sürekliliğinin sağlanması ve korunması da ülkemiz için büyük önem taşımaktadır. Bu durum, ancak toprakların mevcut fiziksel, kimyasal ve biyolojik özelliklerinin belirlenmesi ve bu özellikler doğrultusunda yapılacak bilinçli gübreleme çalışmaları ile mümkündür (Bellitürk, 2011).

Bu derleme nitelikli çalışmada, tarımsal faaliyetlerde toprak verimliliğini direkt olarak etkileyen “toprak organik maddesi” ve toprağın diğer özellikleri ile olan ilişkisi gübrelemede dikkat edilecek hususlar da yer alacak şekilde açıklanmaya çalışılmıştır.

TOPRAĞIN FİZİKSEL, ÖZELLİKLERİ İLE TOPRAK ORGANİK MADDESİ ARASINDAKİ İLİŞKİLER

Toprağın fiziksel özellikleri denilince akla gelen özelliklerin başında toprak tekstürü (bünyesi) ve strüktürü (yapısı) gelmektedir. Toprak havası, toprak sıcaklığı, toprak rengi ve toprak suyu da diğer fiziksel özellikler olarak bilinir. Toprak dünyadaki bütün canlıların hem beslendiği ve hem de barındığı yer olmakla beraber, “tarıma elverişli diye adlandırılan yaklaşık 1 cm kalınlığındaki toprak tabakası ortalama olarak 100 ile 1000 yılda oluşur. Bu toprağın üzerinde tarım yapılması mümkün olacak yani yaklaşık 20 cm’lik bir kalınlığa sahip olması için 10 000 yıldan fazla geçmesi gerekir. Bir toprak genel olarak A, E, B, C ve R katmanlarına (horizonlarına) sahip olup, tarımsal üretim ve yetiştiricilik yapılan ve üreticiler tarafından “pulluk katmanı” diğer adıyla “sürüm katmanı” denilen kısım ise “A ve bazen E veya B” horizonlarından oluşur. Bir toprağın yüzeyden itibaren ana materyale kadar olan dikine kesitine “toprak profili”, profil içindeki yatay bölümlerin her birine de “horizon” ismi verilir (Bellitürk, 2017; Bellitürk ve Goldmann Benardete, 2020). Toprak profilinin yapısı Şekil 3’te görülmektedir.



Şekil 3. Toprak profili.

Tarımsal açıdan bitkisel üretim için bir yetiştirme ortamı olan toprak, bitki kökleri için de tutunma aracıdır. Fiziksel bakımdan ise katı zerrelerin arasını bir ağ gibi saran, içerisinde su ve hava dolu gözenekler bulunan kapillar bir sistem olarak kabul edilir. Bu sistemin bir parçası da topraktaki organik madde içeriğidir (Okur, 2021).

Toprak ıslahı çalışmalarında organik gübrelerin mutlaka “gübreleme programlarında” bulunması hem pH düzenleme ve hem de organik maddenin artırılmasına yardımcı olarak toprakların su tutma kapasitelerinin yükseltilmesi açısından oldukça önemlidir (Bellitürk, 2018). Toprakların fiziksel özelliklerini iyileştirme etkisi bulunmayan mineral gübreler, çoğunlukla ithal edilerek ülkemize girip üreticilere satılmaktadır. Ülkemizin tarımsal potansiyeli göz önüne alındığında, organik gübre üretimi açısından oldukça fazla hammadde ve imkanlara sahip olduğumuz açıkça görülmektedir. Organik gübreler bitkilere besin maddesi kaynağı olması yanında, toprağın fiziksel, kimyasal ve biyolojik özellikleri üzerine de önemli etkileri vardır. Vermikompost, organik tarımda kullanılabilirliği tüm dünyada kabul edilen bir organik gübredir.

Azarmi ve ark. (2008), toprağa dekara 1,5 ton vermikompost uygulandığında domates yetiştirilen bir denemesinde toprak fiziksel yapısının olumlu yönde değiştiğini, organik karbon ile N, P, K, Ca, Zn ve Mn miktarlarında artışlar olduğunu belirtmişlerdir.

TOPRAĞIN KİMYASAL ÖZELLİKLERİ İLE TOPRAK ORGANİK MADDESİ ARASINDAKİ İLİŞKİLER

Organik atıklardan elde edilen kompost gibi organik gübreler, toprakların kimyasal özellikleri üzerinde olumlu etkilere sahiptir. Hsieh ve Hsu (1993), çeşitli organik atıkların kompostlanabilme potansiyelini ve bunların C/N oranı, N, P ve K gibi makro ve mikro element içeriklerini araştırmıştır. Arancon ve Edwards (2005) tarafından bildirildiğine göre, az miktarda kullanıldıklarında bile hem toprakların kimyasal özelliklerine olumlu etkiler yapan ve hem de bitkilerin gelişmelerini önemli ölçüde artıran vermikompost gerek çiçekçilikte ve gerekse meyve ve sebze yetiştiriciliğinde etkin bir şekilde kullanılmaktadır.

Organik gübrelerin en önemli faydası, içerdiği yüksek organik madde miktarından ve hümik+fulvik asit oranından dolayı; öncelikle kullanılan kimyasal gübrelerin toprak ve bitkilere yararlılığını artırmasıdır (Büyükliz ve ark., 2023).

Tarım topraklarının yoğun tarımsal uğraşlar neticesinde verimsizleşmesi ile ortaya çıkan en büyük sorunlardan birisi, toprağın kimyasal özelliklerinin başında gelen azalan toprak organik madde içerikleri ile pH değerlerinin düşmesi ile asitleşmesidir. Organik maddece fakir olan topraklara uygulanan kimyasal gübreden yararlanma oranı düşük olmaktadır. Bunu önlemek için, hazırlanacak gübreleme programlarına mutlaka uygun organik gübrelerin (yosun gübresi, mikrobiyal gübreler, solucan gübresi, kompost, hümik asit, yarasa gübresi vs.) ve yeşil gübreleme uygulamasının ilave edilmesi gerekmektedir. Topraklarda organik maddenin artırılması, toprak ıslahının önemli adımlarından birisidir (Bellitürk, 2019).

Sürdürülebilir tarım, toprağı ve çevreyi olumsuz koşullardan korumaya odaklı bir yöntemdir. Toprağı verimli hale getirip küçük alanlardan en yüksek verimin alınması aynı zamanda ekosistemi de olumlu etkileyerek toprağın uzun yıllar kullanılmasına olanak sağlamaktadır. Sebze yetiştiriciliğinde organik gübre kullanılması gerek toprakların kimyasal özelliklerinin iyileştirilmesi ve gerekse çevre sağlığı açısından olduğu kadar sağlıklı beslenme adına da önem taşımaktadır (Bellitürk ve Akgün, 2023).

TOPRAĞIN BİYOLOJİK ÖZELLİKLERİ İLE TOPRAK ORGANİK MADDESİ ARASINDAKİ İLİŞKİLER

Edwards ve Arancon (2004), organik madde, toprak solucanları ve mikroorganizmaların interaksiyonları konusunda çalışmışlardır. Araştırmacılar, organik maddenin parçalanmasını, toprak solucanları tarafından tüketilen organik madde miktarlarının ve toprak solucanlarının besin döngüsünde özellikle karbon ve azot döngüsündeki etkilerini araştırmışlardır.

Vermikompostun tarımda kullanım alanlarına ve önemine dikkat çekmişlerdir. Araştırmacılar, Darwin'in 1881 yılında solucanlar üzerindeki çalışmasından bu yana, solucanların genel olarak agro ekosistemleri ile topraktaki mikroorganizma faaliyetlerini toprak lehine iyileştirdiği konusunda birçok çalışma yapmışlardır.

Organik atıkların solucanlar kullanılarak kompostlanması ile elde edilen ürünün topraklara uygulanması ile başta biyolojik özellikleri olmak üzere yapısı önemli ölçüde düzeltilebilmektedir (Hartenstein ve Mitchell, 1978). Toprakların mikrobiyal yapısı üzerinde kompost ve vermikompost kullanımının oldukça fazla pozitif katkılar sağladığı bilinmektedir. Vermikompost üretimi, organik maddenin biyooksidasyonunu kolaylaştırarak toprak kalitesini ve verimliliğini artırmaktadır (Dominguez ve Edwards, 2010).

Bellitürk (2016)'e göre; organik solucan gübresi tarımsal üretimi artıran ve besin element kayıplarını azaltan yavaş salınım özelliğine sahip olması ve kullanıldığı topraklarda fiziksel, kimyasal, biyolojik ve mikrobiyolojik iyileşmeler sağlaması sebebiyle güvenilir organik bir gübredir.

SONUÇLAR VE ÖNERİLER

Mineral gübre kullanımına bağımlı hale gelen tarım ve peyzaj alanlarında üretim yapan üreticilerin kendi organik gübrelerini yapma imkanları olduğunda, bunu mutlaka hayata gerçekleştirmeleri, organik gübreyi ucuza mal etme anlamında da önemlidir. Hayvansal ve bitkisel kaynaklı organik atıkların mutlak surette geri dönüşümünün özellikle kompost ve/veya vermikompostlama yöntemiyle sağlanması ve tarım-peyzaj alanlarına "organik gübre" olarak kazandırılması ülkemizin gelecek kuşaklara verimli tarım topraklarını, sağlıklı park ve bahçelerini taşıyabilmelerinde oldukça önemlidir. Bu sadece atıklardan organik gübre üretme olarak bilinmemeli, çevreyle dost bir uygulama olarak da görülmelidir.

Sağlıklı bir yaşam tarzının insan yaşamının kalitesini ve uzunluğunu olumlu etkilediği tartışılmaz bir gerçektir. Sağlıklı bir yaşam tarzının elde edilmesinde, beslenmenin rolü büyüktür. Sağlıklı toprakların ve üzerinde yetişecek ürünlerin elde edilebilmesi için, bitkilerin de sağlıklı beslenmeleri gereklidir. Bitkilerin sağlıklı olarak beslenmelerinde organik gübrelerin etkisi çok büyüktür. Tarımsal uygulamalarda gübreleme programları mutlaka organik gübreleri içermelidir. Organik tarım yapılan uygulamalarda zaten sorun yoktur. Ancak geleneksel tarım yapılıyorsa sadece mineral gübre kullanmak yeterli değildir. Sürdürülebilir tarım, ekolojik tarım, biyolojik tarım gözde olma yolunda devam etmektedir. Ancak tarımsal eğitim ve bu tarz

çalışmalardaki akademik deęerlendirmelerin uygulamaya dönmesi ile tarım toprakları üretim hak ettiği deęeri bulacak, gelecek nesillere saęlıklı ürünler ve temiz çevreler bırakılacaktır.

Bunun yanında tarım topraklarında sıklıkla ortaya çıkan azalan organik madde, bozulan pH dengesi, artan kirlenme, verim kayıpları vb. gibi ıslah gerektiren sorunlar da artacak ve üretim maliyetlerine “toprak ıslah maliyetleri” de ilave edilerek tarımdaki kar-zarar dengeleri olumsuz olarak etkilenebilecektir. Organik maddenin azlığı, topraktaki makro ve mikro besin maddelerinin elverişliliğini olumsuz olarak etkilemektedir. Sonuç olarak organik maddenin topraklar için önemi büyük olup, bu durum bitkilerin dengeli beslenmelerinin saęlanması için de elzemdir. Zamanla azalan organik maddenin yeniden topraklara kazandırılması için mutlaka organik gübrelerin de gübreleme programlarında yer almasına önem verilmelidir.

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**COMPARISON EFFECTS OF DIFFERENT ORGANIC FERTILIZERS ON
NUTRITION STATUS OF SPINACH (*spinacia oleracea* L.): THE CASE OF MACRO
ELEMENTS**

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Abstract

Organic food and plants are a splendid driving healthy lifestyle. It gives the higher consumption cost. Therefore, it will be an opportunity for the farmer to grow organic plants such as spinach. This experiment arranged by factorial completely randomized design in pots (2.5 L volume) under controlled conditions aimed to determine the effects of vermicompost (VC), sheep manure (SM) and cow manure (CM) on plant nutrient contents of spinach (*Spinacia oleracea* L.). Only macro elements were evaluated in this study. Five doses (0%, 2%, 4%, 6%, 8%) of VC, SM, CM were incorporated into a uniform soil sample taken from İzmir, and the experiment was completed after 45 days. Organic matter content of CM, SM, and VC was recorded as 71.56%, 25.15%, and 63.10%, respectively. The highest values were obtained from VC concerning N, K, and Mg. On the other hand, P contents reached the highest values at CM. The highest content of Ca was obtained from SM. The results showed that a dose of 4% generally gave remarkable results in plant nutrients. These results indicated that applications of alternative organic fertilizers can improve nutrition status of spinach. As far as we know, this is the first study investigating the positive contribution of the plant to the macro element content by using different organic fertilizer in spinach production.

Keywords: spinach, macro element, vermicompost, sheep manure, cow manure, plant analysis.

Introduction

The world's population is now 8 billion. The world population will be expected to pass 10 billion by 2040. Considering that natural resources used by the fertilizer sector are decreasing gradually, organic fertilizers derived from livestock and plant wastes will be a more important agricultural input in the future. Providing step by step transition to organic fertilizers in spinach growing and even all vegetables and fruit growing will make it possible to protect farmers against price increases of chemical fertilizers in the future due to lack of raw material and to grow healthy products. When considered in terms of their fertility capability, it is seen that agricultural soils contain inadequate amounts of organic matter in Türkiye [1]. Farmers give importance to mineral fertilizers, but they do not give importance to organic fertilizers. Organic fertilizers are one of the main inputs of organic agriculture. First of all, healthy soil is required for a healthy plant [2]. Spinach originated from Central Asia, and it is one of the vegetables widely produced and consumed in almost every region of the world, including our country. In most agricultural production systems, high amounts of nitrogen (N) and phosphorus (P) fertilizers are relied upon to maximize yields, which has directly resulted in numerous environmental problems. Vermicompost is an organic fertilizer whose applicability in organic agriculture is accepted worldwide, and it is also a good soil rehabilitation matter [3,4]. Mineral fertilizers were used extensively in spinach cultivation in Türkiye, but in recent years, it has been reported that tiny amounts of organic fertilizers have been used to spinach growing. Şenlikoğlu examined the effects of different organic materials addition and nitrogenous fertilization on the growth of greenhouse spinach plants (*Spinacia oleracea* L.). He found that mixing soil with an 8% dose of enriched compost increases plant growth [5]. Organic fertilizers, such as farmyard manure, poultry, goat manure, and biofertilizers, can be substituted for inorganic fertilizers in the production of baby spinach [6]. Topcuoğlu and Kütük reported that ammonium nitrate and urea increased the total and physiologically effective oxalic acid content of the spinach more than ammonium sulphate in the first harvest season [7]. Özenç and Şenlikoğlu investigated the effects of compost addition and nitrogen fertilization on the growth of greenhouse spinach plant (*Spinacia oleracea* L.). Their study showed that an 8% dose of enriched compost increases plant growth. They also found that the use of composting products supports fertilization regularly [8]. Zengin has attempted to determine the effects of some nitrogenous fertilizers and barnyard manure on the nitrate accumulation in spinach yield and nitrogen leaching from the soil [9]. Jahanbakhshi and Kheiralipour found that vermicompost

was a better fertilizer than sheep manure due to its more appropriate carbon to nitrogen ratio (C/N), acidity, and salinity [10].

In this research, macro element contents of organic fertilizers such as VC, SM, CM and their effects on the nutrition of spinach which is fertilized chiefly with mineral fertilizers in Türkiye, were analysed and compared with previous studies. In addition, statistical analysis was performed. In this study, it was aimed to determine the effects of VC, SM and CM on the plant nutrient content of spinach (*Spinacia oleracea* L.).

Materials and Methods

Experiment Preparations: The soil samples were collected from 0-30 cm depth. The soil is clay loam texture, neutral (pH: 6.78), slightly salty, low in lime, low in organic matter (1.65%), in N total, in exchangeable Mg low, moderate in available P, moderate in exchangeable K. Spinach is not highly selective in terms of soil requirement. However, the best soils for spinach are clay loams with high organic matter content. The ideal pH value for soil is between 6.0-7.0. Spinach does not like acidic soil [11] (p. 293). Based on this information, the soils used in this experiment were suitable for spinach cultivation (matador variety). In this study, it is very important to choose the soil to be used for the pots. For this reason, it was necessary to use a soil that would not directly affect the research results. Accordingly, the soil used in the experiment had clay loam (CL) texture and care was taken not to adversely affect the test results. Only the low organic matter and low N content of this soil is the general characteristic of many soils in Turkey and is not a negative for the experiment. In this study, three different organic fertilizers (Vermicompost: VC, Cow Manure: CM, and Sheep Manure: SM) in different doses (0%, 2%, 4%, 6%, 8%, volumetrically) were applied to spinach. The experiment was carried out in pots under controlled conditions for 45 days. Factorial (3x5) in a completely randomized pilot trial design with three replications was used in the experiment. For the experiment, 45 plastic pots (2,5 L in volume) were used, and three seeds were sown in each pot. In the experiment setup, pots were fertilized with 150 mg/kg N, 100 mg/kg P, 125 mg/kg at sowing, and then pots were irrigated with distilled water. Growth parameters of the spinach were examined and recorded. Then, N, P, K, Ca, Mg concentrations were investigated. The pot experiment was set up in a greenhouse under controlled temperature and light conditions and continued. Fig 1 explains soil sampling process and preparations of experiment. Fig 2 explains experiment scheme.



Figure 1. Process of preparation for the experiment.

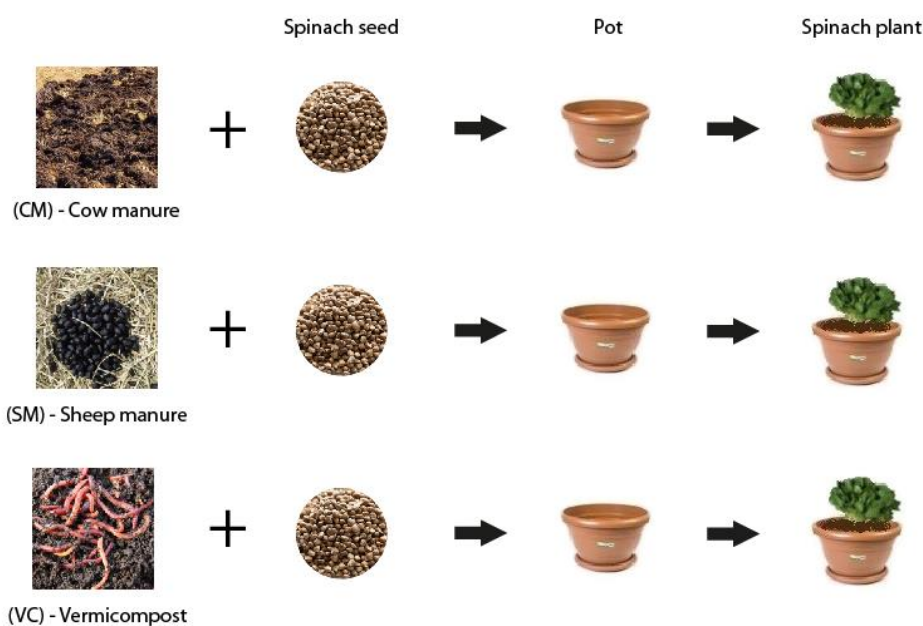


Figure 2. Experiment scheme using cow, sheep and vermicompost manure.

Plant Analysis: Spinach leaves were harvested 45 days after sowing, washed with water until clean, and washed with distilled water at least two times. The leaves were divided into control and four experimental groups and dried under shade for ten days. Then the dried leaves were placed on A4 size envelopes. All samples were put in the oven before analysis for 24 hours at 65°C. The following analysis was performed at dried samples: Total N was measured by the Kjeldahl Method. On the other hand, P, K, Ca and Mg concentrations of spinach samples were determined with ICP-OES (Inductively Coupled Plasma) after wet digestion [12] (pp. 854–855). Effects of CM, CM and VC doses on the growth of spinach are shown in Fig 3.

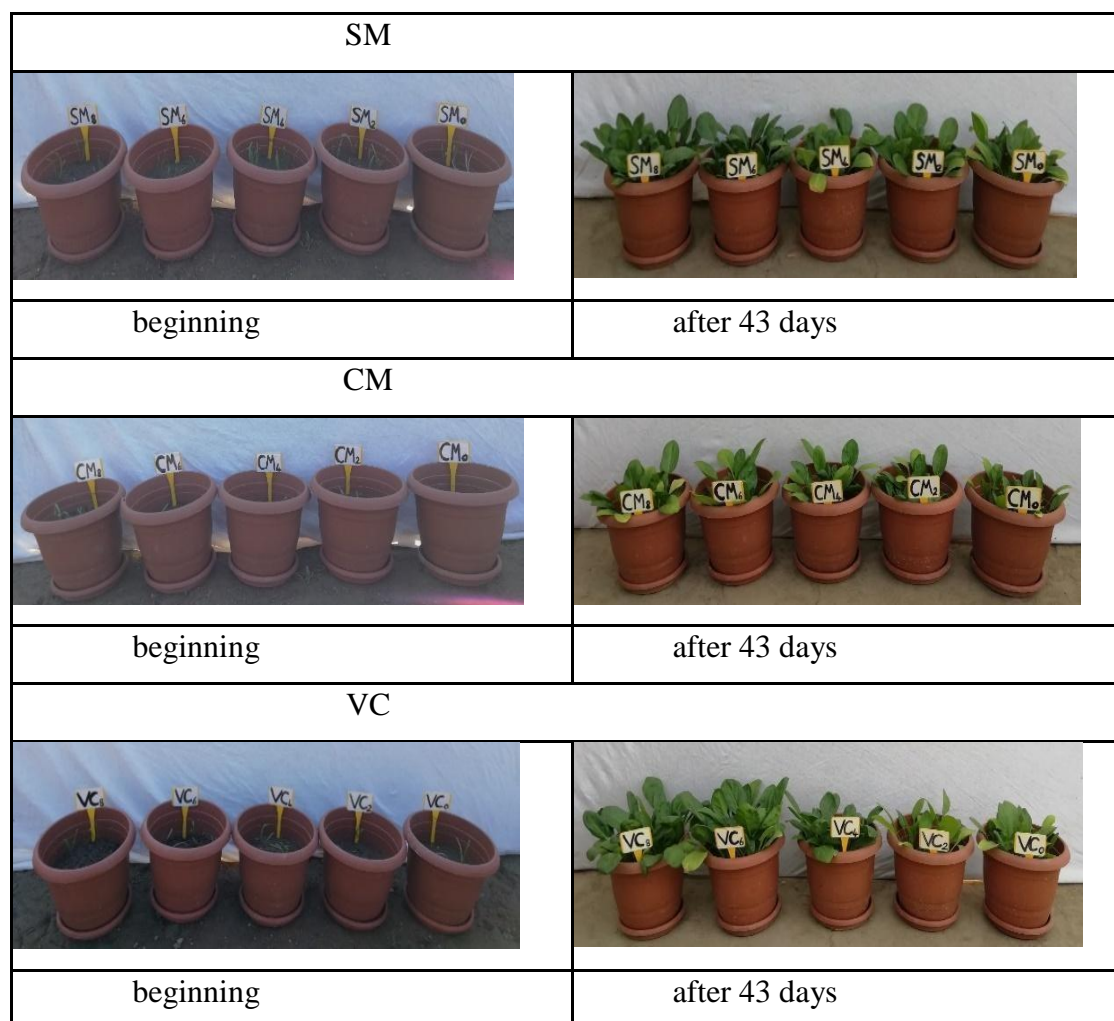


Figure 3. Pots of spinach with treatments of vermicompost, sheep manure, cow manure.

Statistical Data Analysis: Statistical analysis was carried out using JMP 5.0.1. version software. Analysis of variance (ANOVA) was performed, and the significance of the differences between means was tested using Fisher's LSD.

Discussion

Variance analysis results for all elements (N, P, K, Ca and Mg) are given in Table 1. Macro elements concentrations of spinach is presented in Table 2.

Table 1. Results of variance analysis for macro nutrients.

Variation Sources	Elements				
	N	P	K	Ca	Mg
Fertilizer (F)	26.664**	78.580**	6.069*	16.274**	23.164**
Dose (D)	6.422**	0.667ns	6.872**	4.729**	4.656**
F x D	3.888**	3.939**	1.255 ^{ns}	1.792 ^{ns}	7.158**
Significance	ns = not significance, * = significance at the 0.05 level, **= significance at the 0.01 level				

Table 2. Mean values of macro nutrient concentrations (N, P, K, Ca, Mg).

Fertilizers	Doses (%)					Mean
	0	2	4	6	8	
N						
SM	2.563 de	2.847 cde	2.737 cde	3.253 b-e	3.413 bcd	2.963 b
CM	2.563 de	2.743 cde	2.797 cde	2.650 de	2.417 e	2.634 b
VC	2.563 de	3.607 bc	4.640 a	3.993 ab	4.033 ab	3.767 a
Mean	2.563 b	3.066 ab	3.391 a	3.299 a	3.288 a	
LSD (N)	Fertilizer:0.592	Dose: 0.523	Fertilizer x Dose: 0.901			
P						
SM	1.063 ab	1.027 ab	0.910 ab	0.963 ab	0.697 b	0.932 b
CM	1.063 ab	1.297 ab	1.367 a	1.253 ab	1.437 a	1.283 a
VC	1.063 ab	1.083 ab	0.867 ab	0.920 ab	1.103 ab	1.007 b
Mean	1.063	1.136	1.048	1.046	1.079	
LSD	Fertilizer: 0.109	Dose:-	Fertilizer x Dose: 0.639			
K						
SM	5.397	7.350	6.143	7.003	6.357	6.450 ab
CM	5.397	6.123	6.703	5.810	6.163	6.039 b
VC	5.397	8.320	7.407	7.310	6.953	7.077 a
Mean	5.397 b	7.264 a	6.751 a	6.708 a	6.491 a	
LSD	Fertilizer: 0.734	Dose: 1.045	Fertilizer x Dose: -			
Ca						
SM	0.627	0.713	0.790	0.847	0.850	0.765 a
CM	0.627	0.770	0.733	0.703	0.763	0.719 ab
VC	0.627	0.687	0.710	0.680	0.627	0.666 b
Mean	0.627 b	0.723 a	0.744 a	0.743 a	0.747 a	
LSD	Fertilizer:0.065	Dose: 0.094	Fertilizer x Dose:-			
Mg						
SM	0.703 de	0.710 cde	0.647 e	0.813 bcd	0.757 b-e	0.726 b
CM	0.703 de	0.707 de	0.730 b-e	0.670 de	0.657 e	0.693 b
VC	0.703 de	0.770 b-e	1.080 a	0.867 b	0.853 bc	0.855 a
Mean	0.703 b	0.729 b	0.819 a	0.783 ab	0.756 ab	
LSD	Fertilizer: 0.093	Dose: 0.083	Fertilizer x Dose: 0,144			

The comparison of the effects of 3 different organic fertilizers (CM, SM and VC) on the N, P, K, Ca and Mg contents of the spinach plant is shown in Fig 4.

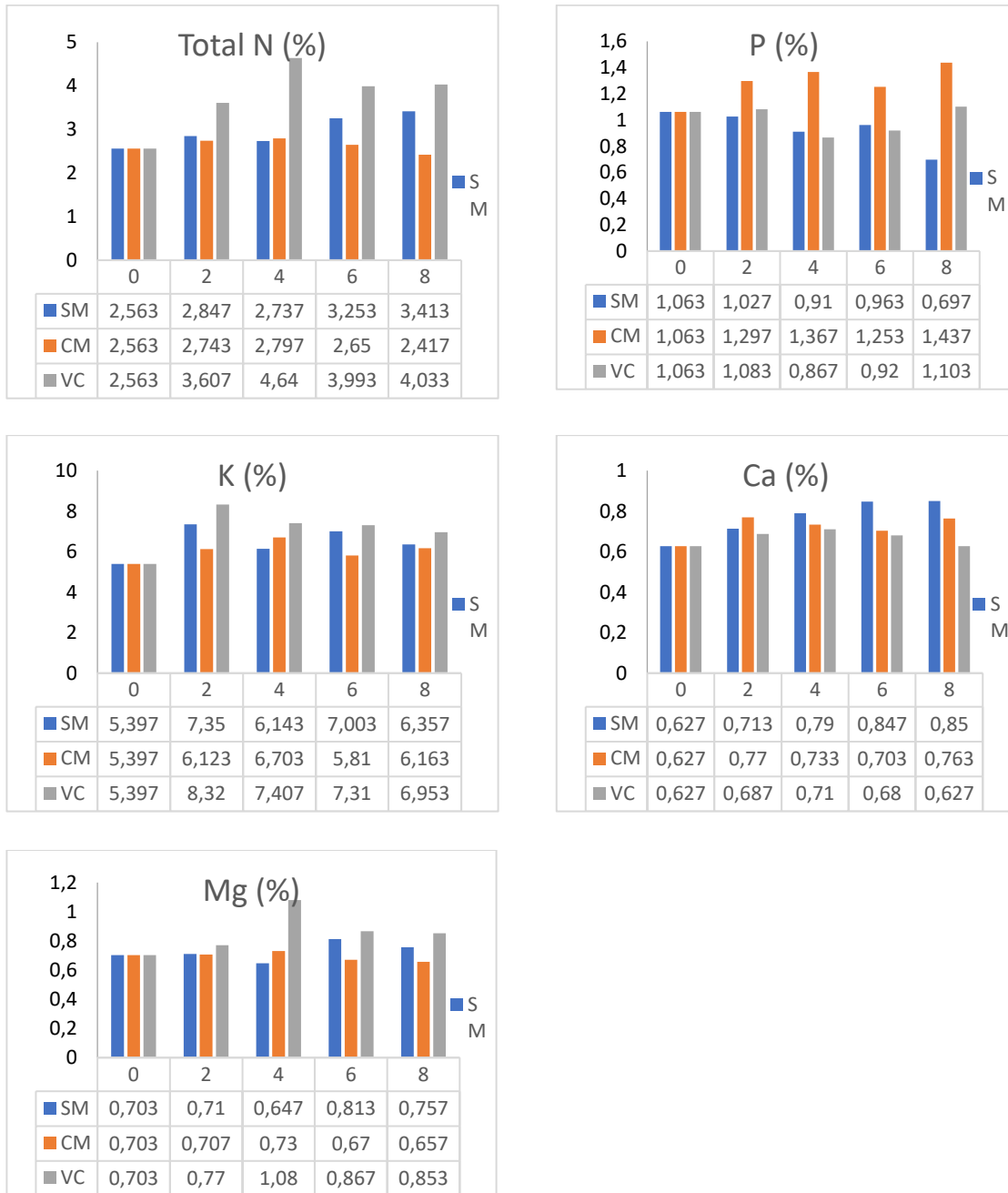


Figure 4. The comparison of the effects of organic fertilizers (CM, SM and VC) on the N, P, K, Ca and Mg contents of the spinach plant.

According to the results of variance analysis, the effect of fertilizers doses and ‘fertilizer x dose’ interactions on the N, P and Mg level were statistically significant at the 1% level ($P < 0.01$). In a study conducted under laboratory conditions in Tekirdağ province, olive pruning wastes were converted as VC with a mixture of farmyard manure using earthworm. It was shown that vermicompost contained sufficient N and rich organic matter [13]. According to this information, VC had a more significant effect on N concentrations in plants when the contained

rich amount of total N. Bellitürk, Hınısli, et al. reported that CM, SM and VC were used to grow curly lettuce. They found that the amount of N in pots with 75 g of the vermicompost was higher than in pots with 25 g of the vermicompost. Therefore, it is similar to this study in terms of the amount of N [1]. Bellitürk and Eryüksel found that the total N content in the onion plant was lowest (5.6%) in the pots treated with 25% VC highest (6.8%) in the pots treated with 75% [14]. Similarly, to this study, the authors stated that total N content increases with increasing VC dose. In many studies has been reported that application of organic vermicompost to soil resulted in increased total N content in the plants. Although VC has been evaluated in several studies, there is still limited information available regarding the influences on plant growth and yield, particularly for greenhouse crops such as spinach [1,15–17]. Bellitürk and Eryüksel reported that the total P content in onion was 4502.4 mg kg⁻¹ at 100% VC dose and 5595.8 mg kg⁻¹ at 75% VC dose [14]. In a study that set out to determine the effect of VC, CM and CM on curly lettuce, Bellitürk, Hınısli, et al. reported that in the P concentration, SM was statistically significant while cow manure was not statistically significant [1]. Bellitürk, Adiloğlu, et al. found that P content was 0.0162% at 0%, while 0.0393 at 7% in pepper [18]. Bellitürk measured P content as 4,70% in CM and VC 0.44% in cow manure+olive pruning waste [19]. Therefore, it seems that the P level could be high in VC, which was obtained from CM by using earthworm. According to the results of variance analysis (Table 1), the effect of fertilizers on K content was statistically significant at the 5% level (P<0.05); the effect of fertilizer doses on potassium content was statistically significant at the 1% level (P<0.01). Bellitürk and Eryüksel found that K value was 77091.8 mg kg⁻¹ at 75% VC rate, 86947,3 mg kg⁻¹ at 25% VC rate and 93357.9 mg kg⁻¹ at 100% VC rate [14]. Bellitürk, Hınısli, et al. reported that K was 4.74% in pots with 25 g of the VC, and the highest K content in curly lettuce was obtained from SM application [1]. Eker stated that the highest Mg, K, and Zn levels were observed in pots fertilized with SM and garbage compost [20]. In another similar study, Azarmi et al. found that the addition of VC at a rate of 1.5 ton da⁻¹ significantly increased contents of soil total organic C, N, P, K, Ca, Zn and Mn [21]. Bellitürk, Hınısli, et al. reported that CM had no impact on the content of Ca. Researchers explained that SM and VC with a dose of 125g had a positive impact on the content of Ca [1]. However, Bellitürk and Eryüksel reported that an inverse proportion between Ca content of onion plant and VC [14]. Çıtak et al. determined that VC showed a significant increase in yield, yield properties, and soil fertility compared to control. They found that VC with a dose of 200 kg was more effective on plant Fe and soil exchangeable Ca concentration. They also found that all treatments showed an increase in pH, E.C., and organic matter values

of soil when compared to control [22]. Bellitürk, Hınısli, et al. demonstrated that the Mg levels were close in all treatments, but it showed fluctuations in CM application [1]. Bellitürk and Eryüksel reported that the content of Mg in onion was decreased, increasing of vermicomposting level [14]. Several studies have indicated an impact of SM, CM and VC on nutrient uptake by plants, and they also noted that better results are obtained by using nutrient-rich fertilizers [1,15,16,23]. Eker stated that different organic fertilizers were studied. The results showed that the most effective results (62%) were obtained at 0%, and the author of this study additionally reported that the best effect on uptake of Mg was recorded at 50% application rate of fertilizer. The addition of VC produced from these different substrates has similarly improved plant growth and yield among a broad spectrum of plant species and cultivars [20]. Demir and Kıran investigated the impact of VC on macro and micronutrients of lettuce under salt stress conditions. Researchers also indicated that the effect of salt stress x VC interaction was statistically significant on N, P, Mg, whereas it was not significant on K and Ca [24]. Kuş studied the effect of different doses of VC on pepper's yield and nutrient content under soilless agricultural systems and reported that P and Mg contents had increased significantly by 2.5% and 5% VC rate. The author also reported that Ca, Fe, and Mn contents were decreased with an increase in the VC rate, whereas K and Cu contents were increased [25]. Çıtak et al. reported that VC with a dose of 200 kg was more effective on Fe content of spinach plant and Ca concentration of soil [22]. Büyükfiliz indicates that Fe, B, and Zn contents were decreased with an increase in the VC rate, while N, P, K, Ca, Mg contents were increased [26].

Conclusion

This study demonstrated that VC, CM and SM had positive effects on the macro element content of the spinach plant. In terms of the N content, VC in this study represented the best contribution of N contents (3.767%) in the spinach plant. When Fig 4 is examined, the highest N (4.64%) and Mg (1.08%) contents in spinach were obtained from 4% application of VC. In terms of the P content, the highest P content was observed at 4% and 8% dose of CM. However, it is concluded that the 4% dose of CM is more suitable economically. In terms of the K content of the plant, the VC was the most effective fertilizer. Fig 4 shows the maximum K content was observed in a 2% dose of vermicompost, 8.32%. Concerning the Ca content of the plant, the SM was most effective when applied at doses 6% and 8%. However, it is concluded that the 4% dose of SM is more suitable economically. Regarding the Mg content of the plant, the use of VC in this study represented the best contribution of Mg contents (0.855%) in the spinach plant (Fig 4). According to research results; the highest content of total N, K, and Mg in spinach was

found in the application of VC; the highest content of P in spinach was obtained in the application of CM, and the highest content of Ca was recorded in the application of SM. The higher values concerning the content of nutrients were generally obtained at a dose of 4%. It was concluded that a dose of 4% is an ideal dose for spinach plants. In addition, this study can serve as a reference source for future studies.

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Conflicts of Interest: The authors declare no competing interest.

Data Availability Statement: The data support the findings of this study are available from the corresponding author upon reasonable request.

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KURŞUNUN AKDOĞMUŞ (gundşeyh) KİLİ (agk-2) İLE ADSORPSİYON KİNETİĞİNİN MODELLENMESİ

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ÖZET

Kurşun insan sağlığı için gerekmeyen ve oldukça yaygın kullanım alanına sahip bir elementtir. Kurşun-asit akümülatörlerde, kablo kılıfında inşaat amacıyla, radyasyondan korunmada ve alaşımlarda kullanılmaktadır. Toz halinde ise pigment, boya, sır, macun, cam ve fonksiyonel seramiklerde kullanılmaktadır. Toksik bir madde olan kurşuna maruz kalan Özellikle kardiyovasküler, hematopoietik, merkezi ve periferik sinir sistemlerine bağlı rahatsızlıklar yaşamaktadırlar. Kurşunun sulu çözeltilerden giderimi için pek çok yöntem bulunmaktadır. Bunlar arasında en etkili olanlardan biriside adsorpsiyon yöntemidir. Adsorpsiyon ucuz, kolay uygulanabilen etkili bir alternatif yöntemdir. Kil ise adsorplayıcı olarak iyi bir seçenektir. Adsorpsiyon işleminde zamanın kritik bir öneme sahip olduğu bilinmektedir. Bu anlamda kinetik çalışmalar yaygın bir şekilde kullanılmaktadır. Bu çalışmada Kurşun (II) iyonlarının Siirt Akdoğmuş (Gundşeyh) kili (AGK-2) ile adsorpsiyon kinetiği incelendi. Çalışma 318 K sıcaklığında gerçekleştirildi. Deney sonuçları adsorpsiyon kinetiğinde en yaygın olarak kullanılan dört kinetik modele uygulandı. Bu modeller, Yalancı-birinci dereceli kinetik model (Pseudo-First Order kinetic Model-PFO), Yalancı ikinci dereceli kinetik model (Pseudo-Second Order kinetic Model-PSO), Elovich ve Weber-Morris (Parçacık içi difüzyon) modelleridir. Regresyon analizi sonucunda, deneysel verilere en uygun modelin PSO olduğu görülmüştür. Bu modele ait sabitler, $q_e=25.125$ (mgg^{-1}), $k_2=0.0289$ ($\text{gmg}^{-1}.\text{dk}^{-1}$) ve $R^2=1$ olarak hesaplandı. Regresyon katsayısının 1'e eşit çıkması ender olarak görülmektedir. Bu da deneysel verilerin teoriyle bire bir uyduğunu göstermektedir.

Anahtar kelimeler: Kurşun, Adsorpsiyon, Adsorpsiyon Kinetiği, Kil, Yalancı-ikinci dereceli kinetik model

**MODELING THE ADSORPTION KINETICS OF LEAD WITH AKDOGMUS-
(gundseyh) (agk-2) CLAY**

ABSTRACT

Lead is an element that is not required for human health and is widely used. It is used in lead-acid batteries, cable sheathing for construction purposes, radiation protection and alloys. In powder form, it is used in pigment, paint, glaze, paste, glass and functional ceramics. People exposed to lead, a toxic substance, experience disorders related to cardiovascular, hematopoietic, central and peripheral nervous systems. There are many methods for removing lead from aqueous solutions. One of the most effective among these is the adsorption method. Adsorption is a cheap, easy-to-apply and effective alternative method. Clay is a good option as an adsorbent. It is known that time is of critical importance in the adsorption process. In this sense, kinetic studies are widely used. In this study, the adsorption kinetics of Lead (II) ions with Siirt Akdoğmuş (Gundseyh) clay (AGK-2) was examined. The study was carried out at a temperature of 318 K. The experimental results were applied to the four most commonly used kinetic models in adsorption kinetics. These models are Pseudo-First Order kinetic Model (PFO), Pseudo-Second Order kinetic Model (PSO), Elovich and Weber-Morris (Intraparticle diffusion) models. As a result of the regression analysis, it was seen that PSO was the model that best suited the experimental data. The constants of this model were calculated as $q_e = 25.125$ (mgg^{-1}), $k_2 = 0.0289$ ($\text{gmg}^{-1} \cdot \text{dk}^{-1}$) and $R^2 = 1$. It is rare for the regression coefficient to be equal to 1. This shows that the experimental data exactly agree with the theory.

Keywords: Lead, Adsorption, Adsorption Kinetics, Clay, Pseudo-quadratic kinetic model

GİRİŞ

Son dönemlerde su kirliliği küresel sorun haline gelmiştir. Buna bağlı olarak ağır metal kirliliği de en ciddi sorunlar arasında kabul edilmektedir (Canpolat, Altunkaynak ve Yavuz 2022). Artan nüfus, küresel iklim değişikliği ve endüstriyel ürünlerin artarak üretimi, önemli ölçüde su kaynaklarının kontrolsüz kullanılmasına buna bağlı olarak ağır metal iyonları, organik kirleticiler, petrol ve türevlerinin kirlenmesine neden olmaktadır (Neskoromnaya, ve diğerleri 2022). Birçok yaşam biçimi üzerinde zararlı etkiye sahip olan ağır metallerin giderimi, bilim insanları açısından özel bir önem arz etmektedir (Onursal, Dal, ve diğerleri 2020). Bunlardan Bakır, kurşun, cıva, nikel, krom ve çinko olmak üzere genellikle çeşitli üretim süreçlerinden geçerken atık su deşarjı yoluyla su sistemlerine girerek doğaya ve canlılara özellikle de insanlara zarar vermektedirler (M. C. Dal, N. Onursal, ve diğerleri 2021). Çünkü bu metaller biyolojik olarak parçalanmazlar. Bu nedenle canlı dokularda özellikle de insan vücudunda birikme eğilimindedirler. Böylelikle çeşitli hastalıklara ve merkezi sinir sistemi hasarı gibi önemli fizyolojik bozukluklar meydana getirebilirler (Alghamdi, ve diğerleri 2020). Normalde su da çok düşük konsantrasyonlarda dahi bulunmayan zararlı ağır metallerden birisi de kurşundur. Kurşunun atom numarası 82 ve atom ağırlığı $207,2 \text{ g mol}^{-1}$ dir. Kurşun doğada çok nadir bulunan fakat geniş bir coğrafyaya sahip olan ağır metaldir. Atık sularda en yaygın olarak kurşun kirliliğine neden olan faktörler, petrol rafinerileri, metal endüstrileri, boya üretim endüstrileri, pil fabrikaları, akümülatörler ve patlayıcı endüstrileri olarak sayılabilir (Ekmekyapar Torun ve Kısacıkoglu 2023). Bunun dışında Kurşun, kâğıt yapımında, kurşun-asit pillerin üretiminde, tekstilde, silah yapımında ve birçok malzeme üretiminde de kullanılmaktadır (Onursal, Altunkaynak, ve diğerleri 2023), ((Onursal, Kul ve Yavuz,2019). Ayrıca kablo kılıfında inşaat amacıyla, radyasyondan korunmada ve alaşımlarda kullanılmaktadır. Toz halinde ise pigment, boya, sır, macun, cam ve fonksiyonel seramiklerde kullanılmaktadır (Abdulla 2020).

Kurşun, insan sağlığı açısından gerekli olmayan bir element olup düşük erime noktasına sahip ve oldukça yumuşaktır. İnsanlarda kurşuna maruz kalma durumları söz konusudur. Özellikle kurşun ile lehimlenmiş kutularda saklanan yiyecekler ve kurşun ile sırlanmış çömlükler de dahil olmak üzere temel olarak yiyecek ve içecekler yoluyla oluşmaktadır. Yapılan çalışmalara göre sanayileşmiş ülkelerde mevcut günlük alımlar 8-282 μg aralığındadır. Ortalama günlük alım ise 100 μg 'dan daha az miktardadır (Abdulla 2020). Toksik özelliğe sahip olan kurşun, vücuttaki birçok organ sistemini olumsuz etkilemektedir. Kardiyovasküler, hematopoietik ve özellikle merkezi ve periferik sinir sistemleri sıklıkla etkilenmektedir. Ayrıca böbrekleri, karaciğeri ve

üreme sistemini, kemikteki mineral metabolizmasını etkilediği bulunmuştur. Meslekleri gereği kurşuna maruz kalan kişilerde ise anemi ve kan basıncında artış gözlenir. Dahası bebekler ve çocuklar kurşun toksisitesine karşı daha savunmasızdırlar. Bunlar kurşuna maruz kaldıkları zaman, (Beyin hastalığı, hasarı yâda arızası anlamına gelen) ensefalopati sıklıkla görülmektedir. İnsanlarda kurşuna maruz kalmayla ilgili sorunlar, kurşunlu benzinin ortadan kaldırılması ve daha iyi çevresel ve mesleki izlemeler sayesinde, son yıllarda daha ciddi ele alınmaya başlanmıştır (Abdulla 2020). Kurşunun çözüldüğüden uzaklaştırılmasına yönelik çokça yöntem bulunmaktadır. Bunlar arasında, kimyasal çökeltme, elektroliz, biyoteknoloji, elektrodiyaliz ve adsorpsiyon sayılabilir. Bunlar arasında adsorpsiyon yöntemi, düşük maliyet, basit işletme ve geniş hammadde kaynağı avantajlarından dolayı en yaygın kullanılanıdır. (Li, ve diğerleri 2023 15(10), 1857). Ağır metallere kirlenmiş alanlar, iyileştirilmesi en zor alanlardan biri olarak kabul edilir. Bu nedenle bu konuda araştırmalar hızla devam etmektedir (Usman, ve diğerleri 2020). Bu çalışmanın ana temasını kirlenmiş alanların ağır metalin giderimi oluşturmaktadır.

Ağır Metaller

Ağır metaller, yer kabuğunda doğal olarak bulunmaktadır. Periyodik tabloda önemli yer tutan ağır metaller yüksek özkütle ve atom kütlesine sahiptirler. Bu metalik olan elementler, oldukça düşük maruz kalma seviyelerinde dahi çoklu organ hasarına neden oldukları bilinen, toksik maddeler olarak belirtilmektedirler. Uluslararası Kanser Araştırma Ajansı ve ABD Çevre Koruma Ajansı'na göre (the U.S. Environmental Protection Agency (EPA), and the International Agency for Research on Cancer (IARC) insanlar için kanserojen (bilinen veya olma ihtimali olan) olarak sınıflandırılabilir (Tchounwou, ve diğerleri 2012; 101).

Kil

Doğal kil mineralleri, geniş yüzey alanları, değişim kapasiteleri, büyük katalitik destekleri ve düşük maliyetleri nedeniyle en çok tercih edilen doğası gereği renksiz bir malzeme sınıfıdır (Sdiri , ve diğerleri 2016). Kayaç anlamı taşıyan kilin, boyutunun birkaç nanometreden mikrometreye kadar değiştiği belirtilmiştir. (Wang ve Wang 2022). Bazı kaynaklara göre ise, tanecik boyutu 4 µm den daha küçük olan taneciklere kil denmektedir (Aird 2019) Kimya ve mineraloji açısından oldukça önemli olan kil çok çeşitli şekillerde kullanılmışlardır. Eski dönemlerde çamaşır ağartıcı olarak kullanılmış olan kil bugün hala seramik yapımında, ilaç sanayinde ve resim ile boya malzemesinde kullanılmaktadır (Onursal, Dal, ve diğerleri 2020)

Adsorpsiyon

Adsorpsiyon, farklı fazlarda bulunan sıvı ya da gaz moleküllerinin katı ya da sıvı fazdaki maddelerin yüzeyine tutunması işlevidir (M. C. Dal, N. Onursal, ve diğçerleri 2021). Adsorpsiyon kinetiđi konusunda yapılan çalıřmalardan en çok kullanılanlar, Lagergren (Yalancı Birinci Dereceden Hız Denklemi-PFO), Ho ve McKay'ın (İkinci Dereceden Hız Denklemi-PSO), Parçacık İçi Difüzyon Modeli olan (Weber-Morris difüzyon modeli) ve Elovich kinetik modelleridir. Bunlara ait denklemler ise ařađıdaki řekilde verilebilir.

Tablo 1. Adsorpsiyon Kinetik Modelleri

Kinetik Modeller	Denklem	Açıklamalar	Kaynak
Lagergren (PFO)	$\log(q_e - q_t) = \log q_e - k_1 t$	Yalancı birinci dereceden kinetik model, adsorbanların sorpsiyon bölgelerinin doluluk oranı ile boş alanların sayısı arasındaki ilişkiyi açıklar. Burada k_1 , adsorpsiyonun birinci dereceden hız sabitidir; q_e ise, dengede adsorbe edilen madde miktarı ve q_t , t Süre sonunda adsorbe edilen madde miktarını ifade etmektedir	(Edet ve Ifelebuegu 2020) (Onursal, 2022)
Ho-MacKay (PSO)	$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \left(\frac{1}{q_e}\right) t$	Bu model geliştirilen kinetik modeldir österilen ifade adsorpsiyon kapasitesinin uanla nasıl değiştiğini göstermektedir. urada q_t ve q_e sırasıyla dengede ve t uanında (dakika) adsorbe edilen madde iktarlarıdır. ve k_2 , yalancı ikinci dereceden z sabitidir (g/mg/dak).	(Dal ve Onursal, 2023)
Elovich	$q_t = \frac{1}{\beta} (\ln \alpha \beta) + \frac{1}{\beta} \ln t$	Bu model katı yüzeydeki adsorpsiyon süreci hakkında bilgi verir. Bu model aynı zamanda Roginsky ve Zeldovich tarafından geliştirilen model olarak da literatürde yerini almış ve denklem olarak formüle edilmiştir. Burada α , başlangıçtaki adsorpsiyon hızıdır (mg/g/dak) ve β , yüzey kaplamasının boyutu ve kemisorpsiyon için aktivasyon enerjisi (g/mg) ile ilgilidir.	(Buldağ ve Yavuz 2023)
Weber-Morris Kinetik Modeli	$q_t = k_{WM} \sqrt{t} + C$	Partikül içi difüzyon olayını incelemek amacıyla WeberMorris modeli tercih edilmiştir. Bu modelde sınır tabaka direnci, çözelti adsorpsiyonun da ki parametrelerden denge, hız ve bunlara bağlı olarak temas süresine etki etmektedir. Burada q_t dengede ve t zamanında (dakika) adsorbe edilen madde miktarlarıdır. k_{WM} ise, IPD hız sabitidir (mg/(g min ^{1/2}), C denklem sabitidir (mg/g).	(M. C. Dal, N. Onursal, ve diğerleri 2021)

MATERYAL VE METOT

Adsorplayıcının Hazırlanması

Bu çalışmada, adsorplayıcı olarak kullanılan kil (AGK-2), Siirt ili Akdoğmuş (Gundşeyh) köyünden yaklaşık 1,5- 2 km mesafedeki bölgeden temin edilmiştir. Kil 15 gün boyunca kurutulmaya bırakılmıştır. Öğütücüde öğütüldükten sonra toz halindeki kil 120 µm'nin altındaki elek ile elenerek hazır hale getirilmiştir.

Metal İyon Çözeltisinin Hazırlanması

Çalışmada kullanılmak üzere stok çözelti olarak 1000 (mgL⁻¹) derişime sahip Pb²⁺ iyon çözeltisi hazırlanmıştır. Merck marka Pb (II) nitrat [Pb (NO₃)₂] ile distile su kullanılarak değişik konsantrasyonlara sahip Pb²⁺ çözeltileri hazırlanmıştır.

Kinetik Deney Çalışma Usulü

Çalışma Memmert marka WNB 14 model ısıtıcılı çalkalamalı su banyosunda 45 °C (318 K) sıcaklıkta gerçekleştirilmiştir. Ön deneylerde 5 saatte geldiği görüldüğü için, esas deneyde kinetik çalışma 5 saatte sona erdirilmiştir.

BULGULAR

XRF Analizi

Kilin karakterizasyonu yapılmış olup, kilin kimyasal bileşimi, XRF analizi verilerine göre; SiO₂ değeri %39,2, Al₂O₃ değeri %10,5 ve CaO değeri ise 13,9 olarak ölçülmüştür. Burada ikinci sıradaki değerin, CaO' dan büyük olması beklenen değerdir. Ancak CAO nun büyük olması kildeki kalsit miktarının fazla olduğu anlamına gelmektedir (Onursal, Siirt Akdoğmuş-2(Gundşeyh-2) Kili ile Cu (I) Adsorpsiyonunda İzoterm Modellerinin Karşılaştırılması 2023).

XRD Analizi

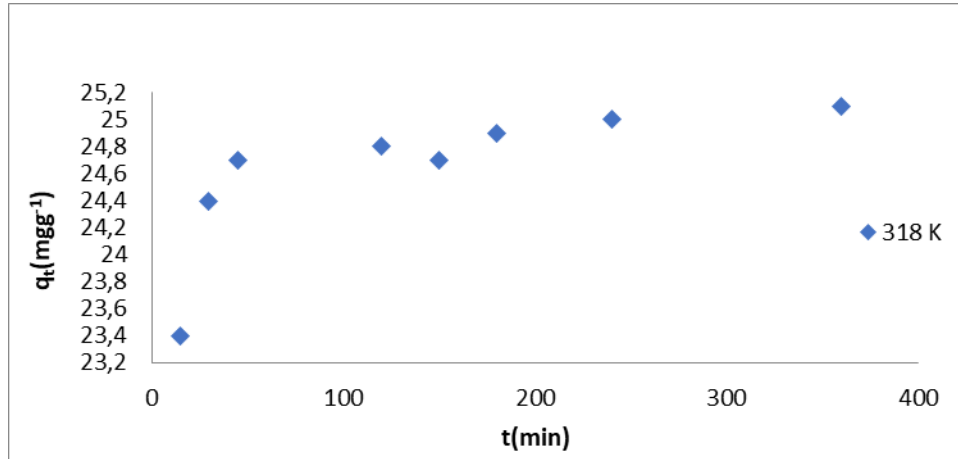
Cu-X ışın tüplü Panalytical X'Pert Powder XRD analiz cihazı ile yapılmış olup, tüm kayaç analizi verilerine göre mixed tipli kil olduğu anlaşılmıştır. (Onursal, Siirt Akdoğmuş-2(Gundşeyh-2) Kili ile Cu (I) Adsorpsiyonunda İzoterm Modellerinin Karşılaştırılması 2023).

Adsorpsiyon Deneyi

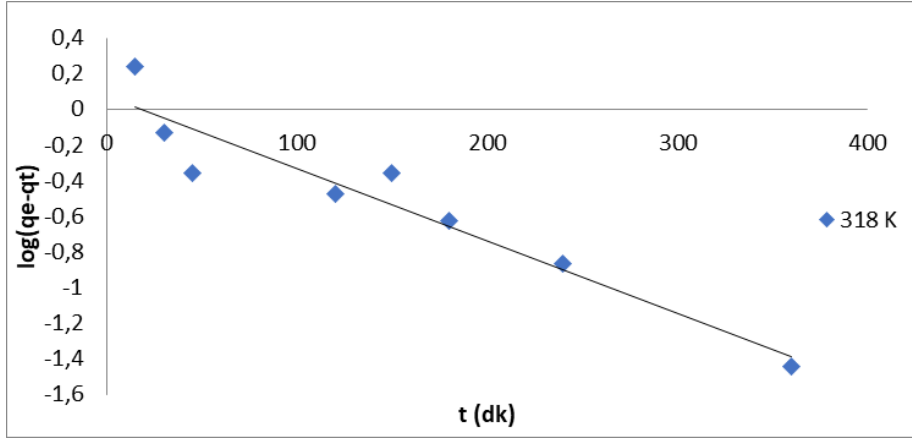
Adsorpsiyon deneyi tek grupta, kinetik olarak yapıldı. Deneyde 1'er g lık illerin üzerine ağır metal çözeltileri, 25 ml olacak şekilde bırakılmıştır. Isıtıcı çalkalayıcıda uygun zaman dilimlerinde çalkalandıktan sonra katı ve sıvı faza ayrılması için 20'şer dakika santrifüj edilmiştir. Akabinde kalan kil ile çözelti ayrıştırıldıktan sonra AAS cihazında analiz edilmiştir. Adsorplanan miktarlar ise aşağıdaki bağıntı kullanılarak hesaplanmıştır.

$$q = \frac{(C_i - C_e) \cdot V}{m}$$

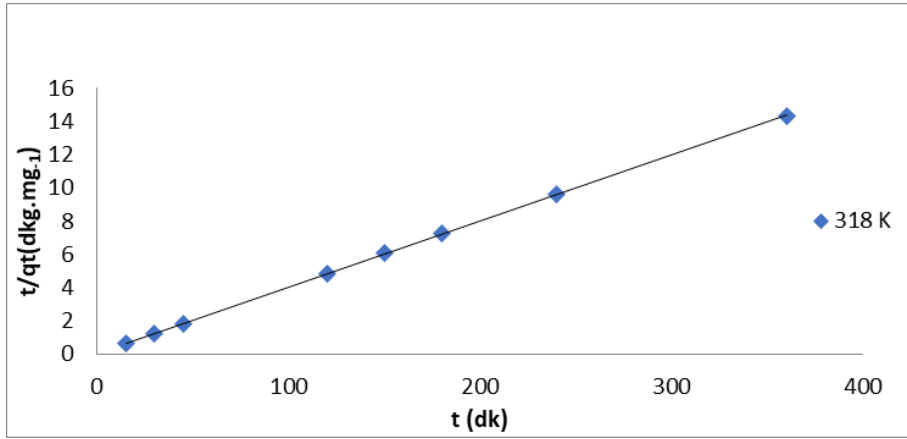
Bağıntıdaki C_i ile C_e (mgL^{-1}) başlangıç ve denge konsantrasyonlarını ifade etmektedirler. V (L) metalin çözelti hacmini m (g) ise alınan kil miktarını göstermektedir. Dengeye ulaşım süresini belirlemek için 15 ile 360 dakika saatleri arasında çalkalama işlemi yapılmıştır. Elde edilen veriler AAS ile ölçülmüş olup, elde edilen veriler ışığında Pb^{2+} çözeltilisinin doyumluğa ulaştığı süre belirlenmiştir. Yapılan deneysel çalışmalar, yalancı-birinci dereceli kinetik model, yalancı-ikinci dereceli kinetik model, Elovich ve Weber-Morris kinetik modellerine uygulandı. Oluşturulan grafiklerden elde edilen veriler regresyon analizine uygulanarak en küçük kareler yöntemi kullanılmıştır. Sonuçlar tablo 2' de verilmiştir.



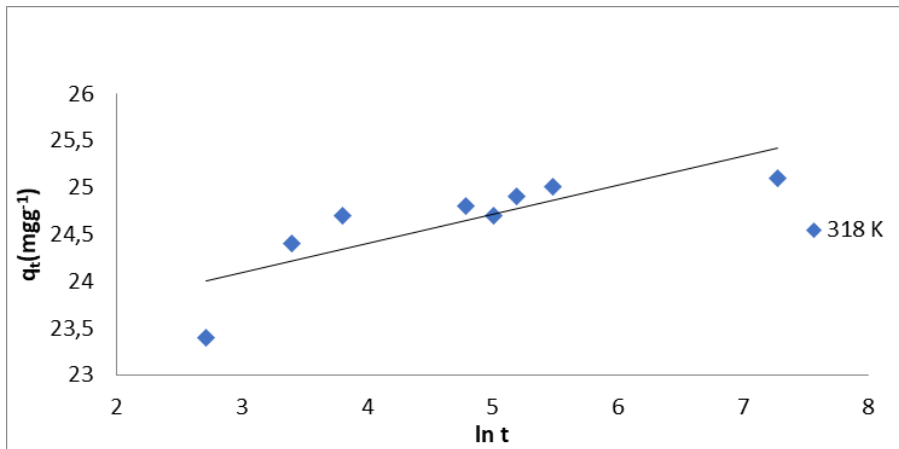
Şekil 1. Pb (II)' nin 318 K sıcaklığında AGK-2 kili ile kinetik grafiği.



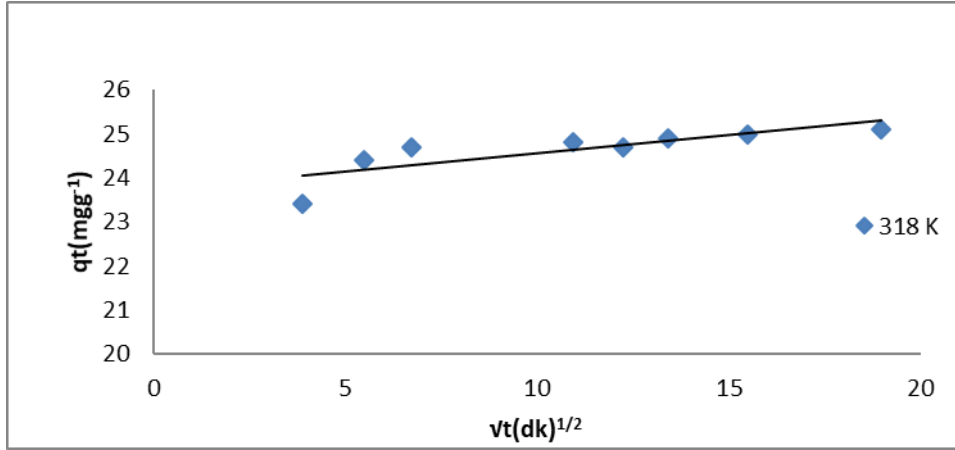
Şekil 2. Pb (II)' nin 318 K sıcaklığında AKG -2 Kili ile Yalancı Birinci dereceli kinetik modeli grafiği.



Şekil 3. Pb (II)' nin 318 K sıcaklığında AKG -2 Kili ile Yalancı İkinci dereceli kinetik modeli grafiği.



Şekil 4. Pb (II)' nin 318 K sıcaklığında AKG -2 Kili Elovich grafiği.



Şekil 5. Pb (II)' nin 318 K sıcaklığında AKG -2 Kili Weber-Morris grafiği

Tablo 2. Adsorpsiyon Kinetik Deneyinden elde edilen sabitler

Pseudo - First Order (Lagergren) Denklemi					Pseudo - Second Order (Ho McKay) Denklemi			
(K)	Doğru denklemi	R ²	k ₁	q _m	Doğru denklemi	R ²	k ₂	q _e
31	y = -	0.908	0.004	1.078	y=	1	0.0289	25.125
8	0.0041x+0.0751	5	1		0.398x+0.0548			
Weber- Morris (İntrapartikül Difüzyon) Modeli					Elovich Modeli			
Doğru denklemi	R ²	k _{WM}	C		Doğru denklemi	R ²	β	α
y=0.0923x-	0.954	0.092	0.047		y=0.6389x-2.009	0.978	1.565	0.0275
0.0476	5	3	6		7			

SONUÇ VE TARTIŞMA

Kurşun hem üretimi hem de tüketimi esnasında çevreyi çok kirleten ve en zararlı ağır metaller arasında başı çeken bir elementtir. Kurşunun kirletici ortamlardan giderilmesi için adsorpsiyon, ucuz ve etkili olması nedeniyle iyi bir alternatiftir. Adsorpsiyon kinetiği bu konuda yapılan çalışmaların bilimsel izdüşümüdür.

Bu çalışmada; Siirt ili Akdoğmuş (Gundşeyh) köyünden alınan kil, adsorplayıcı olarak kullanıldı. 318 K sıcaklığında gerçekleştirilen adsorpsiyon deneyinde Pb (II)'nin kinetik davranışı incelendi. Deneyden elde edilen veriler, en yaygın olarak kullanılan dört kinetik modele (yalancı-birinci dereceli kinetik model, yalancı ikinci-dereceli kinetik model, Weber-Morris ve Elovich modeli) uygulandı. En küçük kareler yönteminin regresyon yöntemi olarak

kullanıldığı çalışmada yalancı-ikinci dereceli kinetik modelin deneysel verilere en çok uyumlu model olduğu ($R^2=1$) görüldü. q_e değeri 25.125 mgg^{-1} olarak ve k_2 değeri 0.289 olarak bulundu. Sonuç olarak Siirt AGK-2 kilinin orta derecede bir kapasiteye sahip olduğu ve yalancı-ikinci dereceli kinetik modele uyduğu için Pb (II) ile kimyasal adsorpsiyon yaptığı değerlendirilmektedir.

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**A CASE REPORT: PULMONARY ARTERY DISSECTION IN A YOUNG PATIENT
WITH PULMONARY HYPERTENSION**

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Introduction

Pulmonary artery dissection is a scarce and fatal condition. It is usually associated with pulmonary artery aneurysm due to pulmonary hypertension. Most diagnoses are made at autopsy because of the high mortality rate. The aim is to raise awareness of this life-threatening condition, alongside other emerging pathologies associated with chest pain and back pain.

Figure 1: Enlarged Pulmonary Artery



Case:

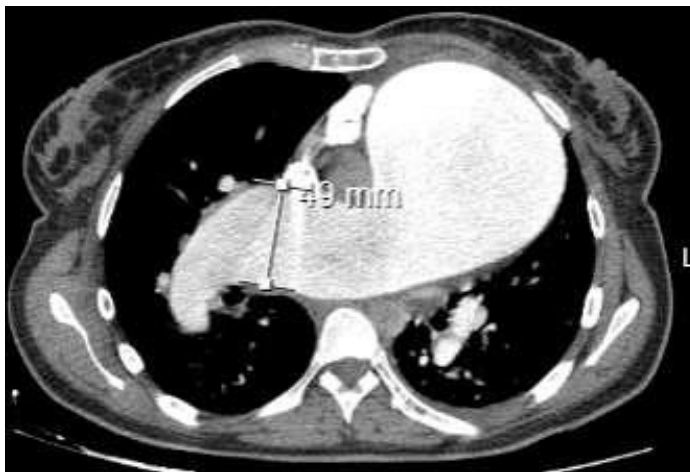
A 37-year-old woman suffering from a "cold" and back pain for 2 days duration was admitted to the emergency department. Her medical history includes pulmonary arterial hypertension for 8 years. She and her husband stated they'd had similar symptoms due to a 'cold'. She had a sore throat, chest pain, and back pain. Physical examination revealed decreased lung sounds in the left base, ecchymosis due to cupping therapy on her back (for her cold), and normal oropharynx. Her blood pressure was 85/50 mmHg, which responded well to normal saline infusion. Heart

rate was 101/min and oxygen saturation was 92%. The patient immediately underwent PA chest radiography (figure 1). The ECG showed T wave inversions in leads v1-v4, D3, and aVF (figure 2).

Figure 2: EKG



Figure 3: Pulmonary Artery Dissection



Enlarged right pulmonary artery

Laboratory results showed that cardiac troponins were within normal limits and CRP was 76. Arterial blood gas was consistent with respiratory alkalosis (pH:7.5; pO₂:52, pCO₂:25). A CT angiography of the pulmonary artery was performed for further evaluation. The CT scan showed an enlarged main pulmonary artery with a diameter of 100 mm and a dissection site of 17 mm in length (figure 3,4,5). Emergency cardiovascular surgery and cardiology consultations were arranged. Unfortunately, the patient suffered a sudden cardiac arrest while under observation in the emergency department and died.

Figure 4: Pulmonary Artery Dissection

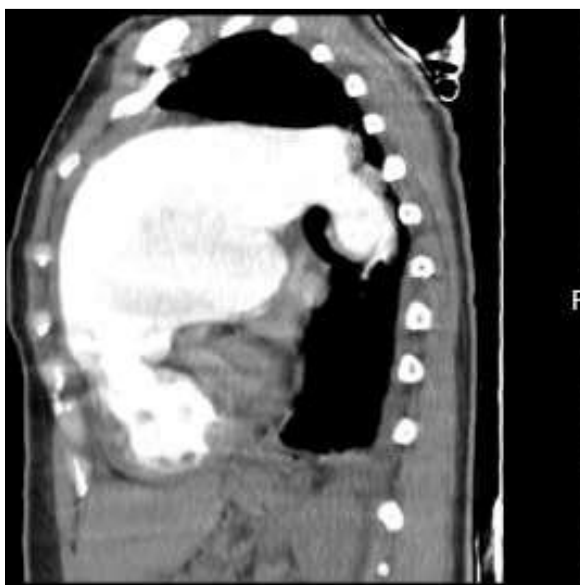


Enlarged pulmonary artery and dissection site

Conclusion

A review of the literature shows that only a few dozen patients with pulmonary artery dissection have survived since it was first described in 1842. This case reminds us that we should consider pulmonary artery pathology alongside other life-threatening diagnoses (acute coronary symptoms, aortic dissection, etc.) when evaluating a patient with chest or back pain. Also, considering that our patient waited for 2 long days before coming to the emergency department, it would be appropriate to work on raising awareness among these high-risk patients with pulmonary hypertension disease. Early surgical intervention can be life-saving for these patients.

Figure 5: Pulmonary Artery Dissection



Enlarged Pulmonary Trunk (sagittal view)

THE GENETICS OF OBSESSIVE-COMPULSIVE DISORDER

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ABSTRACT

Obsessive-compulsive disorder (OCD) is a common, chronic condition characterized by unwanted and distressing thoughts (obsessions) and repetitive behaviors (compulsions). It is an inherited and multifactorial disease contributed by both common and rare features. OCD is ranked by the World Health Organization as one of the ten disorders that most severely impair life quality. Even though it's a routine condition with identical symptom dimensions; each patients symptoms, level of insight, level of comorbidity and genetic history must be evaluated individually. Cognitive behavioral therapy along with selective serotonin reuptake studies (SSRIs), are recommended treatments for OCD. In this study, the genetic background of OCD have been summarized, and recent studies have been highlighted. It focused on the genes such as dopamine receptor D2 (DRD2-TaqIA), catechol-O methyltransferase (COMT), dopamine receptor D3 (DRD3), monoamine oxidase (MAO), dopamine receptor D4 (DRD4), serotonin 5-hidroksitriptamin (5HT2A), 5-HTT (SLC6A4). It also focused on several promising areas of research that could help understand more about the genetic roots and pathophysiology of OCD. In essence, this review aims to provide an overview of OCD, encompassing the latest developments in genetic research, and an outlook on the fields potential future directions.

INTRODUCTION

The increased incidence of Obsessive Compulsive Disorder (OCD), or Obsessive Compulsive Neurosis as it was once known, is a common pigment and formation that can be observed across a wide social spectrum and across cultures. The origin of 'obsession'; It was based on the Latin word "obsidere" meaning to worry or not to give peace. In English, what happened in the seventh century began to be used to mean 'unchanging thoughts'. The use of psychoanalysis literature began when Freud talked about "obsessive neurosis" in 1894. Freud identified the internal thoughts that arise from the obsessional neurotic mind and the elements that are replaced in order to prevent them. Later, new definitions were made in the psychology and psychiatry literature and the name "obsessive compulsive disorder (OCD)" began to be used more frequently instead of obsessional neurosis. Obsessions; Feelings and thoughts that come to every individual repetitively, that disturb him/her and that he cannot get out of his mind despite all his efforts, are imaginary images that could come true. Obsessions, which often seem meaningless to the individual, can appear on various themes. The most common details are obsessions; They can be listed as contamination obsessions, aggression obsessions, obsessions related to order and symmetry, and sexual obsessions. Compulsions, on the other hand, may be used to lessen the anxiety and distress brought on by these thoughts. These rituals, which can be very damaging to one's functioning, can be either private and personal or they can involve others. They serve as a counterbalance to the ego-dystonic feelings caused by the obsessional thoughts. (1) Compulsion compulsions can be listed as cleaning compulsions, control compulsions, mental compulsions, and symmetrical compulsions. OCD affects 3.3 million and 1 million children and adolescents in the United States. The disorder first appears in childhood, adolescence, and early adulthood. Among the ten most disabling disorders affecting people, OCD is ranked by the World Health Organization (WHO) as number 36.(2) It has been announced that many famous people have OCD. Leonardo Dicaprio, David Beckham, Megan Fox, Frank Sinatra, Donald Trump are some of these names. Compared to the general population, OCD patients have a significantly higher risk of dying from natural or unnatural causes (mortality risk ratios = 1.68 and 2.61, respectively; (3) Similarly, another review found that a significant percentage of OCD patients had suicidal ideation and that the mean lifetime rate of suicide attempts was 14.2%. (4) Suicide deaths have been the subject of two sizable population-based Swedish studies with long-term follow-ups. (5)

Although the cause is not fully understood, research has shown that biological and environmental factors may be associated with OCD. Some environmental stressors can trigger

OCD. Certain environmental factors can worsen this condition in a person. These; It could be abuse, life changes, illness, death of a loved one, changes or problems with work or school, and relationship concerns. Although it is not due to chance that individuals with OCD also have various tics, scientific findings have been demonstrated as evidence. Obsessive Compulsive Disorder (OCD) is a disorder that needs to be treated. Before treatment, it is necessary to determine whether the current situation is caused by environmental factors or biological genetic factors. The brain is a complex structure. There are billions of nerve cells called neurons that are needed for the normal functioning of the body. Neurons communicate through electrical signals. Chemicals called neurotransmitters help transmit these signals from neuron to neuron. Research has identified a link between decreased levels of the neurotransmitter called serotonin and the development of OCD. There is also evidence that serotonin imbalance is passed from parent to child. This is an indication that obsessive-compulsive disorder (OCD) may be genetic. Additionally, certain areas of the brain are affected by serotonin imbalance, leading to OCD. This problem appears to be related to brain pathways that are connected to areas of the brain involved in common sense and planning, and areas that filter messages involving bodily movements. The effectiveness of serotonin reuptake inhibitors on obsessive-compulsive symptoms and the fact that mCPP (methyl chloro phenyl piperazine) causes obsessive-compulsive symptoms are considered indicators that there may be dysfunction in serotonergic pathways.

Pharmacological, psychotherapy, and surgical (DBS) options are available for the treatment of OCD. Strong evidence supports the use of cognitive behavioral therapy, such as exposure and response prevention therapy, in conjunction with selective serotonin reuptake inhibitors to treat OCD symptoms (6). Although meta-analyses have shown that higher doses of SSRIs are marginally more effective than lower doses,(7) approximately 60% of patients with OCD do not have satisfactory outcomes with SSRIs.10 On the contrary, numerous patients have experienced unpleasant adverse effects, including difficulty in urination, decreased blood pressure, dry mouth, drowsiness, nausea, headache, and dizziness.(8) Clomipramine or atypical antipsychotic medications, primarily risperidone and aripiprazole, are second-line pharmacological options. (9) But not every OCD sufferer responds to these treatments in a meaningful way. (10) Therefore, a more effective and safer treatment remains an unmet medical need for OCD. Given the severity and prevalence of OCD, further research into the underlying mechanisms is required to enhance treatment outcomes, facilitate early detection, and comprehend the etiology of OCD.

MOLECULAR MECHANISMS

The review highlights the role of neurotransmitter systems, such as glutamate, dopamine, and serotonin, in the development of OCD. These neurotransmitter systems are thought to be involved in the cortico-striato-thalamo-cortical (CSTC) circuits that underlie OCD. The serotonergic system, in particular, has received a lot of attention since it was discovered that OCD responds selectively to serotonin reuptake inhibitors (SRIs). There is discussion of a number of genes connected to neurotransmitter systems that are believed to play a role in the onset of OCD. These genes include DRD2-TaqIA, DRD3, and 5HT2A receptor genes. When new groups of OCD patients with tics were formed, a study discovered an increase in the frequency of homozygosity in the A2 allele of TaqIA at the DRD2 locus. There is also discussion of the DRD4 gene, which has been recognized as a possible candidate gene for OCD because of a 48-base pair (bp) polymorphism in its third exon. According to a study, there is a substantial difference in allele 2 between OCD patients and controls when it comes to DRD4 gene variations and OCD. Serotonin transporter (5-HTT) gene (SLC6A4) is also noted; this gene is being investigated to see how OCD and the serotonergic system are related.

DRD2-TaqIA, DRD3, and 5HT2A receptor genes

Nicolini et al. examined the polymorphism of the dopamine receptor D2 (DRD2-TaqIA), DRD3, and serotonin 5-hidroksitriptamin (5HT2A) receptor genes in 67 OCD patients and discovered no discernible differences in these genes. Nevertheless, they discovered a rise in the frequency of homozygosity in the A2 allele of TaqIA at the DRD2 locus when new groups were created with OCD patients who exhibited tics. This lends credence to the theory that tics and OCD are related. It also appears to explain why risperidone and atypical antipsychotic medications, which have strong affinities for the D2, D3, and D4 dopamine receptors, as well as serotonin 5HT2 and 5HT7 receptor antagonists added to the treatment, are beneficial in OCD cases with tics rather than SSRIs alone (11). In addition, the use of cocaine in OCD patients blocks presynaptic dopamine uptake and aggravates the symptoms of the disease. Again, in cases of cocaine intoxication, it causes obsessive-compulsive symptoms in those who have a family history of OCD but do not have OCD themselves. These findings support the hypothesis that the 5-HT and dopamine systems may be involved in some OCD subtypes (12)

MAO (monoamine oxidase)

Monoamine oxidase A (MAOA) is a mitochondrial enzyme involved in the catabolism of catecholamine neurotransmitters, such as dopamine, serotonin, and norepinephrine (Buckholtz and Meyer-Lindenberg, 2008). Taylor (13) carried out an extensive meta-analysis of studies on

the genetic associations with OCD. 230 polymorphisms in all were found across 113 genetic association studies. Male OCD was found to be associated with COMT and MAO-A polymorphisms in the primary meta-analysis.

Catechol-O-methyltransferase (COMT)

Catechol-O-methyltransferase (COMT) catalyses methyl conjugation and involved in the inactivation of certain catecholamines (norepinephrine, epinephrine, and dopamine). Given the relative dearth of dopamine transporters in the prefrontal cortex, the catechol-O-methyltransferase (COMT) enzyme is especially important in the regulation of prefrontal dopamine. The most extensively researched COMT polymorphism is a single-nucleotide polymorphism (SNP) that causes a valine-to-methionine substitution at codon 158 (val158met or rs4680). This polymorphism produces the met(158) and val(158) alleles, which are the low-activity thermolabile and high-activity thermostable forms of the enzyme, respectively (14). Velocardiofacial syndrome, which is brought on by a deletion in the 22q11 region, which contains the COMT region, raises the risk of numerous psychiatric conditions, including OCD (14). These disorders were included as broader phenotypes in the analyses because family studies have demonstrated familial aggregation between OCD and various psychiatric disorders (e.g., tic disorders, body dysmorphic disorder, skin picking, trichotillomania, and anxiety disorders) [17-22]. OCD patients have been the subjects of gene studies on the enzymes MAO (monoamine oxidase) and COMT (catechol-O-methyltransferase). Contradictory outcomes have been observed. In female OCD patients, Camarena et al. found high rates of low-activity allele frequency of this enzyme in the MAO-A gene (which is located on the X chromosome). (15)

This circumstance may be seen as proof that certain forms of OCD are associated with aberrant neuronal transmission and enzyme deficiencies (15). In a different study, the COMT enzyme and its low activity allele in male OCD patients were found to be positively correlated. This could be explained by the fact that OCD is associated with low MAO activity in certain gender-related subgroups. (16)

DRD4

Dopamine is a neurotransmitter that is involved in reward-motivated behavior and movement. The dopamine receptor D4 gene (DRD4) codes for a protein that is involved in the transmission of dopamine. In one study, probands' clinical evaluation and family history were gathered through the use of the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) in Spanish. All subjects had their tic presence or absence clinically assessed using the DSM-IV criteria for

chronic motor or vocal tic disorder. A standard procedure was used to extract DNA from leukocytes in peripheral blood. 61 OCD patients had their genotypes for the 48 bp repeat region of the DRD4 gene determined by means of primers and PCR amplification conditions. The clinical status was not known to the genotype analysis team. The findings demonstrated that the probands with tics had more copies of the seven-repeat allele of the DRD4 gene than the probands without tics. According to the study, the DRD4 gene's seven-repeat allele may contribute to the phenotypic variation of tics in people with OCD. Stated differently, there may be a greater frequency of the seven-repeat variant of the DRD4 gene in people with OCD who also exhibit tics. (23)

The relationship between obsessive-compulsive disorder and the dopamine receptor D4 (DRD4) gene is issued in another study. According to the study, the DRD4 gene's 2 allele or a nearby genetic variation may be able to prevent OCD symptoms. Other disorders like Tourette's syndrome, attention deficit hyperactivity disorder, pathological gambling, and substance abuse have also been linked to the DRD4 gene. offers fresh perspectives on the genetic foundation of OCD and the possible role of dopamine in the pathophysiology of this anxiety disorder. According to the study, a 48-base pair (bp) polymorphism in the dopamine receptor type 4 (DRD4) gene's third exon has been identified as a potential OCD candidate gene. Through the use of two distinct methodologies, including case-control and transmission-disequilibrium test (TDT) analyses, the study has discovered a correlation between DRD4 gene variants and OCD. Using the TDT method, the study has demonstrated that there is no transmission for allele 2 of the DRD4 48 bp repeat polymorphism in OCD trios. Additionally, it was discovered that OCD patients lacked allele 2 significantly in comparison to controls, which lends more credence to the theory that this variant may be linked to a lower risk of developing OCD. (24)

The serotonin (or 5-hydroxytryptamine) transporter (5- HTT) gene (SLC6A4)

A study is attempting to elucidate the connection between OCD and the serotonin transporter (5-HTT) gene (SLC6A4). This was a double-blind, randomized trial designed to look into the benefits of rTMS augmentation over SSRIs for treating OCD and how SLC6A4 functions in this process. In addition to receiving SSRIs, a total of 57 patients were enrolled and randomly assigned to either the active or sham rTMS group. In comparison to the sham group, the study indicated that OCD symptoms, anxiety, and depression were significantly improved by rTMS augmentation of SSRIs. Furthermore, compared to patients with the L allele, those with the S/S genotype of SLC6A4 demonstrated a higher degree of improvement in OCD symptoms with active rTMS. In summary, OCD has been linked to the serotonin transporter gene (SLC6A4).

In particular, the promoter region of the SLC6A4 gene has a long (L)/short (S) variant due to a functional polymorphism (5-HTTLPR). Reduced transcriptional activity and worse outcomes from antidepressant pharmacological and non-pharmacological treatments are linked to the S allele of this polymorphism. Although 5-HTTLPR polymorphism and OCD have been linked by meta-analyses, there hasn't been any research on the connection between 5-HTTLPR polymorphism—more especially, SLC6A4 polymorphism—and the way OCD patients react to rTMS. (25)

5-HT2A

The effects of targeting the 5-HT1A, 5-HT2A, and 5-HT2C receptors on repetitive behaviors are the subject of a recent review. It suggests that it is possible to reduce repetitive grooming behavior by using DOI to increase 5-HT2A receptor activity. (26)

5-HT2A receptors may be involved in the pathophysiology of obsessive-compulsive disorder (OCD), according to another study. In both OCD patients and animals, long-term use of selective serotonin reuptake inhibitors (SSRIs), which are frequently used to treat OCD, has been demonstrated to cause desensitization or downregulation of 5-HT2A receptors. Nevertheless, research on the function of 5-HT2A receptors in OCD has produced conflicting results, and the exact mechanism of action of SSRIs is still unknown. Strong 5-HT2A agonism in certain compounds has been proposed by some authors as a potential treatment for OCD. (27)

CONCLUSIONS

In summary, the present review of research on obsessive-compulsive disorder identifies areas that require more investigation as well as the advancements made in our understanding of this intricate condition. While genetic research has provided valuable insights into the disorder, much remains unknown about the molecular mechanisms that underlie the interaction between genetic and environmental risk factors. As such, future research should focus on developing a more comprehensive understanding of the biological basis of OCD. In addition to genetic research, it is also important to explore the role of hormones in OCD. More research is required to investigate the potential that hormonal imbalances have a role in the development of OCD. Additionally, since this will paint a fuller picture of the condition and its underlying causes, future research on OCD should consider both hereditary and environmental variables. While current treatments for OCD are often effective, they can also have significant side effects and may not be suitable for all patients. As such, it is important to develop new, more targeted

treatments for OCD that can be tailored to individual patients' needs. Emerging technologies, such as deep brain stimulation and transcranial magnetic stimulation, show promise in this regard and should be further explored. In conclusion, this review emphasizes the necessity of more OCD research as well as the significance of creating more individualized and efficient therapies for this complicated illness. We can make a positive difference in the lives of OCD sufferers by advancing our understanding of the underlying causes of the disorder and creating novel treatments that are individualized for each patient.

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ELİT BOKSÖRLERİN SPORDA MÜKEMMEL PERFORMANSLARININ FARKLI DEĞİŞKENLER AÇISINDAN İNCELENMESİ

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Özet

Çalışmanın amacı, elit seviyede boks branşı ile ilgilenen aktif sporcuların sporda mükemmel performanslarının farklı değişkenler arasındaki ilişkiyi ortaya çıkarmaktır. Çalışmaya 75' i kadın ve 169' u erkek olmak üzere toplam 244 kişi katılmıştır. Araştırmada veri toplama aracı olarak Kişisel Bilgi Formu ve Sporda Mükemmel Performans Ölçeği" kullanılmıştır. Veriler analizinde tanımlayıcı istatistik, güvenilirlik analizi, ikili değişkenler için bağımsız örneklem t testi, ikiden fazla değişkenler için Anova testi yapılmıştır. Araştırma sonucunda cinsiyet, milli sporcu olma, eğitim düzeyi, yaş, spor yaşı, kaç yıl boks branşını yapma durumuna göre ölçek ortalama puanı açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Anahtar Kelimeler: Boks, spor, mükemmel performans

**EXAMINATION OF ELITE BOXERS' EXCELLENT PERFORMANCE IN SPORT
IN TERMS OF DIFFERENT VARIABLES**

Abstract

The aim of the study is to reveal the relationship between different variables and excellent performance in sport of active athletes who are interested in boxing at elite level. A total of 385 people, 75 women and 169 men, participated in the study. Personal Information Form and Excellent Performance in Sport Scale" were used as data collection tools in the study. Descriptive statistics, reliability analysis, independent sample t test for binary variables and Anova test for more than two variables were used in data analysis. As a result of the research, there is no statistically significant difference in terms of scale mean score according to gender, being a national athlete, education level, age, sport age, and number of years of boxing.

Keywords: Boxing, sport, excellent performance

Giriş

Sağlıklı bir toplum olmakta, evren ile bütünleşmekte, ilerlemekte, toplumsal adaletli, aydınlık çevreli bir toplum olmakta sporun yeri ve önemi yadsınamaz (Yazıcı, 2014). İnsanların fiziksel ve ruhsal gelişimine katkı sağlayan spor sosyal açıdan ele alındığında organizasyonlar dâhilinde kültürlerin kaynaşmasına, sorumluluk alabilen, takım çalışmasına yatkın ve etik değerlere sahip sağlıklı bireylerin yetiştirilmesine katkı sağladığı da görülmektedir (Tiryaki & Yetim, 2017). Sporda rekabet ortamının olması ve kazanmanın her zaman ön planda yer alması sporcuların fiziksel ve psikolojik güçlerinin de geliştirilmesi gerekmektedir (Yazıcı vd., 2018). Spor ve fiziksel aktivite bağlamına uygulanan insan davranışı çalışması olarak spor psikolojisi, (Turkay & Demir, 2021) sporun içerisinde yer alan bireylerin psikolojik özelliklerinin değerlendirilerek gerek takım sporlarında gerekse bireysel sporlarda performanslarının en tepeye nasıl çıkarılabileceği ile ilgilenir (Azboy vd., 2012). Spor psikolojisinin yönelimlerinden biri olan bilişsel-davranışçı yaklaşımı; sporcunun bilişsel ve davranışsal yönüne vurgu yaparak bir sporcunun ne düşündüğüne; kendisini ne kadar güvende, rahat veyahut stresli hissettiğine ve bunların performansını nasıl etkilediğine odaklanır (Biddle & Mutrie, 2006).

Alan yazında performans ile ilgili birçok tanıma rastlanmaktadır (Savaş, 2005). Performansa farklı bir açıdan bakacak olursak çalışan kişi verilen vazifeyi ne oranda yaptığı ve yapılaş şekliyle hedeflere ulaşma noktasında ortaya çıkan orandır (Doğan, 2004). Bu tanımlamadan hareketle, değerlendirme için performansın bileşenlerini, belirleyen ve etkileyen tüm faktörleri göz önünde bulundurmak gereğini de beraberinde getirmektedir.

Sportif performansın karmaşık yapısının sebebi, sonucu etkileyen faktörlerin sayısının çokluğu ve çeşitliliğidir. Bu faktörler, performansı olumlu ve olumsuz etkileyebilirler ve oluşum kaynaklarına göre içsel ve dışsal faktörler olarak ikiye ayrılırlar. İçsel faktörler; genel anlamda insanda mevcut olan, kısmen kalıtsal gelen, zaman içinde küçük değişikliklerle farklılaşabilen ve dışarıdan üzerine etki imkânı çok sınırlı olan veya hiç etki yapılamayan etkenlerdir. Yaş, cinsiyet, anatomik yapı, genetik, zekâ, lokomotor sistemin durumu, psikolojik denge, otonom sinir sistemi, salgı bezlerinin fonksiyonları, metabolizma, enerji kullanım mekanizmaları, organ sistemlerinin durumu, allerji, nöromusküler ileti hızı, kardiyovasküler yapı özellikle içsel faktörlerin en başlıcalarıdır. Bu listeyi uzatmak ve detaylandırmak çok mümkündür.

İçsel faktörleri objektifleştirmek oldukça zor olduğundan performans üzerine etkilerini hesaplayabilmek ve yapılabilecek değişiklikleri tümüyle öngörebilmek neredeyse imkansızdır. Dışsal faktörler; ise adından da anlaşılacağı gibi insanın vücudundan ve yapısından kaynaklanmayan dışarıdan gelen ve bu nedenle de dolaylı yolla sportif performansı fiziksel

veya psişik bileşen üzerinden etkileyen faktörlerdir. Dışsal faktörler üzerine olan etkimiz, içsel olanlara göre çok daha fazladır. Birçoğunu uygun şartlar ve müdahaleler ile değiştirmek ve geliştirmek mümkündür (Bayraktar & Kurtoğlu, 2004).

Fiziksel aktivitenin dayanıklılığı artırma da sporcunun performansı açısından çok önemlidir. Bunun yanında zihinsel olarak da eğitilmeli ve dayanıklılık performansına katkı sağlamalıdır. Özellikle sporcular spor performanslarını fizyolojik, biyomekanik ve psikolojik verimliliği artırılması yönünde yapılacak aktivitelerin sıralanması tanımlanmış olması gerekmektedir. Optimum ve üstün bir sonuca ulaşmak için performans her ikisinin de gelişimine bağlıdır. Sporcunun psikolojik ve fizyolojik yetenekleri ve amaca göre belli bir seviyeye yükseltilmesi gerekmektedir (Konter, 2003).

Yarayan ve İlhan'a (2018) günümüz sporunda kazanmakla kaybetmek arasındaki çizgiyi inceleyerek performans yoğunluğunu artırarak sporcular üzerinde büyük bir baskı oluşturduğunu dile getirmişlerdir. Hazırlıksız yakalanan sporcu ve antrenörler ise birçok baskıya maruz kalıp bu durumla başa çıkmak için arayış içine girmişlerdir. Bu nedenle kişilerin psikolojik farkındalıkları arttıkça son yıllarda yapılan psikolojik çalışmalara verilen önemde artmıştır. Bu hem bireysel hem de takım sporları için geçerlidir. Sporcuların hazırlık süreçlerinde zihinsel eğitim kavramlarının verilmesi ve öğretilmesi, zihinsel dayanıklılığın bireylerin içsel ve dışsal, zihinsel ve fiziksel davranışlar ve deneyimler edinmektedir (Unestahl, 1982).

Bireysel dövüş sporlarından biri olan boks, yüksek düzeyde fiziksel ve zihinsel yetenek gerektiren, mevcut yapısı ve uygulaması gereği performansı, vücut temasının ve dövüşün en çok yaşandığı yer yoğun bir şekilde yapılmaktadır (Quinna, 1994). Boks sporu savunma ve hücum yapma, tempoyu artırma gibi maç sırasında temponun düşürülmesi gerekli stratejiler içermektedir. Bu nedenle zihinsel antrenman uygulamaları beden eğitiminin yanı sıra spor da yapılması gereken maçlara hazırlanmalıdırlar (Luthans, 2002).

Boks sporu bireyin kendisini savunma ve atak gibi yeteneklerini ön planda olduğu, galip gelebilmek için vurulan yumruğun alınan net puandan daha fazlası olmasını gerektiren, teknik ve taktik özelliklerin müsabaka sonucunu etkilediği olimpik bir spor branşıdır. Boks sporu karakteristik özelliklerinin yanı sıra temasa dayalı, güç, hız, çeviklik ve spora özgü becerilerin bir kombinasyonunu gerektirdiği bir spor dalı olarak görülmektedir (Ağgön vd., 2020). Her branşta olduğu gibi öncelikli olarak yapılan branşa özgü yetenek ön plana çıkmakla birlikte bu yeteneğin kuvvet, zekâ ve beceri ile bütünleştirilmesi boksta elde edilecek yüksek performansın öncelikli etkenidir. Bununla birlikte, yaratıcılık, kurallarına uygun beslenme, bilimsel çalışma,

anında karar verme, inanç, kötü alışkanlıklardan uzak durma, kurallara uyma, yenme hırsı, mücadele, dayanıklılık, kuvvette devamlılık, hızlılık, kendine güven, düzenli yaşam, ruhsal üstünlük, deneyim kazanma, esneklik, belirli bir hedefe yönelme gibi özellikler boksta başarıyı pekiştirecek önemli faktörler olarak karşımıza çıkmaktadır (Zorba vd., 1999).

Herkes için spor anlayışının temelinde de yatan spor yapan bireylerin mükemmelliğe ulaşma çabası içerisinde ulaşılabilen hedefin kendilerinin en iyi yapabildiğine ulaşmasıdır. Bu bağlamda mükemmeliyetçilik, kişinin davranışını aşırı derecede değerlendirilmesine yönelik eğilimlerinin yanı sıra kusursuz bir performans sergilemek için yüksek standartlar belirlemek ve çabalamak ile karakterize edilen kişilik özelliği olarak görülürken (Flett & Hewitt, 2002), Burns ise mükemmeliyetçiliği; kişinin kendisine koyduğu standartların ulaşılabilecek olanın ve mantığın ötesinde olması, zorla ve aralıksız olarak imkânsız hedefler için çabalaması ve kişinin kendi değerlerini belirlerken bunu yalnızca verimli ve başarılı olma üzerinden yapması olarak tanımlamaktadır (Burns, 1980). Mükemmeliyetçilik sosyal psikoloji ve klinik dallarında sıklıkla yapılan bir başlık olarak araştırmacıların 1970'den beri ilgisini çekmiştir. Mükemmeliyetçilik geleneksel olarak, normalin dışında standartlar koymak ve buna ulaşmak için aşırı derece de çaba göstermektir (Slade vd.,1998).

Sportaki mükemmeliyetçilik ise 1990 yılından beri çalışılmaya başlanılmıştır. Çoğu spor psikoloğu mükemmeliyetçiliğin büyük yarışlarda olumlu bir rol oynadığını kabul etmiştir. Hardy ve ark kendi alanlarında en iyi olan sporcuların mükemmeliyetçi olduğunu ve bu özelliklerin kendilerini geliştirme noktasında olumlu yönde olduğunu ve bu özelliklerinin performanslarını artırdığını söylemişlerdir (Hardy, 1996).

Yöntem

Bu araştırma genel tarama modeli kullanılarak tasarlanmış ve planlanmıştır. Tarama modelleri geçmişte ya da halen var olan bir durumu var olduğu şekli ile betimlemeyi amaç edinen araştırmalar için uygun bir modeldir. Betimsel tarama modelleri kendi içinde iki bölüme ayrılmaktadır. Bu bölümler; genel tarama ve örnek olay taramalarıdır. İlişkisel tarama modeli genel tarama yöntemi içine giren bir yöntemdir.

Genel tarama modelleri; çok sayıda elemandan oluşan bir evrende, evren hakkındaki genel yargıya varmak amacı ile evrenin tümü ya da ondan alınacak bir grup örnek ya da örneklem üzerinde yapılan tarama düzenlemeleridir (Karasar, 2006).

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Evren/Örneklem

Araştırmanın örneklem seçiminde gelişigüzel örnekleme yöntemi kullanılmıştır. Araştırmacının saptanan örneklem büyüklüğüne göre herhangi bir şekilde evrenin bir parçasını seçmesidir. Herhangi bir okula gidip saptanacak sayıda (100 öğrenci gibi) rastlanan öğrenciyi olasılıklı olmadan örnekleme alma gelişigüzel örneklemedir (Dawson & Trapp, 2001).

Çalışmanın evrenini 2022-2023 yılında boks branşında yarışlara katılan sporcular oluşturmaktadır. Araştırmanın örnekleme ise; gelişigüzel 75 kadın, 169 erkek olmak üzere toplam 244 sporcu oluşturmaktadır. Çalışmaya gönüllü katılan her bir sporcuya demografik bilgi toplama formu verilerek, sporcular çalışma içeriği hakkında bilgilendirilmiştir.

Veri Toplama Araçları

Bu çalışmada kişisel bilgi formu ve “Sporda Mükemmel Performans Ölçeği (PPS-S)” uygulanmıştır. Araştırma kullanılan kişisel bilgi formu ve ölçeklere ilişkin bilgiler aşağıda açıklanmıştır.

Kişisel bilgi formu

Kişisel bilgi formu 6 maddeden oluşmaktadır ve katılımcıların cinsiyet, yaş, eğitim durumu, spor yaşı, milli sporcu ve kaç yıldır boks branşı ile uğraşıyorsunuz değişkenleri gibi bilgileri toplamak amacıyla hazırlanmıştır.

Sporda Mükemmel Performans Ölçeği (PPS-S)

Çalışmada Hewitt ve Flett'in (1991) mükemmeliyetçiliğin boyutları ile ilgili ortaya konulan modelden esinlenerek Hill, Appleton ve Mallinson (2016) tarafından geliştirilen bir ölçektir. Çocuk ve yetişkin sporcular için geçerlik ve güvenilirliğinin incelenmesi ise Esentaş vd., 2020 yılında yapılmıştır. Ölçek kendine yönelik performans mükemmeliyetçiliği (SOPP), sosyal olarak belirlenmiş performans mükemmeliyetçiliği (SPPP) ve diğerlerine yönelik performans mükemmeliyetçiliği (OOPP) olmak üzere 3 alt boyuttan oluşmaktadır. Ölçeğin derecelendirilmesinde (1) kesinlikle katılmıyorum (2) katılmıyorum, (3) kısmen katılmıyorum, (4) kararsızım, (5) kısmen katılıyorum, (6) katılıyorum, (7) kesinlikle katılıyorum olmak üzere 7'li Likert tipi bir derecelendirme sistemi kullanılmıştır.

Verilerin Analizi

Araştırmada elde edilen verilerin analizi SPSS 21 paket programında yapılmıştır. Veriler analiz edilirken tanımlayıcı istatistik, güvenilirlik analizi, ikili değişkenler için bağımsız örneklem t testi, ikiden fazla değişkenler için Anova testi yapılmıştır. Tüm istatistiksel işlemler için güven aralığı 0.05 kabul edilmiştir.

Bulgular

Tablo 1. Örneklem grubuna ilişkin demografik dağılımı

Değişkenler	n	min.	mak.	x	s.s.
Lise	244	1,00	4,00	2,59	,93
Yaş	244	15,00	18,00	16,47	1,02
Cinsiyet	244	1,00	2,00	1,69	,46
Spor_deneyim_süresi	244	1,00	3,00	2,12	,87
Milli_sporcu	244	1,00	2,00	1,80	,39
Kaç yıldır boks yapıyorsunuz	244	1,00	3,00	2,03	,86
Ölçek_ort	244	1,00	7,00	2,89	1,16

Tablo 1’de araştırmada katılımcı grubuna ait demografik dağılım görülmektedir.

Tablo 2. Katılımcılardan elde edilen betimsel istatistikler

Değişkenler	n	%	
Eğitim Düzeyi	Lise 1	34	13,9
	Lise 2	73	29,9
	Lise 3	94	38,5
	Lise 4	43	17,6
	Toplam	244	100,0
Yaş	15	55	22,5
	16	62	25,4
	17	84	34,4
	18	43	17,6
	Toplam	244	100,0
Cinsiyet	Kadın	75	30,7
	Erkek	169	69,3
	Toplam	244	100,0
Spor Deneyimi	1 ve 2 yıl	79	32,4
	3 ve 4 yıl	55	22,5
	5 yıl ve üstü	110	45,1
	Toplam	244	100,0
Milli Sporcu	Evet	48	19,7
	Hayır	196	80,3
	Total	244	100,0
Boks deneyimi	0-2 yıl	86	35,2
	3-4 yıl	64	26,2
	5 yıl ve üzeri	94	38,5
	Toplam	244	100,0

Tablo 2'deki veriler incelendiğinde 75 (%30,7) kadın, 169 (%69,3) erkek olmak üzere toplam 244 kişi katıldığı görülmektedir. Katılımcıların eğitim düzeyleri incelendiğinde ise 34'ünün (%13,9) lise 1. sınıf, 73'ünün (%29,9) lise 2. sınıf, 94'ünün (%38,5) lise 3.sınıf ve 43'ünün (%17,6) lise 4. sınıf düzeyinde olduğu görülmektedir. Katılımcıların yaş değişkeni incelendiğinde ise 55'inin (%22,5) 15 yaşında, 62'sinin (%25,4) 16 yaşında, 84'ünün (%34,4) 17 yaşında ve 43'ünün (%17,6) 18 yaşında olduğu tespit edilmiştir. Spor deneyimi durumuna göre incelendiğinde ise katılımcıların 79'unun (%32,4) 1-2 yıl, 55'inin (%22,5) 3- 4 yıl ve 110'unun (%45,1) 5 yıl ve üstü olduğu görülmüştür. Milli sporcu olup olmadığı durumuna bakıldığında katılımcıların 48'inin (%19,7) evet ve 196'sının (%80,3) hayır olduğu tespit edilmiştir. Katılımcıların boks deneyimi değişkeni incelendiğinde ise; 86'sının (%35,2) 0-2 yıl, 64'ünün (%26,2) 3-4 yıl ve 94'ünün (%38,5) 5 yıl ve üzeri olduğu görülmektedir.

Tablo 3. Cinsiyet Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

	Cinsiyet	n	x	s.s.	t	p
Ölçek_ort	Kadın	75	2,8800	1,09889	-,127	,899
	Erkek	168	2,9006	1,19903		

Tablo 3'de cinsiyet değişkeni ile ölçek ortalama puanı ($t=-127;p>0.05$), açısından anlamlı bir farklılık görülmemektedir.

Tablo 4. Milli Sporcu Olma Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		n	x	s.s	t	p
Milli Sporcu Olma Durumu	Evet	48	3,0333	1,13613	,921	,358
	Hayır	196	2,8602	1,17471		

Tablo 4'de milli sporcu değişkeni ile ölçek ortalama puanı ($t=921;p>0.05$), açısından anlamlı bir farklılık görülmemektedir.

Tablo 5. Eğitim Düzeyi Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Eğitim Düzeyi	Gruplar arası	32,327	27	1,197 ,835	1,434	,084
	Grup içi	180,312	217			
	Toplam	212,639	243			

Tablo 5'deki veriler incelendiğinde eğitim düzeyi değişkeni ile ölçek ortalama puanı [(F 27.216) 1,434; $p> 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Tablo 6. Yaş Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Yaş	Gruplar arası	36,544	27	1,353	1,327	,138
	Grup içi	220,255	217	1,020		
	Toplam	256,799	243			

Tablo 6' ya göre yaş değişkeni ile ölçek ortalama puanı [(F 27.216) 1,327; $p > 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Tablo 7. Spor Yaşı Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Spor yaşı	Gruplar arası	14,709	27	,545	,691	,873
	Grup içi	170,352	217	,789		
	Toplam	185,061	243			

Tablo 7' deki veriler incelendiğinde spor deneyim süresi değişkeni ile ölçek ortalama puanı [(F 27.216) 691; $p > 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Tablo 8. Kaç Yıldır Boks Yapıyorsunuz Değişkenine Göre Sporda Mükemmel Performans Ölçeği Puanlarının Dağılımı

		Karelerin Toplamı	sd	Karelerin Ortalaması	f	p
Kaç yıldır boks yapıyorsunuz?	Gruplar arası	17,052	27	,632	,839	,698
	Grup içi	162,686	217	,753		
	Toplam	179,738	243			

Tablo 8'e göre kaç yıldır boks yapıyorsunuz değişkeni ile ölçek ortalama puanı [(F 27.216) 839; $p > 0.05$] açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Sonuç ve Tartışma

Araştırmamızda elit boksörlerin sporda mükemmel performanslarının farklı değişkenler açısından incelenmesi amacıyla yapılmıştır.

Araştırmada katılımcıların sporda mükemmel performans düzeyleri ile cinsiyetleri arasındaki farklılık değerlendirildiğinde kadın ve erkek boksörler arasında istatistiksel olarak anlamlı farklılık olmadığı belirlenmiştir. Alan yazın incelendiğinde araştırmamızla aynı doğrultuda

olmayan çalışmalara rastlanılmıştır. Abdioğlu vd., (2022) ve erkek tenisçilerin performans mükemmeliyetçiliğinin, kız tenisçilerin performans mükemmeliyetçiliğinden daha yüksek olduğu belirlenmiştir. Yine Gönülateş ve İmamoğlu (2019) araştırmasında erkeklerin kadınlardan daha yüksek mükemmeliyetçilik puanlarına sahip olduğu bildirilmiştir. Bu bulgular araştırmamızla paralellik göstermemektedir. Bu durum profesyonel sporcular için genellikle kendilerini mükemmeliyetçi olarak tanımlamalarından (Hill vd., 2016) kaynaklandığı düşünülmektedir. Yine Kangotan (2020) de yapmış olduğu çalışmada sporcuların cinsiyetlerine göre spora ait mükemmeliyetçilikleri arasında istatistiksel olarak anlamlı farklılık olmadığını ortaya çıkarmıştır. Bu bulgu araştırmamız ile aynı doğrultudadır.

Araştırmada sporda mükemmel performans düzeyleri ile spor yaşı arasındaki farklılık değerlendirildiğinde ölçek ortalama puanı açısından istatistiksel olarak anlamlı farklılık olmadığı belirlenmiştir. Özen (2019) yılında yapmış olduğu araştırmada Taekwondocuların spor yaşlarına göre anlamlı fark bulmuştur. Bu çalışma araştırmamızla paralellik göstermemektedir. İlgili literatür incelendiğinde sporda mükemmel performans üzerine çalışmalar yetersiz olduğu görülmüştür. Sonuç olarak araştırmada cinsiyet, milli sporcu olma, eğitim düzeyi, yaş, spor yaşı, kaç yıl boks branşını yapma durumuna göre ölçek ortalama puanı açısından istatistiksel olarak anlamlı bir farklılık görülmemektedir.

Öneriler

1. Araştırmanın örneklem grubunu sadece Boks branşındaki elit düzeydeki sporcuların oluşturması bir sınırlılık meydana getirdiği için diğer branşlarla ilgilenen elit sporcular üzerinde de uygulanabilir.
2. Çalışma başka ölçeklerle kullanılarak genişletilebilir. (Örn. stres, kaygı düzeyi, atılganlık vb.... gibi)
3. Araştırma sonuçlarımız benzer bilimsel çalışmaların yürütülmesinde kullanılabilir.
4. Elit düzeyde sporda konusunda literatürde çok fazla araştırma bulunmamaktadır. Bu kavramın farklı değişkenlerle ilişkisi üzerine araştırmalar yapılabilir.

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**CONSTRAINTS TO ADOPTION OF EXPORT STANDARD PRACTICES (ESP)
AMONG COFFEE-BASED FARMERS IN KOGI STATE, NIGERIA**

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ABSTRACT

The study investigated constraints to Adoption of Export Standard Practices (ESP) among Coffee-based farmers in Kogi State, Nigeria. Multistage random sampling was used to select 227 coffee-based farmers. Data was collected using validated interview schedule while frequency count and percentages, weighted mean score and binary logistic regression were used for data analysis. The results reveal that mean age was 43.74 years while majority were male (84.1%), married (86.8%) with mean household size of 8.52 persons and mean farm size of 5.8ha. The highly severe constraints faced by the farmers were inadequate training on coffee processing (WA = 3.34), inadequate training on capacity building (WA =3.19), availability and acquisition of adequate land (WA = 2.92), availability of improved seeds/seedlings (WA = 2.89). The extent of adoption of ESP among the coffee-based farmers was very low (7.9%). the effect of awareness of export standard practices was (M=2.59). The binary logistic regression model was able to explain about 42.1% variation in the level of adoption of export standard practices in coffee production and processing among farmers (R = 0.421). Also the model classified correctly 69.27% cases, while the remaining 30.73% was not predicted by the model at both 0.05 and 0.01 levels of significance.

Keywords: Coffee production technology, Constraints to ESP, Coffee-based farmer, Export standard practices.

INTRODUCTION

Coffee beans are one of the most widely traded commodities in the world and thus play a vital role in the balance of trade between developed and developing countries (Adeleke, *et al.*, 2018). There are more than 100 different plant varieties of the *Coffea* genus in the world. Despite this great diversity, only two varieties *Coffea canephora* (Robusta coffee) and *Coffea Arabica* (Arabica coffee) with significant economic importance in the world coffee market are being cultivated in Nigeria (Alli, *et al.*, 2021; Akinpelu & Oluyole, 2020; Pigozzi *et al.*, 2018).

In Nigeria, Coffee growing states are Oyo, Ogun, Ondo, Ekiti, Kwara, Kogi, Edo, Delta, Abia, Cross River, Akwa Ibom, Taraba, Bauchi, and Jos (Adepoju & Obayelu, 2017). Of these states, Kogi State is known as the major producer of coffee; especially the Robusta which accounts for 90% of coffee export (Akinpelu, *et al.*, 2020; Idrisu, *et al.*, 2012). Reports indicated that coffee production quantity in Nigeria was 2040 tons in 2009 and gradually depreciated to 1829 tons in 2018 (FAOSTAT, 2019). The reduction in the international market price of coffee beans may be attributed to its decreased production (Alli, *et al.*, 2021). However, the production of coffee is profitable for a sustainable economy and serves as the major source of income for the majority of farming households in Kabba areas of Kogi State (Aderolu, *et al.*, 2014; Mohammed, *et al.*, 2013).

To improve upon the export performance and to ensure continuous growth in the major strongholds of the subsector (quality, price, and exports), the Cocoa Research Institute of Nigeria (CRIN) has recommended Export Standard Practices (ESP) in line with the International Coffee Organization (ICO, 2018), Coffee Exporter's Guide for coffee processing to meet up with international export standard practices and improve the profitability of farmers. According to the Cocoa Research Institute of Nigeria, (CRIN, 2004), the ESP of coffee production are:

Regular harvesting of ripe berries fortnightly and weekly at peak periods;

The berries are sorted out after harvesting and either of the processing technique is carried out (Dry and/or Wet processing);

Fermentation must be covered and protected from rain and/or cold;

Turning of beans once daily during fermentation;

Drying of beans on a raised slab;

The thick layer of drying beans should be between 3 to 5 cm;

Regular turning during drying;

Dried beans should be packed into clean jute bags;

The bagged beans should be stored off the ground and away from walls;

The storage house should be well ventilated; and

Store beans away from strong odours e.g. smoke

Thus, strictly adhere to these practices might improve standard of coffee production processed locally and acceptable internationally and on the long run fetch the farmer good money that may affect his livelihood positively.

However, there has been a decline in coffee production in recent years mainly due to a decline in prices, non-compliance to post-harvest processing and some constraints faced by coffee farmers in coffee production that could guarantee improved sales. Consequently, farmers are faced with poor prices, low income, low profits, and increased poverty. Idrisu, *et al.*, (2012), reported that some problems arise from several factors related to the quantity and quality of the product, these factors include poor information on appropriate husbandry practices, good agricultural/management practices, quality of the product, processing, pricing, marketing problem. Previous studies reported by (Sanusi, *et al.*, 2004) have established that low profit from coffee is a major reason for the declining participation in coffee production by farmers in Nigeria. According to Osorio, (2005), the decline in coffee prices contributes to increased poverty and makes it more difficult to reach the Millennium Development Goals. In many developing countries, including Nigeria, low pricing of coffee has led to the abandonment of coffee farming for readily marketable crops.

Due to decline and constraints faced by coffee farmers and coffee production, therefore, there is a need to investigate constraints to farmers' adoption of ESP among coffee-based farmers' and possible solution in the study area, doing this might give room for an increase in the farmers' adoption of ESP for coffee production, processing, and marketing of coffee to add value to their productivity. According to Laven & Boosma, (2012), the constraints to adoption of improved export standard practices (ESP) is a platform for the increased price of coffee, and farmers' profits, through higher yields, good quality, and internationally accepted coffee for export. According to the Nation, Iyama, (2020), various measures must be undertaken to boost coffee production. Among these, is working with coffee farmers and others in the industry to meet the country's goals through improved technologies of coffee seedlings. Abdul-karim, *et al.* (2019) reported that, it is alarming and quite incredible to see many rural youths opting out of farming in search of non-existent white-collar jobs in the cities, leading to unprecedented level of rural-urban migration. All these constraints are affecting production, processing and adoption of technologies in coffee production. However, there is need to find lasting solution

to all these constraints in order to boost coffee production, processing and adoption of its technologies. The study a constraint to adoption of export standard practices among coffee-based farmer in Kogi State was investigated among the coffee-based farmers in the study area is a step thus expedient. This study provided answered to the following research questions; what are the coffee farmers' socio-economic characteristics? What are the farmers' adoption levels of ESP? what are the constraints to adoption of ESP among the coffee farmers?

The general objective of the study is to investigate the constraints to adoption of export standard practices (ESP) among coffee-based farmers in Kogi State, Nigeria. The specific objectives were to: identify the farmers' sources of information on ESP of coffee production; determine the coffee farmers' adoption level of ESP; and Identify the constraints to farmers' adoption of ESP in the study area. the hypotheses that powered this study were: There is no significant relationship between some selected socio-economic characteristics of coffee-based farmers and the adoption of ESP, There is no significant relationship between the farmers' knowledge level of ESP and the adoption of ESP, There is no significant relationship between the farmers' adoption level of ESP and their perceived effect on productivity.

Significance of the Study

The decline in agricultural production has been attributed to some factors, one of which has been the inappropriate and ineffective dissemination of technologies (Aremu, *et al.*, 2015). However, this study, therefore, evaluated the key elements upon the constraints which make farmers not to the adopt export standard practices (ESP) to processed coffee profitably in Nigeria, to improve the quality and quantity of the product and to be an internationally accepted export product. Thus, if the solution is provided to the constraints the faced by coffee farmers and the farmers were able to strictly adhere to it, it make adoption of the export standard practices of coffee significant to producers and exporters.

Constraints to coffee production processing and adoption of agricultural technologies

According to statistics from Raw Material Research and Development Council (RMRDC), between 2010 and 2015, about an N1.5billion worth of coffee products were imported into the country. Several factors have been attributed to the country's dwindling production level, the majority of which have forced farmers to abandon coffee farms for other crops to make ends meet. According to analysts, most of the coffee plots are also old and farmers have suspended major activities on their farms. To revamp the sector, the President of the Federation of Agricultural Commodities Association of Nigeria (FACAN), Victor Iyama, urged the government to support massive coffee production and productivity improvement efforts

throughout the whole coffee growing destinations. As it has potential for coffee production, he said the nation has set a goal of increasing coffee export to support its economic development. Farm-gate prices received in most of the sub-region in the last five to ten years have mostly been below a breakeven point. The low farm-gate realizations have reduced farmers' disposable income and therefore discouraged investment in production and processing. Some of the main causal factors for low farm-gate earnings include world coffee prices, high costs of production, high deductions, diseconomies of scale either due to the disintegration of farmer organizations or sub-division of land, and high marketing costs. Taking the high cost of production as an example, it was noted that in Kenya, it is estimated that production costs increased two and a half times for the small-holder sector, while it tripled for estates between 1987/88 and 1997/98 (CRF, 1999). The respective cost of production values for 2002 was US\$ 56 – 49, for smallholders and US\$ 106 for commercial estates, per 50kg of clean coffee produced (Agro Consortium, 2002). Another example where the sub-region's performance is uncompetitive concerned statutory deduction, levies, and cost of processing where Kenya's deductions for 2001/02 were just below US\$ 0.60 per kg of clean coffee compared to other high quality, high-cost producers like Colombia, with costs estimated at US\$ 0.30 and Costa Rica at US\$ 0.39 per kg of clean coffee, local deductions and levies are exorbitant. However, the following listed are constraints to coffee production and processing;

Limited Availability of and Access to Appropriate Technology: inadequate of appropriate technologies is major impedance to the sustainable production of high-quality coffee. It reduces the system's competitiveness and is the result of lag or sluggishness in research response to current farmer's needs, inefficient extension systems, low farmer capacity to access and use improved technology, and non-innovative and non-proactive research systems. Inefficient Extension Service Ineffective and inadequate extension service in most countries of the sub-region is a major cause of declining coffee production and quality.

Low Farmer Capacity to Access and Use of Technology: Farmers in the sub-region are often beset by myriads of constraints limiting their capacity to access and use technology even if it is appropriate. These include, among others, risks and uncertainties in the coffee business, poor technology packaging which is often inappropriate and expensive, lack of affordable cost-saving and appropriate technologies inadequate financial resources given that the majority of smallholders have no access to affordable credit, poor extension and extension coverage and poor farmer perception of new technologies due to limitations related to farmer literacy, exposure traditions, attitudes, and social obligations.

Non-innovative, Non-Proactive Research Systems: Non-innovative, non-proactive research systems were identified as a cause of limited availability of and access to appropriate technology. This is often reflected in form of inadequate participation of stakeholders in research priority setting, leading to the formulation of poor research programmes hence resulting in the development of technologies that are often not well adapted to the primary concerns of the farmers.

Poor rewarding system and recognition for scientists: this is probably the single most important contributor to non-innovative and non-proactive research in the sub-region, the weak link between researchers and end users, poor strategic partnerships, inadequate and obsolete research facilities, poor access to research information, and poor strategic planning. Processing Practices The major causes of poor processing practices in the sub-region include inadequate incentives for quality coffee, poor crop husbandry, and harvesting practices, prevailing low coffee prices and unpredictable fluctuations, lack of objective grading mechanisms, inability to enforce code of good factory practices, inappropriate and dilapidated processing facilities, poor extension service, high cost of establishment and maintenance of processing facility, lack of innovative processing systems and high cost of processing.

Inadequate Price Incentives for High-Quality Coffee: This is among the most serious constraint to improved coffee processing practices among smallholders in all the countries of the sub-region. Although high-quality coffees attract premium prices, the prevailing differentials are too low to compensate for the increased associated with the production and processing of high-quality coffee. Furthermore, these differential payments are often obscured by other factors including high operating costs, deductions along the value chain, high processing costs, and lack of an objective and simple system for grading cherry at the delivery point.

Poor Coffee Harvesting Practices: Non-selective picking is a common practice on smallholder farms in D. R. Congo, Uganda, Ethiopia, and Madagascar and on some estates in Kenya, and Robusta coffee in Uganda and Madagascar. This practice is a contributor to poor-quality coffee regardless of whether it is a wet or dry process. In addition, sorting and grading coffee berries before further processing is a practice that is long forgotten among most smallholders because of low net earnings, high cost of labour, and lack of incentives for high-quality coffees.

Lack of Innovative and Dynamic Extension Approach: This is a result of low morale, poor attitudes, and aptitude of extension agents, the major causes being poor remuneration and

working conditions, lack of frequent in-service training, and poor linkage with research. Lack of logistical support is cited by most countries in the sub-region as among the major causes of ineffective extension. The lack of farmer participatory approach is another cause of non-innovative extension approaches and is a result of a lack of proper training in a participatory approach and the inadequate number of extension staff in coffee processing.

High Cost of Establishment and Maintenance of Processing Facilities: Limited use of locally available and inexpensive materials in coffee processing facilities increases the cost of establishment whereas lack of locally fabricated maintenance parts increases the cost of maintenance of processing factories.

Inefficient processing chains: Inefficient management of processing facilities is another cause of poor processing. Reasons for mismanagement along the processing chain vary from country to country and include a lack of skilled and trained manpower in coffee processing and factory management, inefficient and ineffective extension services, and limited participation by farmers in decision-making processes concerning coffee processing.

Lack of skilled and well-trained manpower: is a fairly high priority constraint in most countries of the sub-region. And is the result of inadequate training programs and training facilities, high cost of training in the few available institutions, lack of interest by the youth in factory management, poor sourcing and recruitment of coffee processing staff, and low investment in training of factory technicians.

The lack of interest by young people in coffee processing is probably due to poor remuneration and lack of social welfare incentives, drudgery associated with the working environment, and negative attitudes of youth.

Inappropriate and or Dilapidated Processing Facilities: This is a major constraint to improved coffee processing in all countries except Ethiopia and Kenya. The causes of the problem include inefficient management of processing facilities, lack of more innovative and cost-effective processing systems, lack of capital, and archaic legislation hindering private sector investment in more innovative processing systems, e.g., privately owned hand pulpers or mobile pulping units.

Lack of Codes of Good Factory Practices: This would include for example a list of precautions to be observed from picking, grading, pulping, fermenting, washing, and drying, in addition to factory maintenance and factory hygiene. The lack of such a code in many societies and farmer's organizations is a reflection of apathy among most growers given the present sorry

state of the coffee industry, i.e. low coffee prices and widespread poor husbandry practices and mismanagement and laxity within the factories.

The constraints faced by the farmers in order of severity according to Awodunmila *et al* (2020) are, Low market price for processed coffee, lack of government support in form of loans and financial assistance, inadequate processing machine, and inadequate labour were ranked order of their severity respectively. poor access to credit is a serious issue for farmers, this usually come as a result of high and stringent measures adopted in granting the loan to farmers such as high-interest rates, high collateral demand, etc. all these were the constraint considered by coffee farmers' before technology or innovation could be adopted.

Eghe *et al.*, (2008) reported that poor marketing and pricing were the highest constraints to field maintenance of coffee in Taraba State. This means farmers find it difficult to market their coffee beans. It could have serious implications on their income. This situation corroborates the finding of Sanusi *et al.*, (2004), those most coffee producers in Nigeria experience low sales and sometimes no market for their products after processing. Inadequate market information was also high, which could be an indication of poor knowledge about the information on the coffee commodity market among growers. Lack of farm inputs and high labour costs were high respectively. It means that inputs and cost of labour are among the very serious constraints of coffee production. Another variable, weak extension services was another constraint to coffee. These findings confirm that there is a gap between extension workers and coffee farmers. There is a need for information providers to always relate with coffee growers to reduce any form of problems militating against coffee production

Farmers' decisions about whether and how to adopt new technology are conditioned by the dynamic interaction between the characteristics of the technology itself and the array of conditions and circumstances. The characteristics of innovation are:

Relative advantage is the degree to which innovation is perceived as better than the idea it supersedes. The degree of relative advantage may be measured in economic terms., **Compatibility** is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.

Observability is the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the result of innovation, the more likely they are to adopt it. Such visibility stimulates peer discussion of a new idea, as friends and neighbours of an adopter ask him or her for innovation evaluation information about it.

Trial-ability or a degree to which a potential adopter can try something out on a small scale first before adopting it completely is a major determinant of technology adoption. (Singh, 2007). In studying determinants of adopting Imazapyr Resistant maize (IRM) technology in Western Kenya (Mignouna, *et al*, 2011), stated that the character of the technology plays a critical role in the adoption decision process. They argued that farmers who perceive the technology find it a positive investment. Farmers' perception of the performance of the technologies significantly influences their decision to adopt them.

Farmers with large farm sizes are likely to adopt a new technology as they can afford to devote part of their land to try new technology unlike those with less term size (Uaiene, *et al.*, 2009). In addition, lumpy technologies such as mechanized equipment or animal traction require economies of size to ensure profitability. Some studies have shown a negative influence of farm size on the adoption of new agricultural technology. Small farm size may provide an incentive to adopt a technology, especially in the case of an input-intensive innovation such as a labor-intensive or land-saving technology. Farmers with small land may adopt land-saving technologies such as greenhouse technology, Zero grazing among others as an alternative to increased agricultural production (Yaron, *et al.*, 1992; Harper, *et al.*, 1990).

CONCEPT OF COFFEE PRODUCTION AND / OR PROCESSING

According to Shahbandeh, (2021), Global coffee production reached 163.7 million 60-kilogram bags as of 2019/2020, decreasing from 172.5 million 60-kilogram bags in 2018/2019. The majority of the world's coffee is produced in South America, specifically Brazil. Also, the leading coffee producer in the world in 2018, Brazil produced 61.7 million 60-kilogram bags of coffee. Vietnam is the second leading producer of coffee, with 29.5 million 60-kilogram bags of coffee in that year. However, Vietnam exports a higher volume of coffee than Brazil, at 3.3 million 60-kilogram bags as of January 2019, Shahbandeh, (2021).

Coffee Processing

According to coffeeresearch.org, (2006), Irrespective of the harvesting method, green coffee beans and overripe coffee cherries inevitably end up mixed with the perfectly ripe cherries and must be separated during coffee processing. An overripe coffee cherry, undeveloped coffee cherries, sticks and leaves float in water.

Coffee Processing Equipment

The first stage of coffee pulping is used to remove the green coffee cherries from the ripe cherries. In the coffee pulping machinery, the internal pressure is monitored to push the coffee against a screen with holes only large enough for a coffee bean (not cherry) to pass through. Since the ripe cherries are soft, they break and the coffee seed is released through the screen.

Pulping Coffee

The green cherries are hard and cannot be pulped. Instead of passing through the screen, the green coffee beans pass to the end of the barrel system and are separated from the ripe coffee beans. The pressure inside the barrel controls how many cherries will be pulped. A very high pressure will cause all of the cherries including the green beans to be pulped. It is necessary to continuously monitor the pressure so that about 3% of ripe cherries are not pulped and are removed with the green cherries. This margin of error ensures that no green cherries are mistakenly pulped. The pulp and coffee beans are then separated by centrifugal force and a barrel screen system.

Coffee Fermentation

The coffee beans covered in the slippery mucilage can be sent to the patios to dry as pulped natural coffees or can be sent to coffee fermentation tanks. The coffee fermentation tanks are used to remove the mucilage before drying. The pulped coffee beans are put into cement tanks with water and are allowed to ferment for 16-36 hours. On the way to the fermentation tanks, another density separation can occur. The highest quality coffees are the densest and should be separated and fermented in a different tank.

The coffee fermentation time depends on a number of factors including the amount of coffee fermenting, water temperature, and humidity. The mucilage is made up of pectin materials including protopectin (33%), reducing sugars including glucose and fructose (30%), non-reducing sugars such as sucrose (20%), and cellulose and ash (17%). Protopectin is not water soluble and will hydrolyze to pectinic acid in the fermentation tanks. Hydrolysis of the protopectin and degradation of the pectin by enzymes is the process that occurs to remove the mucilage during fermentation. Currently, the best way of determining the end of coffee fermentation is to feel the coffee beans to determine if they are still encased in mucilage. If the coffee beans are fermented for 36-72 hours, stinker beans develop. Lactic, acetic, and propionic acids are produced in this process and are believed to prevent the traditional fermentation taste by inhibiting mold growth that regularly occurs during drying on a patio in humid conditions.

Coffee Drying

From the coffee fermentation tanks, the beans are moved to drying patios and dried to 11-12% moisture content. See coffee drying section for more details. A small portion of the lot is hulled and milled by a mini-huller. Three hundred grams of coffee is classified for defects (100 grams is often used), and the percentage of each screen size is determined. Then, 200-300 grams of coffee is roasted in a sample roaster and cupped to determine coffee quality. Ideally no lots will be mixed until the coffee has been classified and cupped. The coffee remains in pergamino until shipment time to help protect the flavor and aroma of the coffee.

Roger, 2003 hence developed the adopters' categories to measure the innovativeness of farmers over the average time of adoption.

Innovators: They constitute 2.5% of the social system population and are willing to take risks, have the highest social status, have financial liquidity, are social, and have the closest contact to scientific sources and interaction with other innovators. Their risk tolerance allows them to adopt technologies that may ultimately fail. Financial resources help absorb these failures.

Early adopters: 13.5% of the social system population are these individuals with the highest degree of opinion leadership among the adopter categories. Early adopters have a higher social status, financial liquidity, and advanced education and are more socially forward than late adopters. They are more discreet in adoption choices than innovators. They use the judicious choice of adoption to help them maintain a central communication position.

Early Majority: They constitute 34% of the social system population and tend to adopt an innovation after a varying degree of time that is significantly longer than the innovators and early adopters. The early Majority have above-average social status, and contact with early adopters and seldom hold positions of opinion leadership in a system.

Late Majority: They adopt an innovation after the average participant. These individuals approach an innovation with a high degree of scepticism after the majority of society has adopted the innovation. They comprise 34% who are typically sceptical about an innovation, have below-average social status, and little financial liquidity, are in contact with others in the late majority and early majority, and have little opinion leadership.

Laggards: They are the last to adopt an innovation. Unlike some of the previous categories, individuals in this category usually constitute 16% of the social system population who show little to no opinion leadership. These individuals are typically aversive in nature to extension agents. Laggards typically are the oldest among adopters who focus more on "traditions", lowest social status, lowest financial liquidity, and usually have contact with only family and close friends.

METHODOLOGY

This study was conducted in Kogi State, Nigeria. Kogi is a state in the Middle-Belt of Nigeria. The population for the study comprised 631 registered coffee-based farmers in Kogi State, Nigeria. These comprised (i.e. the addition of registered population of coffee-based farmers; 219, 165, 172, and 75 which makes up 631) registered coffee-based farmers in the study area. Multistage sampling procedure was used to select coffee-based farmers. The first stage involved a purposive selection of four Local Government Areas (4-LGAs) with the highest, medium and lower production of coffee in recent times. The primary data were collected through field surveys. Respondents were interviewed through the use of a questionnaire while a few respondents filled the well-structured questionnaire. The interview schedule with the questionnaire was designed to obtain information relevant to the objectives of the study. This study considered two paramount sets of variables which are independent and dependent. Constraints faced by the farmers in the adoption of ESP among coffee-based farmers were measured by asking the respondents to indicate the challenges they face towards the adoption of standard practices and it was ranked using a 3-point Likert-type scale such as Highly Severe constraint (HSC-3), Severe Constraint (SC-2), Not Severe constraint (NSC-1). This was added to obtain 6 and was divided by 3 to obtain the mean point of 2; any constraint below 2 points was regarded as not severe. Both descriptive and inferential statistics were used for data analysis. Descriptive statistics including the frequencies, percentages, and means were used to summarize the adoption of export standard practices (ESP). The Statistical Package for Social Science (SPSS) software was used to analyze the objectives.

RESULTS AND DISCUSSION

Table 1: Distribution of respondents by socio-economic characteristics (n=227)

Socio-economic Characteristics	Frequency	Percentage	Mean	Standard Deviation
Age (Years)				
<30	8	3.5		
30 – 49 years	97	42.7	43.74	8.61
50 – 59 years	87	38.3		
60 years and above	35	15.4		
Sex				
Male	191	84.1		
Female	36	15.9		
Marital status				
Single	17	7.5		
Married	197	86.8		
Divorced	9	4.0		
Widowed/widower	4	1.8		
Level of education				
No formal education	41	18.1		
Primary education	53	23.3		
Secondary education	104	45.8		
Tertiary education	29	12.8		
Household Size				
<5	59	26.0		
5-10	103	45.4	8.52 person	2.11
11 persons and above	65	28.6		
Experience in cultivating coffee				
<10	19	8.4		
10 – 19 years	27	11.9		
20 – 29 years	87	38.3	21.51	5.69
30 years and Above	94	41.4		
Size of land (ha) for coffee				
<2.5	9	4.0		
2.5 – 5 ha	81	35.7	5.76 ha	1.51
5 ha and Above	137	60.4		

Source: Computed from Field Survey, 2021.

Age

Results in Table 1 show that the mean age of the respondents was approximately 44 years, hence, the farmers were still in their economically productive ages and can therefore withstand the rigour associated with coffee farming. However, out of 227 respondents coffee-based farmers, 42.7% were between 30 and 39 years, 38.3% were found between 50 and 59 years, and 15.4% were 60 years and above. These findings imply that the cultivation of coffee in the study area was dominated by the youth farmers who were in their productive ages. This finding is incongruent with that of Kelemen, (2014), who opined that learning reduces with an increase in age. Thus, the adoption of farming-related practices has been documented to be influenced by age (Serebrennikov, *et al.*, 2020, Wauters & Mathijs, 2014 Liu, *et al.*, 2018). This study is also supported by Guangchen Guo, *et al.*, (2015) who concluded that young farmers appear to utilize new technologies in agricultural production more than the elderly ones, and input and experience of the older farmers do not have enough to compensate for the adverse effect of their age.

Sex

The result in Table 1 also shows that the majority (84.1%) of the respondents were male while females constituted 15.9% of the coffee farmers in the study area. The reason for this may not be far-fetched as women are less likely to allocate farmland for tree crop production in many parts of Nigeria due to cultural implications of land ownership (Chigbu, 2020). Culturally and traditionally, women's access to farmland is limited as they are not mostly allowed to access farmland for plantation farming. This is because this type of farming is assumed to be synonymous with permanent ownership of farmland. Able women should be encouraged to go into coffee production since technologies are available to reduce the drudgery in land preparation, application of input, and pest and disease control among others. Women must be seen as part of the nation's agricultural development process.

Marital Status

It was also observed from the results that the majority (86.8%) of the respondents were married while 7.5% of the respondents were single, 4.0% were divorced and 1.8% was widowed. According to Ebewore, *et al.*, (2013), marital status is a crucial factor in shaping social rural participation and acceptance. This implies that marital status is a measure of commitment as opined by Aderolu, *et al.*, (2014) and according to the same study 100% of the Coffee farmers in Kogi State were married. Similarly, Akinpelu, *et al.*, (2020) findings on the marital status of coffee farmers in Kogi State reported that over 60% of the farmers were married and marital

status was a significant variable in their involvement in coffee production. These findings, therefore, conform to the existing literature that the majority of farmers who cultivate Coffee in Kogi State are married with accessibility to family labour and commitment to the production of the crop. This would have significant contributions to the adoption of export standard practices by increasing the number of farmland available for coffee production.

Level of Education

Results in Table 1 further show that less than average (45.8%) of the respondents had secondary education, 12.8% had tertiary education, 23.3% had primary education, and 18.1% had no formal education. This means that most of the coffee farmers were educated and very few were without formal education. This implies that the level of education is adequate to promote awareness and adoption of ESP that may enhance their means of livelihood, particularly in coffee production. This is because education has been researched to be a significant determinant of the adoption of farming practices as corroborated by Akinpelu, *et al.*, (2020), Adinoyi & Atanda, (2016), and Mohammed, *et al.*, (2013) in their various studies on adoption. Thus, the farmers who completed minimum education of secondary level are most likely to adopt modern varieties and experience the yield-augmenting effects of education. This indicates that attaining a minimum threshold level of education helps farmers in ways of improving their skills and capabilities to collect and analyse information and execute that on the field. It creates a conducive environment for modern technology adoption and thereby augments productivity (Paltasingh & Goyari, 2018).

Household Size

The numbers of members of a household are those that eat from the same pot and sleep under the same roof at a particular period. In this study, it was found that on average, about 9 persons represented members of the Coffee farmers' households and about 45.4% had between 5 and 10 household members while 28.6% had between 11 persons and above as their household size. The findings show that Coffee farmers in the study area had moderately high household members and the implication of this is that they may have enough members of their family being used as family labour provided their interest in farming is aroused through better yield, the use of technology, and better profit. The finding is in line with the findings of Agwu, *et al.*, (2019), who reported that 50% of farmers in Kogi State had between 5 and 10 household size. Akinpelu, *et al.*, (2020), reported that in the same state, 52.0% and 24.0% of Coffee farmers had between 5-10 and 11 and above as members of their household, respectively.

Years of Experience in cultivating Coffee

Results in Table 1 show that 41.4% of the respondents had between 20 and 29 years of experience and 38.3 % had experience between 30 years and above in coffee production. The average years of experience of the respondents in coffee production were 21.5 years. This means that the experience of the farmers may come to play in the awareness and adoption of practices that will ensure that the crops, being export crops are internationally recognized and accepted, provided the information of the export standard practices is sought by the farmers. This study contradicts the findings of Agwu, *et al.*, (2019), who reported that in Kogi State the average farming experience recorded by Coffee farmers was 19 years, while Akinpelu, *et al.*, (2020), asserted that Coffee farmers in the State had on average, 29 years of farming experience and Mohammad, *et al.*, (2013), affirmed that about 78% of the Coffee farmers in the state had over 30 years of farming experience in coffee production. Reason been that most of the coffee-based farmers were aged farmer, they had the experience but the experience is arcade one.

Size of farmland (Hectare)

The result from the table shows that the majority (60.4%) of the respondents had 5 hectares and above, 35.7% had between 2.5 and 5 hectares while 4.0% of the farmers cultivated less than 2.5 hectares of available farmland. The average farm size cultivated by the farmers in the study area was 5.8 hectares. In Africa, due to the land tenure system, farmland ranging from 1–5 hectares is classified as small scale while between 5 hectares and above are classified as medium scale according to Lowder & Raney, (2016). This implies that most of the farmers in the study area operate medium-scale farming with an average farm size of 5.8 hectares. This finding conforms to the opinion of Akinpelu, *et al.*, (2020) whose results showed that farmers cultivated about 5 hectares of farmland for Coffee production but not support of Aderolu, *et al.*, (2014) who posited that the average farm size dedicated to Coffee production in Kogi State was approximately 6.1 hectares. Because the farmers were small-scale farmers, low income, and there is no support in terms of loan to expand the farm land.

Table 2: Distribution of respondents based on their Socioeconomic characteristics (Cont'd) (n=227)

Categories	Frequency	Percentage	Mean	S. Deviation
Type of coffee cultivated				
Robusta coffee	204	89.9		
Arabica coffee	23	10.1		
Mode of farmland acquisition				
Rent	22	9.7		
Gift	17	7.5		
Purchase	79	34.8		
Inheritance	109	48.0		
Type of labour used**				
Family labour	24	10.6		
Hired	182	80.2		
Both	88	38.8		
Average income from coffee (Naira)/year				
<700,000	27	11.9		
700,000 - 800,000	55	24.2		
800,001 - 900,000	21	9.3	795,500.14	139,138.19
900,001 - 1,000,000	63	27.8		
1,000,000 and Above	61	26.9		
Other occupation**				
Other farming activities	195	85.9		
Artisan	67	29.5		
Business	71	31.3		
Public service	58	25.6		
Income from Other occupations/annual (Naira)				
<500,000	76	33.5		
500,001 - 600,000	41	18.1		
600,001 - 700,000	27	11.9		
700,001 - 800,000	39	17.2	507,590.44	193,881.73
800,001 - 900,000	31	13.7		
900,001 and Above	13	5.7		
Contact an extension agent	61	26.9		
Access to farm credit	96	42.3		
Awareness of ESP in coffee production	12	5.3		

Source: Computed from Field Survey, 2021.**Multiple responses given

Types of coffee cultivated

The result in Table 2 shows that the respondents (90.0%) of the Coffee farmers in Kogi State cultivated Robusta variety of the coffee crop while only 10.1% cultivated Arabica type. The findings show that the most common type of Coffee cultivated in the study area was the Robusta type. This finding is buttressed by Aderolu, *et al.*, (2014), who concluded that 100% of farmers in the Kabba Local Government Area of Kogi State cultivated Coffee Robusta; Alli, *et al.*, (2021), revealed that although two types of Coffee are cultivated in Nigeria Coffee Robusta was the commonest among cultivated variety suitable for the soil and other climatic conditions in Nigeria.

Mode of farmland Acquisition

On the mode of farmland acquisition, the result shows that most (48.0%) of the respondents acquired their farmland through inheritance, 34.8% acquired their farmland by outright purchase while 9.7% and 7.5% of the farmers respectively acquired their farmland through rent, and gift. This means that a little less than half of the respondents' utilized inherited farmland from their family members for Coffee production. Usually, the land is a critical factor in the production of economic tree crops in Nigeria due to undue pressure on land as a result of the land tenure system. Therefore, the easiest way of securing land for such permanent crops is through inheritance because land ownership is in the hands of the individual and community as an entity, hence, individuals and communities control the ownership of land. In a situation where a farmer has enough money to purchase, it is always difficult to acquire a large expanse of farmland due to the communal and family influence that usually generates a crisis for the buyers. This finding is in tandem with the studies of Aderolu, *et al.*, (2014), and Mohammed, *et al.*, (2013), who reported that 90.0% and 87.0% of the coffee farmers in Kogi State acquired their farmland by inheritance while only 10.0% and 8.0% were reported by the authors as those that purchased their farmland. This simply infers that land by inheritance is the viable mode of land acquisition for plantation farming like Coffee production.

Types of labour used

The result in Table 2 shows that most (82.2%) of the Coffee farmers used hired labour for Coffee production, 11.0% indicated the use of family labour while 38.8% of the farmers used both family and hired labour. This means that hired labour is the most common type of labour engaged in the study area. The use of family labour for farming has been affected by the rapid migration of youth out of rural areas to urban areas due to poor condition of basic amenities that

could make them stay (Ajaero & Onokala, 2013). This has been a major setback to farming in Nigeria as farming primarily takes place in rural areas due to less pressure on land for building Construction and other industrial uses (Yusuf, 2018).

Average annual income from Coffee

The results in Table 2 show that on average farmers earned ₦795, 500.14k from the sales of Coffee annually. This means that every month, a farmer earns ₦66, 291.00 as an income from the sales of Coffee. This indicates that Coffee farmers in Nigeria earn far more than the monthly minimum wage of ₦30, 000.00 per month and ₦360, 000.00 per annum stipulated by the government. This implies that Coffee production may be profitable just like every other tree crop in Nigeria. Though, the Cost of inputs and other factors of production may grossly affect the farmers' income under adequate cost and returns analysis of coffee production. Even with this, it could be observed from the above analysis that coffee farming enterprise is profitable. This conforms to the finding of Mohammad, *et al.* (2013), who stated that the profitability index of the coffee farmers was 0.29; an indication that coffee farmers earn 0.29 on every naira invested into production and this low level of profit was attributed to the high cost of labour. This is because the study submitted that the cost of labour takes about 95.16% share of the total variable cost. This may be attributed to the scarcity of family labour in rural areas where farming takes place; hence, farmers have no choice but to depend on hired labour.

Other occupation

The result of the findings shows that coffee farmers did not just depend on coffee production as the only means of livelihood but engaged in other forms of enterprises such as crop and animal rearing, artisanship, trading, and civil and public services to complement the income from coffee. Specifically, the findings show that 85.9% of the farmers engaged in the production of food crops, 29.5% engaged in artisanship, 31.3% were found to have indicated their involvement in trading and 25.6% of the farmers were public servants. The findings also revealed that Coffee farmers had a high degree of income diversification through agro-forestry. This may be of great benefit as income from agro-forestry may be useful in keeping the family going before the maturation of Coffee trees. The concept of agro-forestry is a strategy to combine food crops with cash crops in a rotational arrangement (Allen, 2001). This is based on the assertion of Feintrenie, *et al.*, (2010), on the significance of agro-forestry as a strategy to alleviate poverty. This implies that coffee production takes a longer period to attain gestation and farmers solely depend on them for survival and may suffer before this period. Also, the

establishment of coffee production requires huge investment, and getting income from other sources may be of great help in securing such an investment in coffee production.

Income from other sources

The result further shows that a reasonable amount of income was obtained by the farmers from other sources. It was revealed that on average, farmers earned ₦507, 590.44k from other sources.

This will serve as a great source of investment for the maintenance of the coffee plant which takes almost 3 – 4 years for the newly established plantation. Most (33.5%) of the farmers earned less than ₦500, 000.00 as their annual income from other sources apart from Coffee production while only 5.7% earned ₦900, 000 and above. For instance, in every other tree crop farming in Nigeria, farmers are involved in other economic enterprises that would sustain them during the growing period and off-season.

Contact an extension agent

The finding reveals that contact with extension agents was very poor as very few (26.9%) of the farmers indicated that they had contact with extension agents. This indicates that extension visit to coffee farmers in the study area was poor. The implication of this is that coffee farmers may be poorly updated concerning new technologies that are useful for optimal production including information on the ESP that may promote and encourage the production of high-quality coffee beans that would be internationally recognized and accepted by the international communities. The finding supports the study of Aderolu, *et al.* (2014), who submitted that only 15.0% of Coffee farmers received information from extension agents in Kogi State. The significance of extension contact was emphasized by the study of Ntshangase, *et al.*, (2018), where extension contacts made huge contributions to the adoption of zero tillage among farmers in Zashuke, KwaZulu-Natal Province in South Africa.

Access to credit

Access to credit is also another critical factor of production in farming. Based on the findings of this study, it was observed that less than the average (42.3%) of the farmers had access to credit in form of either loans or grants. This shows that farmers may be unable to manage large hectares of farmland if they are to depend on their finance without assistance from external sources such as the government, NGOs, and other stakeholders in agriculture. Similarly, Ntshangase, *et al.*, (2018), indicated that only about 10% of farmers in South Africa could access credit for farming while Ajah, (2017), posited that farmers in Nigeria only access credit through their self-built efforts such as cooperative society and other forms of self-help

mechanism as government pays less attention toward improving agricultural productivity in terms of credit and grants to farmers.

Awareness of Export Standard Practices (ESP) among coffee-based farmers

The results in Table 2 show that very few (5.3%) of the respondents indicated their awareness of ESP among farmers. This is an indication that awareness of ESP among Coffee farmers was low despite the introduction of these practices by CRIN to increase farmers' profitability in coffee production following the guideline of the International Coffee Organization (ICO, 2018). This finding implies that coffee farmers may still be using the old techniques for coffee production. The low awareness of the ESP among coffee-based farmers and processing may be attributed to the poor extension contact earlier recorded. This may harm the quality of Coffee beans and farmers' profit in the study area.

Table 3: Distribution of respondents according to Adoption level of Export Standard Practices (ESP) by coffee-based farmers

	NA	A	I	E	T	UR	SU		
Practices	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	Mea n	Ra nk
		227						4.51	1 st
Fermentation must be covered and protected from rain and/or cold.		(100.0)	227 (100.0)	227 (100.0)	227 (100.0)		227 (100.0)		
The bagged beans should be stored off the ground and away from walls.	195 (85.9)	32 (14.1)	32 (14.1)	32 (14.1)	32 (14.1)		32 (14.1)	2.63	2 nd
Drying of beans on a raised slab.	199 (87.7)	28 (12.3)	28 (12.3)	28 (12.3)	28 (12.3)		28 (12.3)	2.49	3 rd
Regular turning during drying.	201 (88.5)	26 (11.5)	26 (11.5)	26 (11.5)	26 (11.5)		26 (11.5)	2.12	4 th
The berries is sorted out after harvesting and either of the processing technique is carried out (Dry and Wet processing).	209 (92.1)	18 (7.9)	18 (7.9)	18 (7.9)	18 (7.9)		18 (7.9)	1.83	5 th
Store beans away from strong odours e.g. smoke	212 (93.4)	15 (6.6)	15 (6.6)	15 (6.6)	15 (6.6)		15 (6.6)	1.65	6 th
Regular harvesting of ripe berries fortnightly and weekly at peak periods.	208 (91.6)	19 (8.4)	19 (8.4)	19 (8.4)	19 (8.4)	6 (2.64)	13 (5.7)	1.57	7 th
Dried beans should be packed into clean jute bags.	222 (97.8)	5 (2.2)	5 (2.2)	5 (2.2)	5 (2.2)		5 (2.2)	1.45	8 th
Turning of beans once daily during fermentation.	227 (100.0)							1.00	9 th
The thickness of the layer of drying beans should be between 3 to 5 cm.	227 (100.0)							1.00	9 th
The storage house should be well-ventilated.	227 (100.0)							1.00	9 th

Source: Computed from Field Survey, 2021. NA= Not Aware, A= Aware, I= Interest, E= Evaluation, T= Trial, UR= Used but Rejected, SU= Still Using

Results in Table 3 show that 8.4% of the respondents adopted the use of regular harvesting of ripe berries fortnightly and weekly at peak periods while 2.64% discontinued its usage. Furthermore, 91.6% were not aware of the regular harvesting of ripe berries fortnightly and weekly at peak periods, 8.4% were at the awareness stage, 8.4% were interested in the technology while 8.4% and 8.4% of the respondents were at the evaluation and trial stages of the adoption of ESP. The implication of this finding is that majority of the respondents were not aware of this technology as a result of poor extension and other channels of communication contact in the study area. The low number that adopted must have seen the positive effect of carrying out this practice as a way of improving the quality of the product for the international market and they must have made the deliberate effort or unconsciously adopted such practice without knowing the implications on the ESP quality among Coffee-based farmers.

The result in Table 3 reveals that 7.9% of the respondents adopted the sorting out of berries after harvesting while 92.1% indicated their non-awareness of this technology as one of the practices to improve the acceptability of the product in the international market. Interestingly, each 7.9% of the respondents were aware, interested, evaluated, and tried the technology without any recorded discontinuance of the technology in the study area.

The result in Table 3 shows that the majority (100.0%) of the respondents adopted the technology of fermentation covered and protected from rain or cold. This means that the majority (100.0%) of the coffee farmers were aware, interested, evaluated, and tried the technology before totally adopted without any record of discontinuance in the study area. Because the adoption process, awareness, interest, evaluation, trial, and adoption (AIETA) were familiar to the farmers' and they were comfortable with it. This finding implies that fermentation is gaining popularity among farmers probably because they were already evaluated the practice. This agrees with the findings of Edeoghon, (2008), who stressed that farmers are usually more involved in practices that they are more familiar with than any other practices.

The result in Table 3 reveals that the majority (100.0%) of the respondents indicated their non-awareness of the turning of beans once daily during fermentation. This finding implies that the respondents failed to recognize the importance of turning the beans daily for even dryness and quality of the Coffee beans. This may be responsible for the poor quality of Coffee beans usually recorded in Nigeria by the international markets (Aderolu, *et al.*, 2014). There was no adoption at all as a result of the low knowledge they have about the significance of fermentation to the quality of agricultural produce. This is in line with the assertion of Nutley, *et al.*, (2002), who identified knowledge as the first and critical stage in the innovation decision-making process.

The result in Table 3 shows that 12.3% of the respondents adopted drying of beans on a raised slab, 87.7% were never aware of drying of beans on a raised slab but only 12.3% continued the usage of this practice. The significance of this practice may need to be re-integrated into the agricultural extension programme for better adoption as this seems to encourage fast and better drying of Coffee beans for quality assurance purposes. The poor adoption and continuous usage are an indication that respondents had poor knowledge of the importance of this practice as part of the export standard practices that could enhance the quality of Coffee beans.

The result of the findings in Table 3 shows that the majority (100.0%) of the respondents were not aware of the thickness of drying materials between 3 and 5cm and none of them was found to be using it at the time of data collection for this study. This shows that respondents never

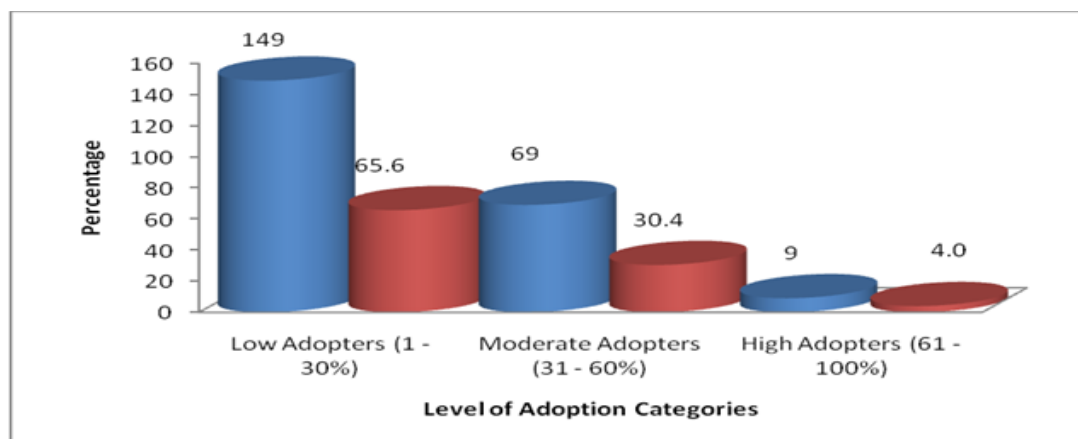
consider this practice as a measure to improve the quality of Coffee beans. The results in Table 12 reveal that 11.5% of the respondents adopted regular turning during the drying of coffee beans while 88.5% were completely not aware of this practice in the study area. However, 11.5% of the respondents were at the stages of awareness, interest, evaluation, and trial of this technology and never discontinued the usage.

It was reported in Table 3 that only 2.2% of the respondents adopted the package of dried coffee beans into clean jute bags while 97.8% were not aware of this export standard practice in the study area. Moreover, 2.2% were at the stages of awareness, interest, evaluation, and trial of this technology. This finding implies that the respondents failed to adopt and recognize the importance of packaging dried coffee beans in clean jute bags. Doing so will improve the quality of the product and increase the market value.

The results in Table 3 indicate that very few (14.1%) of the respondents adopted the storage of bagged beans off the ground and away from walls while the majority (85.9%) of the farmers were not aware of the practice in the study area. Hence, 14.1% of the respondents were each at the stages of awareness, interest, evaluation, and trial of this technology without discontinuance. On the storage in a well-ventilated house, it shows that 100.0% of the respondents were never aware of this practice probably because of poor extension contact in the study area. This finding implies that the farmers were not even ready to continue this technology since all of them were not aware.

The result in table 3 reveals that only 6.6% of the respondents adopted the storage of beans away from strong odour in the study area while the majority (93.4%) of the farmers were not aware of this practice. This finding implies that the coffee beans being produced in the study area may be substandard and not meeting up with the quality of beans required to be sold in the international market.

Figure 1: in parentheses represented percentages.



Level of adoption

Source: Computed from Field Survey, 2021.

On the overall level of adoption, results in Figure 1 show that 65.6% of the respondents recorded a low level of adoption while 30.4% and only 4.0% had moderate and high levels of adoption. The low level of adoption of the Export Standard Practices recorded by the farmers may be attributed to their low knowledge level and high knowledge gap about the export standard practices as knowledge proxy by awareness is a first and indispensable stage in the adoption process (Nutley, *et al.*, 2002).

The low adoption level of the practices among coffee farmers might have been attributed to inadequate interactions of coffee-based farmers with the extension agents and other stakeholders in the Coffee industry and among themselves on the best way to solve their problems as extension contact was poor based on the findings of this study. Adoption would only take place with input support, information and monitoring, otherwise, the rate of rejection may be high based on the findings of Ukaejiofo, *et al.*, (2013).

Distribution of respondents according to their constraints to adoption of ESP among coffee-based farmers

Table 4: Constraints to adoption of ESP and level of severeness

Constraints	Yes	Percent	No	Percent	Not severe	sometimes severe	Severe	Highly severe	WT	WA
Availability of improved seeds/seedlings	208	91.6	19	8.4	17	78	45	87	656	2.89
Availability and acquisition of adequate land for coffee production	109	48	118	52	17	80	35	95	662	2.92
Low cost of farm input for the adoption of ESP	172	75.8	55	24.2	29	108	3	87	602	2.65
Inadequate financial support for ESP	153	67.4	74	32.6	25	80	41	81	632	2.78
The old age of coffee farm	151	66.5	76	33.5	2	121	38	66	622	2.74
Inadequate visits of extension agents or worker	206	90.7	21	9.3	4	143	59	21	551	2.43
Inadequate sensitization of farmers on coffee ESP	10	4.4	217	95.6	27	122	14	64	569	2.51
Inadequate training in coffee processing	199	87.7	28	12.3	3	51	38	135	759	3.34
Inadequate capacity building on coffee ESP	187	82.4	40	17.6	25	34	41	127	724	3.19
Inadequate storage facilities for coffee ESP	113	49.8	114	50.2	25	69	41	92	654	2.88
Poor dissemination of current information on coffee ESP	227	100	0	0	24	78	17	108	663	2.92

Source: Field Survey, 2021 *Mean >2.5 = Highly Severe Constraints

Results in Table 4 show that inadequate training on coffee processing (WA = 3.34), inadequate training on capacity building (WA = 3.19), availability and acquisition of adequate land (WA = 2.92), availability of improved seeds/seedlings (WA = 2.89), inadequate financial supports (WA = 2.78) were the identified constraints to adoption of ESP among farmers. However, inadequate training on coffee processing (135), inadequate training and capacity building (127), poor dissemination of current information on coffee (108), availability and acquisition of adequate land (95), and inadequate storage facilities (92) were found to very serious constraints among the identified major constraints. Furthermore, the Low cost of farm input for the adoption of ESP (29), Inadequate sensitization of farmers (27), Inadequate financial support (25), Inadequate capacity building (25), and Inadequate storage facilities (25) were also found not to be serious constraints to adoption of export standard practices in the study area.

The identified constraints are very critical to the adoption of ESP as they determine the quantity and quality of the products that would be produced by the farmers. For example, the inability to access farmland will limit the expansion of farmland, and poor access to finance and

information could also hinder the scaling up of farms, thereby reducing the expected yield (Uiaene, *et al.*, 2009, Genius, *et al.*, 2010). Inadequate information may be misleading and farmers have a high tendency of misinterpreting information to suit their local practice. Similarly, Mohammed and Temu, (2008), posited that access to credit is an important stimulus to the adoption of technologies. Also, Uaiene, *et al.*, (2009), stressed the significance of farm size which could be proxy by the access to land in the adoption of technology in agriculture while studies like the ones conducted by Uematsu, *et al.*, (2010), Mishra, *et al.*, (2005); Mishra, *et al.*, (2009), Rahm & Roberts, *et al.*, (2004), confirmed the importance of current information dissemination to the adoption of technologies among farmers.

Results of Hypotheses Testing

H₀₁: There is no significant relationship between some selected socio-economic characteristics of coffee-based farmers and the adoption of ESP.

The binary logistic regression model showing the relationship between socio-economic characteristics and level of adoption

Table 5: Determinants of level of adoption of ESP

	Coeff (B)	Wald	Odd Ratio	Decision
Age (years)	0.691	0.912	1.996	NS
Sex	0.048	1.732	1.049	NS
Level of education	1.813	3.916*	6.129	S
Household Size	0.196	1.073	1.217	NS
Experience (years) in cultivating coffee	1.611	2.881*	5.008	S
Size of land (ha) for coffee production	0.519	1.534	1.680	NS
Mode of farmland acquisition	0.092	0.729	1.096	NS
Type of labour used	2.619	4.133**	13.722	S
Income (Naira) from other occupations	3.261	5.125**	26.076	S
Contact an extension agent	2.103	3.019*	5.108	S
Access to farm credit	2.172	3.162*	8.776	S
Awareness of ESP in coffee	2.719	4.129**	15.165	S
Constant	4.419	15.772**	83.013	S

Source: Field Survey, 2021 Nakerkalke R – Square = 0.421, log-likelihood = 0.8151, Overall

percentage prediction = 69.27 *Significant at 0.05, **Significant at 0.01

Results in Table 5 show that the binary logistic regression model was able to explain about 42.1% variation in the level of adoption of export standard practices in Coffee production and

processing among farmers ($R = 0.421$). Also, the model classified correctly 69.27% of cases while the remaining 30.73% were not predicted by the model. Hence, the findings revealed that level of education (Odd ratio = 6.129), experience in coffee cultivation (Odd ratio = 5.008), labour used (Odd ratio = 13.722), income from other sources (Odd ratio = 26.07), access to credit (Odd ratio = 8.77) and awareness of ESP (Odd ratio = 15.16) were the significant variables that influenced the adoption of ESP among coffee-based farmers in the study area at both 0.05 and 0.01 levels of significance. The odd ratio of 6.129 for the level of education implies that being educated increases the odd of adopting ESP by 6 times; meaning that educated farmers are more likely to adopt ESP 6 times more than non-educated farmers. This is in consonant with the studies of Mignouna, *et al.*, (2011); Lavison, (2013); Namara, *et al.*, (2003), and Okunlola, *et al.*, (2011), who opined that level of education was a positive determinant of adoption in their various findings.

Furthermore, experience in the cultivation of Coffee with an odd ratio of 5.008 is an indication that farmers with high experience have the likelihood of adopting ESP five times more than those with low experience proxy by the number of years cultivating and processing Coffee. Also, the type of labour used was significant at $P < 0.01$ while income from other sources with an odd ratio of 26.076 signifies that farmers who have other sources of income would be 26 times better in the adoption of ESP than those without other income sources while contact with extension (Odd ratio = 5.108) and access to credit (Odd ratio = 8.77), as well as awareness of ESP (Odd ratio = 15.16), imply that farmers who have contact with extension agents have the chance of adopting ESP five times faster than those without extension contact and those that had awareness of ESP would be 15 times probably adopt than those who have never heard about it. The findings conform to the studies of Akudugu, *et al.*, (2012), and Genius, *et al.*, (2010), who affirmed the significance of extension contact to the adoption of technology, and Mohammed & Temu, (2008), who submitted that access to credit a significant determinant of technology adoption among the farmers.

H₀₂: There is no significant relationship between the farmers' knowledge of ESP and the adoption of ESP among coffee-based farmers.

Linear Regression analysis showing the influence of knowledge on the adoption of ESP among Coffee-based farmers

Table 6: Influence of Knowledge on the adoption of ESP

	Co-eff	Std. Err.	T – ratio	Decision
Knowledge	1.518	0.162	9.370**	S

Source: Field Survey, 2021 R = 0.612; R – Square = 0.375**Significant at 0.01

Evidence in Table 6 shows that knowledge of export standard practices ($t = 9.370$) was positive and significantly influenced the adoption of ESP at $P < 0.01$ and the R – the square value of 0.375 implies that a unit change in knowledge would bring about 37.5% variation in the adoption of the practices by the farmers. This implies that increasing the knowledge level by one unit will increase adoption by about 37.5%. This means that knowledge is an important stage in the adoption of ESP. Therefore, for adoption to be increased, knowledge of such technology should be the entry point. This finding is in agreement with the study of Nutley, *et al.*, (2002), who stated that knowledge is an important component of adoption. It reinforces adoption and ensures that the target audience in any adoption process is well informed about the innovation characteristics such as relative advantage, compatibility, cost, trial-ability, and complexity among others.

Therefore, the study was conducted to investigate the adoption of Export Standard Practices (ESP) among coffee-based farmers in Kogi State, Nigeria where the specific objectives were to: describe the socio-economic characteristics of coffee farmers; identify the farmers’ sources of information on ESP among coffee-based farmers; determine farmers’ knowledge level of ESP among coffee-based farmers; determine adoption level of the farmers’ adoption of ESP among coffee farmers; examine the perceived effect of the adoption of ESP on farmers’ productivity and identify the constraints of farmers to the adoption of ESP among coffee-based in the study area.

A three-stage sampling procedure was used to select 16 communities in 4 Local Government Areas of the State where the concentration of coffee farmers is high. A total of 631 registered coffee farmers were found in the selected LGAs and communities. The Research Advisors Table (2006) sample size formula and Table with 95% confidence and 5.0% Margin of Error were applied to obtain the statistically represented sample size of 227 coffee farmers. Data were collected with the use of a structured questionnaire and interview schedule. However, 227 copies of the questionnaire taken to the field were adequately filled and returned for analysis. This represented a 100% response rate. Thus, 227 respondents were used for this study. Data

collected were described with descriptive statistics such as frequency, percentages, mean, weighted mean discrepancy scores, and charts while binary logistic regression and simple linear regression were used to make inferences from the findings through the stated hypotheses.

Conclusion

Based on the research findings, coffee farmers in the study area embraced and adopted the ESP to their processing of coffee though the adoption level was very low, possibly due to low awareness, low knowledge level of the ESP as established in the study.

- The findings showed that farmers who produce and process Coffee in Kogi State are still in their active age and they could still learn very fast if the opportunity is presented before them to increase productivity and ensure that Nigerian Coffee beans are among the best in the world if they follow the export standard practices in the production and processing of Coffee beans.
- Males dominated the enterprise and most of them had between primary and secondary education which could make the adoption of technologies easier.
- Robusta type of Coffee was popularly cultivated but most of the farmers operate at a medium scale level with about 5 hectares of farmland obtained mostly through inheritance because of their low income.
- Level of education, experience in coffee cultivation, labour used, income from other sources, access to credit, and awareness of ESP were the significant determinants of the adoption of ESP among coffee-based farmers in the study area.
- Even with the limited size of farmland, they make approximately ₦66, 291.00 as monthly income from Coffee production and about ₦507, 590.44 annually from other economic activities.
- Though, the major information sources are intra-personal such as fellow farmers and Coffee Farmers' Association.
- Also, information sources like the Cocoa Research Institute of Nigeria (CRIN), fellow farmers, and radio could be used to increase the adoption of ESP among Coffee farmers in the study area.
- However, very few of these farmers had high knowledge of the parameters used to determine export standard practices in Coffee production and
- The adoption of these practices was very low; hence it leads to reasons for the poor quality of Nigerian Coffee local and international markets.

- The identified constraints are very critical to the adoption of ESP as they determine the quantity and quality of the products that would be produced by the farmers.

Recommendations

Based on the findings of this study, the following recommendations were put forward:

1. There should be sensitization either on the radio, television and other means to inform the coffee farmers on ESP on coffee.
2. Educating and training of coffee farmers on ESP to boost their knowledge on post-harvest processing techniques on coffee.
3. Educate the coffee farmers on the importance and significant of adopting the ESP compared to the previous techniques on coffee processing.
4. There should be solution to major constraints faced by coffee farmers in coffee production and processing. Extension agents could arrange programmes for coffee farmers inform of training.
5. Stakeholders (such as farmers, processors, input dealers, Nigeria export promotion council (NEPC), standard organization of Nigeria (SON), extension agents, CRIN and the likes) in agriculture must work hard to ensure that the adoption of best practices especially in crops like coffee with international relevance standard is disseminated to the farmers to make Nigeria a home for producing high-quality coffee crops in the world. This will serve as a way of restoring Nigeria's glory in agriculture.
6. CRIN assisted by extension agent or researchers should do regular teaching like workshops and seminars on adoption of ESP.
7. Coffee farmers on their own should make effort to visit CRIN for information on ESP and not rely only on other farmers' information.
8. Young aged able body coffee farmers should be sensitized, motivated, encouraged, trained, and financed on ESP and good quality coffee production to sustain its production in the study areas and Nigeria as a whole by governments.
9. Women who are critical stakeholders (coffee farmers) in agriculture should be encouraged by the government and community leaders to own plantation farming as their contributions to arable crops are recognized worldwide. Able women should be encouraged to go into coffee production since technologies are available to reduce the drudgery in land preparation, application of input, and pest and disease control among others. Women must be seen as part of the nation's agricultural development process.

10. Efforts must be made by the authority of the Cocoa Research Institute of Nigeria (CRIN) to ensure that Export Standard Practices in Coffee knowledge are disseminated to the farmers to increase the adoption of the practices and ensure that farmers' economic environment is favourable in terms of income from such crops.
11. Stakeholders in the agricultural sector should take the advantage of the use of social media to contact farmers, especially Coffee farmers with relevant information that could improve the quantity and quality of agricultural products in Nigeria.
12. Awareness creation through mass media, symposiums, seminars, workshops, conferences, fliers, and pamphlets among others should be carried out to sensitize and enlighten the coffee farmers on ESP practices in post-harvest processing on coffee production.
13. Coffee farmers and any interested members of the public who had desired coffee production should be encouraged to carry out soil testing before planting on such soil and the type of coffee variety to be planted.

Contributions to the body of knowledge based on empirical findings

The study will contribute to the body of knowledge in agricultural extension and rural developments as follows:

1. The study documented that socio-economics like sex, age, marital status, level of education, household size, farm size, farmers' experience etc.in the study area.
2. The study provided quantitative data on source of information on ESP in the study area.
3. The study ascertained knowledge level of the coffee farmers on ESP in the study area.
4. The study provided quantitative data on adoption level of coffee processors in the study area.
5. The study documented the perceived effect of the adoption of ESP on farmers' productivity in the study area.

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INVESTIGATING THE UTILIZATION OF AQUAFABA IN THE FOOD INDUSTRY

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Abstract

Trends towards healthy and environmentally friendly diets have increased interest in more affordable and nutritious plant proteins as an alternative to animal protein sources. Plant protein sources such as legumes and pulses allow the manufacturing of products similar to animal proteins, thanks to their functional properties such as water and fat holding capacities, solubility, foaming capacity, stability, emulsifying, and gelling. In addition, plant proteins are sustainable, affordable, low in allergens, and high in nutrients. Legume and pulse proteins are characterized by globulins and albumin, which are soluble in salt solutions. Boiling these legumes or pulses is one of the traditional methods of food preparation. Cooking or canning of the legumes or pulses leads to the production of a solution called aquafaba. This aquafaba is obtained from the boiling water of many legumes or pulses such as beans, peas, green lentils, and chickpeas, and can be used as a plant-based rheological additive in food formulations. Aquafaba contains water (92-95%), carbohydrates, low molecular weight proteins (0.95-1.5% w/v; ≤ 24 kDa), saponins, and Maillard reaction products. Aquafaba has different functional properties such as thickening, emulsifying and foaming. The composition of Aquafaba varies depending on several factors, such as pre-soaking of the legume or pulse, legume-to-water ratio, extraction conditions (temperature, pH, time, and pressure), the type and genotype of legume or pulse, as well as the cell wall composition and the structure of legume or pulse. Due to its plant origin and versatile functionality, aquafaba can be used as an egg substitute in the food industry. This study aims to examine the methods used to obtain aquafaba, the end product characteristics, and the possibilities of its use.

Keywords: Aquafaba, food waste, functional properties, legume, pulse

Introduction

In recent years, there has been a growing interest in plant-based proteins as potential candidates to replace animal-based proteins (Sharif et al., 2017). This interest stems from a modern consumer perspective and the increasing awareness of sustainability and healthy living observed in the food industry (Sharif et al., 2017). The production of peas and legumes has increased in the last 15 years, reaching levels such as 12.7 million tons of chickpea production worldwide in 2016 (FAO, 2016). The functional properties of peas and legumes, especially when compared to proteins from animal and milk sources, have been a significant factor in their increased production (Sharif et al., 2017). Functional properties include fat binding, water holding capacity, solubility, as well as gelation, foaming, and emulsifying properties, making pea and legume proteins an alternative source in various food applications, such as salad dressings and imitation chicken nuggets (Sharima-Abdullah et al., 2018). Additionally, nutritional benefits such as low allergenicity, coupled with sustainable production, low cost, and high production volumes, support the industrial use of pea and legume proteins (Gumus, Decker, & McClements, 2017; Papalamprou, Doxastakis, & Kiosseoglou, 2010; Sánchez-Vioque et al., 1998).

Due to changing and evolving consumer needs, it has been observed that technology experts and scientists have long been working on developing plant-based egg substitutes (Mustafa and Reaney, 2020). The reasons behind the quest for egg substitutes can be listed as the increasing number of allergenic factors, the adoption of vegan and vegetarian diets, environmental sustainability, the growing interest in healthy eating, and the expectation of price reductions (Erem et al., 2021). The functional properties of wastewater from the cooking process of chickpeas were discovered a few years ago as a result of the search for a vegan egg alternative to make meringues. The wastewater was named aquafaba based on the Latin origin of water (aqua) and beans (faba), and it is defined as both the liquid from canned chickpeas and the boiling water from chickpea preparations (The Official Aquafaba Website, 2016). In addition to the discovered foaming abilities, the wastewater also exhibits emulsifying properties (The Official Aquafaba Website, 2016). Based on the foaming and emulsifying properties of this plant-based liquid, there is a growing interest in evaluating the capacity of aquafaba as an egg replacement.

Aquafaba History

The term "aquafaba" was coined by the French musician Joël Roessel and was initially used in an attempt to replace egg whites as a foaming agent in a "floating island" recipe (Révolution

végétales, 2014). Roessel mentioned that the stability of aquafaba foam was improved by adding cornstarch and guar gum. He also observed the foamability of red kidney bean and palm heart cooking water (Révolution végétales, 2014). This development has served as a guiding light for food businesses and manufacturers in creating vegan recipes.

Recorded numbers of studies related to Aquafaba by country are given in Figure 1. The countries with the highest number of publications on Aquafaba are Canada (14), Turkey (12), China (11) and South Korea (11).

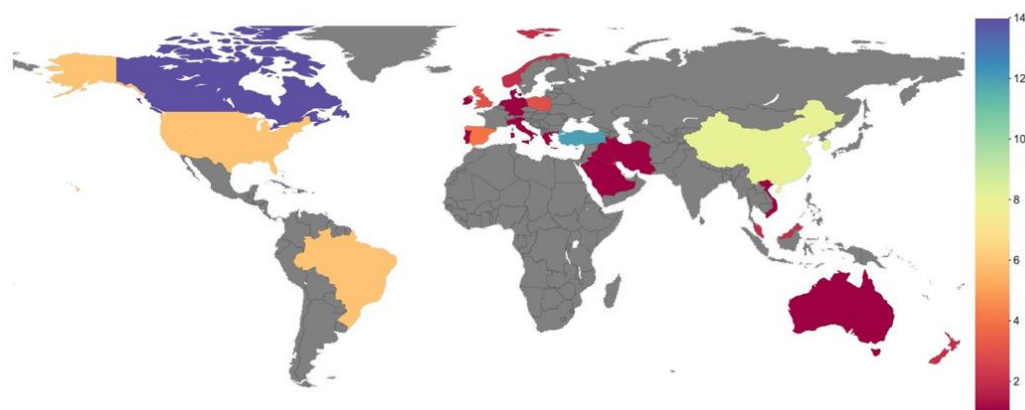


Figure 1. The recorded numbers of studies related to Aquafaba by country

Preparation of Aquafaba

The primary cooking method for legumes involves boiling them after they have been soaked in water, causing them to absorb water and increase in volume, as shown in Figure 2. Chickpeas can be cooked in water and consumed directly or packaged for sale. The water remaining after cooking is referred to as "aquafaba." Commercially produced aquafaba is obtained by drying this water under suitable processing conditions and delivered to suppliers. During the process of cooking chickpeas and preparing them for consumption, the addition of mineral salts to the soaking and/or cooking water can be applied to shorten the cooking time. When comparing the nutritional values of raw and cooked chickpeas, a decrease in the quantity of valuable nutritional compounds in cooked chickpeas has been observed (Shim et al., 2018; Xu and Chang, 2009). This is because legumes contain many water-soluble components such as proteins (albumins, etc.), carbohydrates (sugar, fiber), phenolic compounds, and saponins (Klupšaitė and Juodeikienė, 2015). These components that pass into the water make the cooking water of chickpeas valuable.



Figure 2. The preparation of the aquafaba (He et al., 2021)

The Composition and Functional Properties of Aquafaba

Aquafaba is a mixture of water, proteins, and carbohydrates that varies depending on the legume. This liquid, which is typically thrown away as food waste, contains saponins and phenolic compounds. Studies have shown that aquafaba is a useful component that can be incorporated into a variety of formulations due to its desired functional qualities such as foaming, emulsifying, and gelling (Damian et al., 2018; Shim et al., 2018; Raikos et al., 2020). The factors effecting the aquafaba composition and functional properties are given in Figure 3. Raikos et al. (2020) reported the energy ($72.00 \pm 1.00\text{kJ}/100\text{g}$), moisture ($94.97 \pm 0.03\text{g}/100\text{g}$), ash ($0.44 \pm 0.00\text{g}/100\text{g}$), protein ($1.27 \pm 0.02 \text{g}/100\text{g}$), fat ($<0.1\text{g}/100\text{g}$), available carbohydrates ($2.64 \pm 0.04\text{g}/100\text{g}$), total sugars ($0.64 \pm 0.10\text{g}/100\text{g}$), dietary fibre ($0.69 \pm 0.03\text{g}/100\text{g}$), sodium ($17.00 \pm 0.00 \text{mg}/100\text{g}$), tocopherols ($0.11 \pm 0.01 \mu\text{g}/\text{mL}$), and total phenols ($6.50 \pm 0.00 \text{mg GAE}/\text{g}$) contents of aquafaba from commercial canned chickpeas. After analyzing the aquafaba from ten commercial canned chickpea products, Shim et al. (2018) found that the protein and dry matter contents varied from 1.21 to 1.72 g/100 g and 4.9 to 6.4 g/100 g, respectively. Buhl et al. (2019) also determined the energy ($494\text{kJ}/100\text{g}$), fat ($2.2/100\text{g}$), carbohydrates ($15\text{g}/100\text{g}$), protein ($6.3\text{g}/100\text{g}$), and salt ($0.65\text{g}/100\text{g}$) contents of aquafaba from commercial canned chickpeas. Upon reviewing research on aquafaba, it becomes evident that there are studies investigating the characteristics of the aquafaba from canned chickpeas, as well as studies focused on the preparation and properties of aquafaba itself. Table 1 provides information on the composition of aquafaba and the the preparation conditions from studies specifically focused on aquafaba production . When Table 1 is analyzed, aquafaba composition is

significantly affected by pulse variety and aquafaba production conditions (such as pulse: water ratio, temperature, time, etc.).

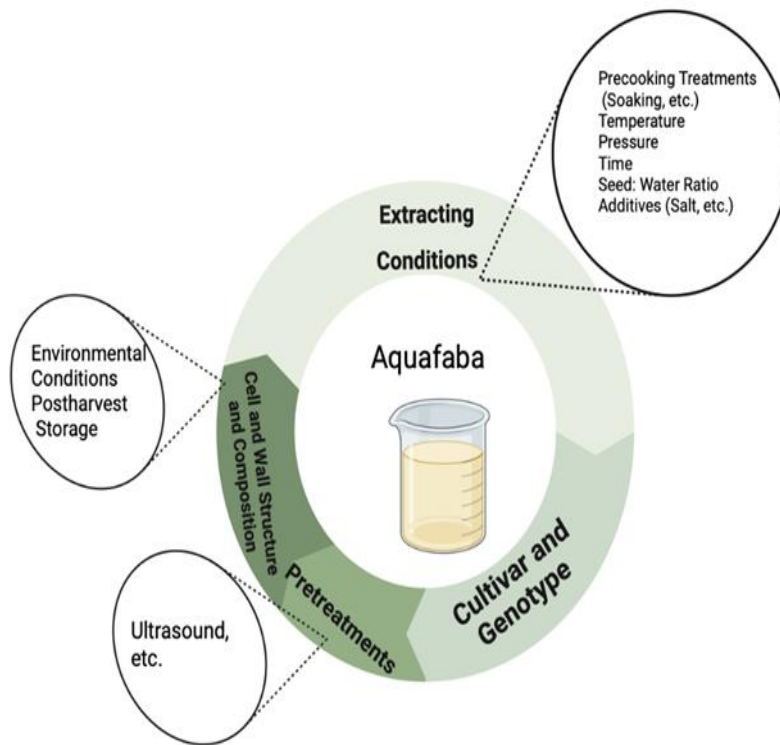


Figure 3. The factors effecting the aquafaba composition and functional properties

The functional properties (foaming, emulsification and gelling properties) of aquafaba are influenced by its physical characteristics, encompassing factors such as pH, density, viscosity, as well as water- and oil-absorption capacities (He et al., 2021). The foam capacity of aquafabas produced from yellow soybean, green lentil, split yellow pea, haricot bean, and chickpea were reported as 65% (Serventi et al., 2018), 93%, 97%, 39%, and 58% (Stantial et al., 2018; Damian et al., 2018), respectively. Emulsion stabilities of aquafaba produced from chickpea were reported as follows: 60–80% (Mustafa et al., 2018), 19–21.5 min (Buhl et al., 2019), 71.9–77.1% (He et al., 2019), and 8 mL (2:3 pulse:water, 60 min cooking, Alsalman et al., 2020). Emulsion capacity of yellow soybean, green lentil, split yellow pea, haricot bean, and chickpea were reported as 49.3% (Serventi et al., 2018), 49.0%, 52.7%, 46.3%, and 54.2% (Stantial et al., 2018; Damian et al., 2018), respectively. Mustafa et al. (2018) reported that aquafaba from chickpea generates foam that exhibits similar density (1.01 ± 0.01 g/mL), foam volume (98.00 ± 2.00 mL) and stability ($296.97 \pm 6.06\%$) when compared to both fresh egg white and commercial egg white liquid. Buhl et al. (2019) noted that the foam capacity (95–105%) of aquafaba from canned chickpea is lower than that of egg white, but its foam stability is

comparable to that of egg white. Stantial et al (2018) and Damian et al. (2018) reported that the foam capacity of aquafaba (58%) is notably lower than that of egg white.

Table 1. Preparation Methods and Compositions of Aquafaba

Legumes	Preparation Method	Dry Matter (%)	Moisture Content (%)	Carbohydrate (CHO) Content (%)	Protein Content (%)	Insoluble Fiber (%)	Ash Content (%)	Saponin Content (mg/g)	Total Phenolic Content (mg/g)	Tannins (mg Catechin Eq./100 g)	Reference
Dry Canadian Kabuli chickpea	Soaking: 40 °C for 2 h; Cooking (pressure cooker) 1:2, 1:4, and 2:3 pulse: water, 15, 30, 45, and 60 min	3.5 ± 0.5-15.0 ± 1.0	-	-	0.50 ± 0.0-1.00 ± 0.0	-	-	-	-	0.49 ± 0.4-11.80 ± 0.4	Alsahman et al. (2020)
Chickpea cultivars (Four Kabuli, and Desi)	Soaking: 1:4 (pulse: water) 16h at 4°C. Cooking: (pressure cooker) 1:1 pulse: water, 115-118 °C, 70-80 kPa for 30 min	-	92.4-94.2%	-	-	-	-	-	-	-	He et al. (2019)
Yellow soybean	Soaking: 1:3.3 (pulse: water) 16 h; Boiling: 1:1.75 pulse: water for 90 min	5.59 ± 0.10	-	2.46 ± 0.10 (Insoluble CHO) 1.66 ± 0.03 (water soluble CHO)	0.68 ± 0.00	-	0.78 ± 0.02	6.4 ± 0.6	-	-	Serventi et al. (2018)
Haricot beans	Soaking: 1:3.3 (pulse: water) 16h at room temp. Boiling: 1:1.75 (pulse: water) for 90 min (lentil: 60min)	3.28 ± 0.5	-	0.73 ± 0.03 (low molecular weight water soluble CHO) 0.16 ± 0.20 (high molecular weight water soluble CHO)	0.70 ± 0.00	0.93 ± 0.05	0.75 ± 0.03	5.9 ± 0.5	-	-	Stantial et al. (2018)
Garbanzo chickpeas	Soaking: 1:3.3 (pulse: water) 16h at room temp. Boiling: 1:1.75 (pulse: water) for 90 min (lentil: 60min)	5.13 ± 0.02	-	1.20 ± 0.02 (low molecular weight water soluble CHO) 0.04 ± 0.00 (high molecular weight water soluble CHO)	0.95 ± 0.01	2.37 ± 0.02	0.57 ± 0.01	4.5 ± 0.6	-	-	Stantial et al. (2018)
Whole		4.69 ±	-	0.54 ± 0.03 (low	1.51 ± 0.01	2.09 ± 0.02	0.48 ± 0.00	12 ± 1	-	-	

combining egg whites or whole eggs, sugar, and flour to create a foam form. Aquafaba has been added as a substance that replaces egg whites in this application, foaming and enhancing the texture (Mustafa et al., 2018). Additionally, in the study conducted by Mustafa et al. (2018), an aquafaba sponge cake with similar color, appearance, and texture to a sponge cake made with egg whites was obtained. However, it is observed that the cake prepared with aquafaba showed a distinct collapsed center and large spaced voids, making aquafaba sponge cakes less elastic and cohesive than egg white cakes.

In a study conducted by Raikos et al. (2020), the researchers investigated the viability of utilizing aquafaba extracted from commercially canned chickpeas as an egg substitute in the creation of a vegan mayonnaise formula. The findings indicated that aquafaba demonstrated effective emulsion-forming capabilities, maintaining stability throughout a 21-day period of cold storage.

Aslan and Ertaş (2020) found that aquafaba can be used to replace half of the egg in a cake recipe, but a cake made with 100% aquafaba exhibited high hardness values and low color, odor, and pore structure scores.

Meringue is typically made with whipped egg whites and sugar. However, aquafaba can be used as a foaming and gelling agent in meringue. Stantiall et al. (2018) demonstrated that meringues made with aquafaba and cooking water from split yellow peas have a flavor and overall quality comparable to traditional egg white meringue. While the color parameters and sensory scores of meringues made with egg whites or aquafaba are similar, aquafaba meringue exhibits lower hardness and lower consistency. The texture and color of aquafaba meringue have been improved when aquafaba is pre-processed with ultrasound (Meurer et al., 2020). However, the poor gelling ability of bean aquafaba results in a flat structure, and the cooking water of whole green lentils contains an unpleasant taste due to saponins and phenols, limiting the use of aquafaba (Stantiall et al., 2018).

Cream mousse is made by whipping egg whites, whipped cream, and sugar. Aquafaba, due to its foaming and emulsifying properties, serves the function of egg whites. Cream mousse made with chickpea aquafaba and cooking water from split yellow peas have received high scores in terms of flavor, color, and shine (Damian et al., 2018). No flaws related to aroma have been detected. However, in aquafaba cream puffs, lower perceived sweetness and smoothness have been observed, stemming from the mineral and saponin content.

Aquafaba can also be used to enhance the texture of gluten-free baked goods due to its gelatinizing properties and water-holding capacity. Serventi et al. (2018) increased water

absorption in gluten-free crackers by adding soy cooking water, resulting in a product with stronger yellow color. Soy cooking water increases the softness and moisture content of the product.

Mayonnaise is made from a mixture of edible vegetable oil, egg yolk, acetic or citric acid, spices, salt, and natural sweeteners. Aquafaba has been investigated as a substitute for egg yolk due to its stabilization and emulsification properties. Aquafaba mayonnaise has a significantly deeper appearance and higher color density compared to egg-based mayonnaise (Lafarga et al., 2019). There is no difference in taste and texture scores between mayonnaises made with aquafaba or egg, but the overall acceptance score for aquafaba mayonnaise is lower than the control group.

Aquafaba serves as an ideal alternative for egg and foaming agents for vegans and individuals with egg allergies. With these properties, it has become an indispensable component of many innovative and healthy recipes in the food industry.

Conclusion and Recommendations

The process of canning or cooking pulse/ legume in water results in a solution that, when extracted from the seeds, serves as a plant-based additive for food formulations. This solution, known as "aquafaba," has gained widespread attention as a novel clean label additive derived from pulses. Aquafaba is composed of mainly water (92–95%) and dry matter (5–8%, carbohydrates, low molecular weight proteins, saponins, etc). Its functional attributes, including foaming, emulsification, and gelling properties, are notable. These properties are contingent on various factors such as pulse genotype, composition, and processing conditions. It is notably favored by content creators who specialize in sharing vegetarian and vegan recipes. Recent studies have revealed beneficial impacts of aquafaba on the physiochemical characteristics of various food items, including confections, egg/gluten-free bakery products, and mayonnaise. A review of the literature on aquafaba indicates the need for increased research in this field. Further investigation is required to address existing gaps and gain a deeper understanding. These studies are expected to provide a significant foundation for evaluating the industrial potential of aquafaba and contributing to its more effective utilization in food production.

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**BRICS-T ÜLKELERİNDE İNOVASYON VE EKONOMİK BÜYÜME:
DUMİTRESCU VE HURLİN PANEL NEDENSELLİK ANALİZİ**

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ÖZET

Bu çalışmanın amacı, inovasyon ile ekonomik büyüme arasındaki ilişkiyi uygulamalı olarak test etmektir. Çalışmada BRICS-T ülkeleri (Brezilya, Rusya, Hindistan, Çin, Güney Afrika ve Türkiye) için 1992-2021 dönemi verileri kullanılarak panel veri analizi gerçekleştirilmiştir. Çalışmadaki model, ölçeye göre sabit getirili modelden geliştirilen Romer (1986) modeli ele alınarak oluşturulmuştur. Bu çerçevede çalışmamızda ekonomik büyüme için kişi başına düşen gelir, inovasyon için patent sayıları, sermaye için gayri safi sabit sermaye oluşumunun GSYH içindeki payı (%), istihdam için 15 yaş üstü çalışan nüfusun toplam nüfus içindeki payı (%) verileri kullanılmıştır. Bu değişkenler arasındaki ilişkiler Dumitrescu ve Hurlin (2012) panel nedensellik analizi kullanılarak gerçekleştirilmiştir. Gerçekleştirilen analizler neticesinde hem ekonomik büyümeden inovasyon değişkenine hem de inovasyon değişkeninden ekonomik büyümeye doğru nedensellik ilişkisi tespit edilmiştir ve ekonomik büyüme ile inovasyon arasında çift yönlü nedensellik ilişkisi olduğu ifade edilmektedir. Ekonomik büyüme ile sermaye arasında ve ekonomik büyüme ile istidam arasında da çift yönlü nedensellik ilişkisi tespit edilmiştir.

AnahtarKelimeler: İnovasyon, ekonomik büyüme, patent

**INNOVATION AND ECONOMIC GROWTH IN BRICS-T COUNTRIES:
DUMITRESCU AND HURLIN PANEL CAUSATION ANALYSIS**

ABSTRACT

The aim of this study is to practically test the relationship between innovation and economic growth. In the study, panel data analysis was carried out using 1992-2021 period data for BRICS-T countries (Brazil, Russia, India, China, South Africa and Turkey). The model in the study was created by considering the Romer (1986) model, which was developed from the constant returns to scale model. In this context, in our study, per capita income data were used for economic growth, patent numbers for innovation, share of gross fixed capital formation in GDP for capital (%), and share of the working population over the age of 15 in the total population (%) for employment. The relationships between these variables were carried out using Dumitrescu and Hurlin (2012) panel causality analysis. As a result of the analyses, a causal relationship was determined both from economic growth to the innovation variable and from the innovation variable to economic growth, and it is stated that there is a bidirectional causal relationship between economic growth and innovation. A bidirectional causality relationship has been determined between economic growth and capital and between economic growth and employment.

Keywords: Innovation, economic growth, patent

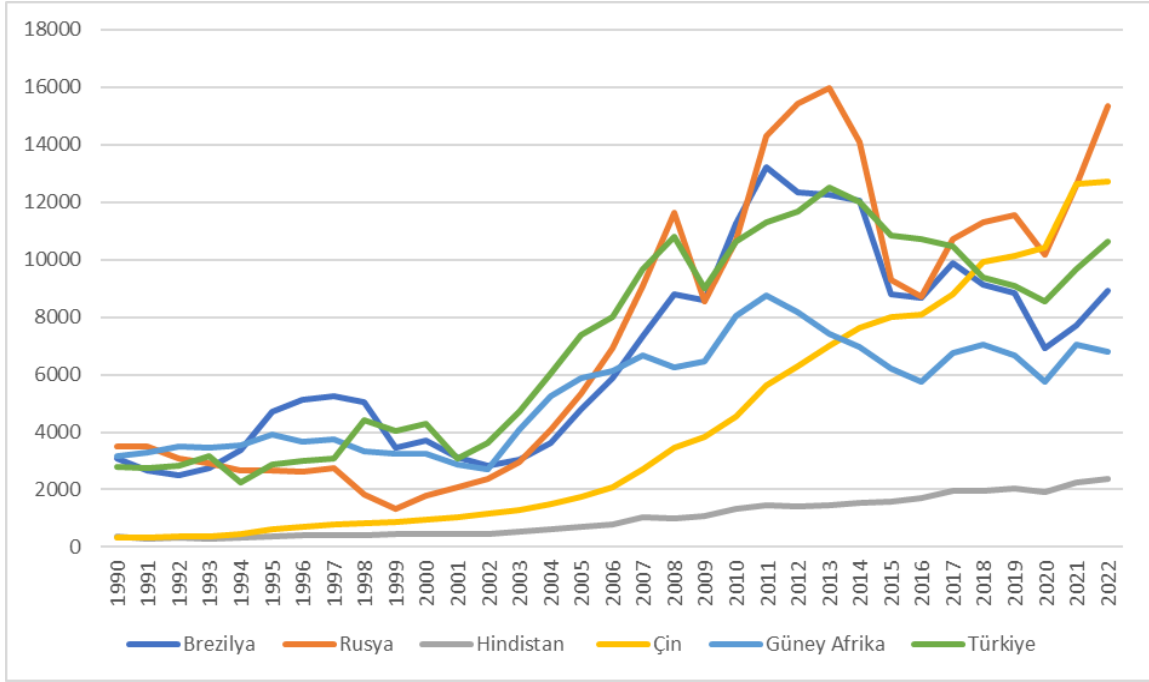
Giriş

İnovasyon, işletme içi uygulamalarda, işyeri organizasyonunda ya da dış ilişkilerde yeni ya da önemli ölçüde geliştirilmiş bir ürün/hizmet ya da yeni bir süreç, yeni bir pazarlama yönteminin ya da yeni bir organizasyonel yöntemin gerçekleştirilmesidir (OECD, 2005). İnovasyon ölçütü olarak genellikle Ar-Ge ve patent verilerinin kullanıldığı görülmektedir. Bu amaçla Ar-Ge harcamaları daha spesifik şekilde Ar-Ge harcamalarının GSYİH'ye (Gayri Safi Yurtiçi Hasıla) oranı şeklinde kullanılmaktadır ve patent istatistikleri kullanılmaktadır (Wang, 2013: 1). İnovasyon neticesinde elde edilen buluşlar patent ile tescillenmekte olup, bunun da farklı alanlarda kullanılmaya başlandığını görürüz. Böylece, her bir inovasyon sonraki inovasyonun alt basamağını oluşturmaktadır. İnovasyon bu haliyle hiç durmayan ve sürekli kendini besleyen bir sistem haline dönüşmektedir (Hall, 2002: 3). Ekonomi metodolojisi bakımından inovasyon kavramı büyüme ve üretim faktörlerine odaklanmaktadır (Demir, 2009: 4). Ülkeler ekonomik büyümelerini devam ettirmek ve rekabete karşı güçlerini arttırabilmek için inovasyon geliştirmek ve inovasyonu yeni ticari başarıya dönüştürmek durumundadırlar (Tüylüoğlu ve Saraç, 2012: 40).

Bu bağlamda çalışmanın amacı inovasyon ve ekonomik büyüme arasındaki ilişkiyi BRICS-T ülkeleri için ele almaktır. Çalışmanın giriş bölümünü takiben ikinci bölümde BRICS-T ülkeleri ve ekonomik yapısı yer almaktadır. Üçüncü bölümde literatür yer alırken, dördüncü bölümde veri seti, yöntem ve bulgular sunulmuştur. Çalışmanın son kısmında ise sonuçlar bölümünde yer verilmiştir.

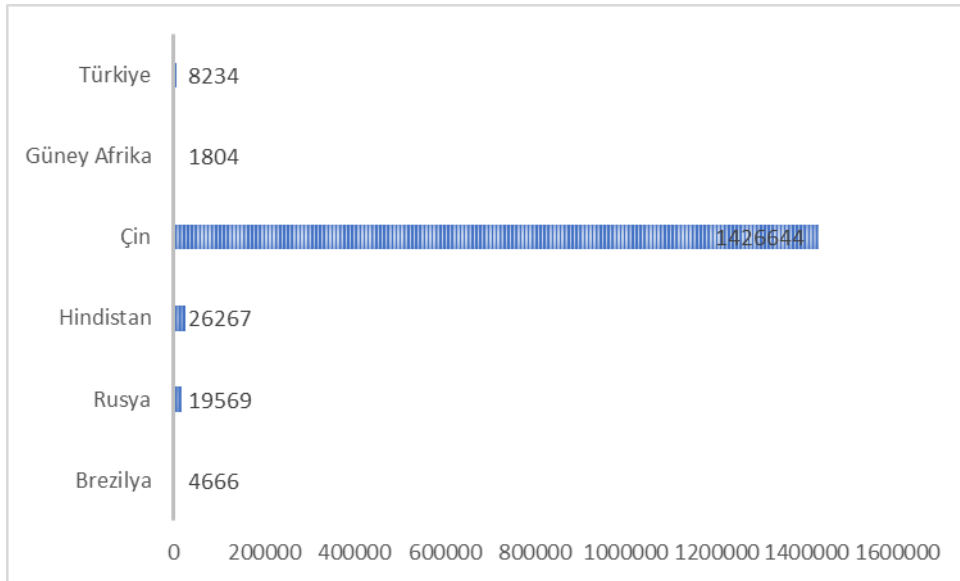
BRICS-T Ülkeleri ve Ekonomik Yapısı

Dünya Bankası'ndan elde edilen veriler ışığında BRICS-T ülkelerinin kişi başına düşen milli geliri (US \$) Şekil 1'de verilmiştir. Şekil 1'de görüleceği gibi, 1990-2022 döneminde Çin ekonomisinde kişi başına düşen milli gelir yıllar itibariyle giderek artmıştır.



Şekil 1. BRICS-T Ülkelerinde Kişi Başına Düşen Milli Gelir (1990-2022) (Dünya Bankası)

Çalışmada inovasyon göstergesi olarak patent sayısı ele alınmıştır. Şekil 2'de Dünya Bankasından elde edilen patent sayıları verilerine göre; 2021 yılında BRICS-T ülkeleri içerisinde en fazla patent sayısına sahip olan ülkenin Çin olduğu görülmektedir. 2021 yılında BRICS-T ülkeleri içinde Çin'i takiben en çok patent başvurusunda bulunan ülkeler sırasıyla Hindistan, Rusya, Türkiye, Brezilya ve Güney Afrika olduğu gözlemlenmiştir.



Şekil 2. BRICS-T Ülkelerinde Patent Sayıları (2021 Yılı) (Dünya Bankası)

Literatür İnovasyon ve ekonomik büyüme arasındaki ilişkiyi ortaya koyabilmek için konuya ilişkin literatürün incelenmesi oldukça önemlidir. Bu bölümde konuya ilişkin literatürden örnekler kronolojik şekilde sıralanarak Çizelge 1’de sunulmuştur.

Çizelge 1.

Çalışma	Yılı	Ülke/Ülke Grubu	Bulgular
Lichtenberg (1993)	1964-1989	74 ülke	Özel sektör tarafından yapılan Ar-Ge harcamaları ve ekonomik büyüme arasında pozitif ve anlamlı bir ilişki olduğu saptanmıştır.
Goel ve Gam (1994)	1960-1980	52 Ülke	Ar-Ge faaliyetleri ekonomik büyümeyi olumlu etkilemektedir.
Freire-Serén (1999)	1965-1990	21 OECD	Ar-Ge harcamaları ile ekonomik büyüme arasında çok güçlü bir ekonomik ilişki olduğu saptanmıştır.
Crosby (2000)	1901-1997	Avustralya	Patent başvuruları ile ekonomik büyüme arasında pozitif ilişki vardır.
Bassanini ve Scarpetta (2001)	1971-1998	21 OECD	Ar-Ge harcamalarının ekonomik büyüme üzerindeki etkisi pozitifdir. Ar-Ge harcamalarındaki %1’lik artışın ekonomik büyümeyi %0,4 oranında artırdığını tespit etmiştir.
Sylwester (2001)	1981-1996	16 OECD Ülkesi	Ar-Ge ile ekonomik büyüme arasında bir ilişki olmadığı sonucuna ulaşmıştır.
Ülkü (2004)	1981-1997	30 Ülke (20 OECD, 10 OECD Üyesi Olmayan)	Ar-Ge harcamaları ve patent sayısı ile GSYH arasında istatistiksel açıdan anlamlı pozitif ilişki olduğu sonucuna ulaşılmıştır
Yanyun ve Mingquian (2004)	1994-2003	8 Asya Ülkesi	Ar-Ge harcamalarının ekonomik büyüme üzerinde pozitif yönde etkisi olduğu sonucuna ulaşılmıştır.
Yang (2006)	1951-2001	Tayvan	Patent sayısı ile ekonomik büyüme arasında pozitif bir ilişki olduğu tespit edilmiştir.
Falk (2007)	1970-2004	15 OECD Ülkesi	AR-GE harcamaları, teknolojiye yönelik yatırımlar ve kişi başı milli gelir arasındaki ilişkiyi inceleyerek değişkenler arasında pozitif yönlü ilişki tespit etmiştir.
Sinha (2008)	1963-2005	Japonya ve Güney Kore	Japonya için reel GSYH ile patent sayısının uzun dönemde birlikte hareket ettiği tespit edilmiştir ve Granger nedensellik analizine

			göre aralarında çift yönlü nedensellik ilişkisi bulunmuştur. Ancak Güney Kore için eşbütünleşik ve nedensellik ilişkisi tespit edilememiştir.
Altın ve Kaya (2009)	1990-2005	Türkiye	Ar-Ge harcamaları uzun dönemde ekonomik büyümeyi arttırmaktadır.
Saraç (2009)	1983-2004	10 OECD ülkesi	Ar-Ge harcamalarının ekonomik büyümeyi pozitif yönde etkilediği sonucuna ulaşılmıştır.
Alene (2010)	1970-2004	52 Afrika ülkesi	Ar-Ge harcamalarının büyüme üzerinde pozitif ve anlamlı bir etkisi olduğu sonucuna ulaşılmıştır.
Genç ve Atasoy (2010)	1997-2008	34 Ülke	Ar-Ge harcamalarından ekonomik büyümeye doğru tek yönlü bir nedensellik ilişkisi tespit etmiştir.
Josheski ve Koteski (2011)	1963-1993	G7 Ülkeleri	Patent ve ekonomik büyüme arasında uzun dönemde pozitif ilişki bulunmuştur.
Güloğlu ve Tekin (2012)	1991-2007	13 OECD ülkesi	Ar-Ge harcamalarının, inovasyonun Granger nedeni olduğu sonucuna ulaşılmıştır.
Gülmez ve Yardımcıoğlu (2012)	1990-2010	21 OECD Ülkesi	Ar-Ge harcamalarındaki %1'lik bir artış ekonomik büyüme üzerinde uzun dönemde yaklaşık olarak %0,77'lik bir artış meydana getirdiği tespit edilmiştir. Ar-Ge harcamaları ile büyüme arasında uzun dönemli ve anlamlı bir ilişki tespit edilmiştir.
Galindo ve Mendez (2014)	2002-2007	13 Gelişmiş Ülke	İnovasyonun artmasının ekonomik büyümeyi teşvik edeceğini göstermektedir.
Gülmez ve Akpolat (2014)	2000-2010	Türkiye ve 15 AB ülkesi	Ar-Ge harcamaları ve patent sayılarının ekonomik büyüme üzerinde etkisi olduğu tespit edilmiştir. Ar-Ge harcamalarının etkisinin patent sayısına göre 4 kat daha fazla olduğu sonucu elde edilmiştir.
Pece vd. (2015)	2000-2013	Polonya, Çek Cumhuriyeti, Macaristan	Ekonomik büyüme ve inovasyon arasında pozitif bir ilişkinin var olduğu saptanmıştır.
Işık (2017)	1995-2015	G20 Ülkeleri	Ekonomik büyüme ile inovasyon panel verilerinin eş bütünleşik olduğu kabul edilmiştir. İnovasyon ve ekonomik büyüme

			arasında uzun dönemde pozitif ve anlamlı ilişki tespit edilmiştir.
Akar ve Ay (2018)	1990-2014	52 Ülke	İnovasyonun ekonomik büyüme üzerinde pozitif bir etkisi tespit edilmiştir.
Yıldırım ve Kantarcı (2018)	1998-2013	Gelişmekte olan ülkeler	Ar-Ge harcamalarının ekonomik büyüme üzerinde istatistiksel olarak anlamlı bir etkiye sahip olmadığı bulunmuştur.
Duman ve Aydın (2018)	1998-2015	Türkiye	Ar-Ge harcamalarındaki artış GSYH üzerinde olumlu artışlara yol açarken, azalmalar da GSYH’de azalışa sebep olduğu tespit edilmiştir. Ar-Ge harcamalarının GSYİH’nin nedeni olduğu görülmüştür.
Kethudaoğlu ve Bayraktutan (2019)	1996-2015	29 Ülke	Ar-Ge harcamaları ekonomik büyümeyi pozitif etkilemektedir.
Cütçü ve Bozan (2019)	1981-2016	G-7 Ülkeleri	İnovasyon ile ekonomik büyüme arasında uzun dönemli ilişki vardır. Ekonomik büyüme ile Ar-Ge arasında negatif yönlü ilişki tespit edilmiştir. Ekonomik büyümeden patent başvurularına doğru tek yönlü nedensellik ilişkisine ulaşılmıştır.
Dereli ve Salğar (2019)	1990-2015	Türkiye	Ar-Ge harcamaları ve büyüme arasında uzun dönemli bir ilişkinin olduğu tespit edilmiştir. Değişkenler arasında çift yönlü bir nedensellik ilişkisi bulunmuştur.
Moustapha ve Yu (2020)	2000-2016	35 OECD Ülkesi	İnovasyon ve ekonomik büyüme arasında pozitif ilişki vardır.
Wusiman ve Ndzembanteh (2020)	1988-2013	Malezya ve Türkiye	İnovasyonun ekonomik büyümeye etkisi pozitifdir. Malezya’da inovasyondan ekonomik büyümeye doğru tek yönlü nedensellik ilişkisi tespit edilmiştir.
Bakari (2021)	1990-2020	Romanya	Patentlerin ekonomik büyüme üzerinde pozitif etkisi bulunmuştur.

Veri seti, Yöntem ve Bulgular

Çalışmada 1992-2021 döneminde BRICS-T Ülkeleri (Brezilya, Rusya, Hindistan, Çin, Güney Afrika ve Türkiye) için ekonomik büyüme ile inovasyon arasındaki ilişki araştırılmıştır. Çalışmada 6 ülke (N=6) ve 30 yıl (T=30) verileri yer almaktadır. Çalışmadaki model, ölçüğe

göre sabit getirili modelden geliştirilen Romer (1986) modeli ele alınarak oluşturulmuştur. Çalışmada bağımlı değişken olarak ekonomik büyüme değişkeni kullanılmıştır. Açıklayıcı değişken olarak inovasyonu temsilen patent değişkeni kullanılmıştır ve kontrol değişkenleri ise istihdam oranı ile sermaye değişkenidir. Çizelge 2’de çalışmada yer alan değişkenlere ilişkin açıklamalar ve veri kaynağı yer almaktadır.

Çizelge 2. Değişkenler ve Veri Kaynakları

Değişkenler	Değişkenlerin açıklaması	Değişkenlerin Kısaltması	Elde Edilen Kaynak	Zaman Aralığı
Ekonomik büyüme	Kişi başına reel GSYH (constant 2015 US\$)*	GDP	Dünya Bankası	1992-2021
İnovasyon	Yurt içi yerleşikler tarafından patent sayıları*	İNO	Dünya Bankası	1992-2021
Sermaye	Gayri safi sabit sermaye oluşumunun içindeki payı (%)	CAP	Dünya Bankası	1992-2021
İstihdam	15 yaş üstü çalışan nüfusun toplam nüfus içindeki payı (%)	EMP	Dünya Bankası	1992-2021

*Doğal logaritması alınmış seriler kullanılmıştır

Çalışmada 1992-2021 döneminde BRICS-T Ülkelerinde (Brezilya, Rusya, Hindistan, Çin, Güney Afrika ve Türkiye) değişkenlere ilişkin tanımlayıcı istatistiki bilgileri içeren gözlem sayısı, ortalama, standart sapma, minimum ve maksimum değerler Çizelge 3’te sunulmuştur. Çizelge 4’te ekonomik büyüme ile inovasyon ve sermaye değişkeni arasında korelasyon katsayısı pozitif ve güçlü çıkmıştır. Ayrıca, istihdam değişkeni ile hem inovasyon hem de sermaye arasındaki korelasyon düşük çıkmıştır.

Çizelge 3. Tanımlayıcı İstatistikler

Değişken Adı	Gözlem Sayısı	Ortalama	Standart Sapma	Minimum	Maksimum
GDP	180	27.68	1.00	25.91	30.39
İNO	180	8.71	2.05	4.92	14.17
CAP	180	24.66	8.17	13.09	44.51
EMP	180	37.82	12.78	13.28	73.04

Çizelge 4. Korelasyon Testi Sonuçları

Değişkenler	GDP	İNO	CAP	EMP
GDP	1.0000			
İNO	0.8987	1.0000		
CAP	0.7455	0.6672	1.0000	
EMP	0.5073	0.3536	0.4129	1.0000

Yatay Kesit Bağımlılığı durumunda En Küçük Kareler Yöntemine (OLS, Ordinary Least Square) dayalı tahminler etkin olmamakta, tutarsız ve yanlı sonuçlar elde edilmektedir. Bu sebeple panel analizlerine başlarken birimler arasındaki bağımlılığın incelenmesi önem arz etmektedir (Tarı vd., 2019). Breusch ve Pagan LM testinde birimler arası korelasyonun olup olmadığı tespit edilebilmektedir ve her bir birim için kurulan eşbütünlüşme ya da hata düzeltme modelinin kalıntıları arasında korelasyon olup olmadığı sınanmaktadır. Breusch ve Pagan LM testinde temel hipotez ve LM test istatistikleri Denklem 2'deki gibi hesaplanmaktadır. Breusch ve Pagan LM test istatistiği $N(N-1)/2$ serbestlik derecesi ile χ^2 dağılmaktadır (Yerdelen Tatoğlu, 2020: 238).

Çizelge 5 incelendiğinde olasılık değeri kritik değer olan 0.05'ten küçük olduğu tespit edilmiştir. Bu sonuç temel hipotezin reddedildiğini göstermektedir ve birimler arasında yatay kesit bağımlılığı olduğu bulgusuna ulaşılmaktadır.

Çizelge 5. Pesaran CD Testi Sonuçları

İstatistik	Olasılık Değeri
2.321	0.0203

Çalışmada $T > N$ koşulunu barındıran ve panel veri setinin yapısına uygun olan serilerin durağanlığı ikinci nesil birim kök testlerinden olan Im-Pesaran-Shin (CIPS) ile tespit edilmiştir. Burada, temel hipotez H_0 : "Seri durağan değildir" şeklindedir. CIPS testi istatistik mutlak değeri %10, %5 ve %1 önem düzeyindeki değerlerden daha yüksek olduğunda seri durağandır, şeklinde yorumlanmaktadır. Çalışmada yer alan değişkenlerin CIPS birim kök testi sonuçlarına göre ekonomik büyüme değişkeninin düzeyde durağan $I(0)$ olduğu belirlenmiştir. İnovasyon, sermaye ve istihdam değişkenlerinin ise düzeyde durağan olmadıkları birinci farkları alındığında $I(1)$ 'de durağan hale geldikleri belirlenmiştir. (Çizelge 6)

Çizelge 6. CIPS Birim Kök Testi

Test	I(0)	I(1)
GDP	-2.637**	-3.840**
İNO	-2.329	-4.529**
CAP	-1.937	-5.072**
EMP	-1.800	-5.218**

Not: ** %5 anlamlılık düzeyini göstermektedir. %5 düzeyinde kritik değer -2.33'tür.

Eğim katsayılarının homojen ya da heterojen olduğunu tespit etmek için Pesaran ve Yamagata (2008) tarafından geliştirilen delta testi kullanılabilir. Delta test istatistiklerini şu şekilde gösterebiliriz (Pesaran ve Yamagata, 2008: 56):

$$\tilde{\Delta} = \sqrt{N} \frac{N^{-1}\tilde{S} - k}{\sqrt{2k}}$$
$$\tilde{\Delta}_{adj} = \sqrt{N} \frac{N^{-1}\tilde{S} - k}{\sqrt{Var(t, k)}}$$

Delta ve Δ_{adj} test sonuçlarına Çizelge 7’de yer almaktadır. Elde edilen bulgulara göre her iki test istatistiğinde de olasılık değeri 0.05’ten küçük olduğundan temel hipotez reddedilerek alternatif hipotezin kabulü sonucuna ulaşılmaktadır. Dolayısıyla eğim katsayılarının heterojen olduğu bulgusuna ulaşılmıştır.

Çizelge 7. Homojenlik Testi

Test istatistiği	Test İstatistiği	Olasılık Değeri
Delta_tilde	18.163	0.000
Düzeltilmiş Delta_tilde	19.897	0.000

Dumitrescu ve Hurlin (2012), Granger nedensellik testini heterojen panel için genişletmiştir. Denklem 1 de yer alan panel VAR modelinin birinci eşitliği ele alındığında, gecikme uzunluğu (k) panelin her bir birimi için aynı ve panel dengeli olduğunda, otoregresif parametre $\gamma_i^{(k)}$ ve eğimler $\beta_i^{(k)}$ birimlere göre farklılaşmaktadır. Temel hipotez “ β_i lerin tümü sıfıra eşittir şeklinde kurulmaktadır ve tüm panel için X’den Y’ye doğru nedensellik olmadığını ifade etmektedir (Yerdelen Tatoğlu, 2020: 154-155).

$$Y_{i,t} = \alpha_i + \sum_{k=1}^K \gamma_i^{(k)} Y_{i,t-k} + \sum_{k=1}^K \beta_i^{(k)} x_{i,t-k} + \varepsilon_{i,t} \quad (1)$$

Çizelge 8. Dumitrescu-Hurlin Panel Nedensellik Analizi Sonuçları

İlişkinin Yönü	W İstatistiği	Z bar İstatistiği	Olasılık Değeri
GDP → İNO	2.4403	2.4946	0.0126
İNO → GDP	18.3381	6.3308	0.0000
GDP → CAP	11.2836	2.0108	0.0443
CAP → GDP	13.5737	3.4132	0.0006
GDP → EMP	30.6079	13.8445	0.0000
EMP → GDP	7.0146	6.1416	0.0000

Not: ** %5 anlamlılık düzeyini göstermektedir.

Dumitrescu-Hurlin panel nedensellik testi sonuçlarına göre ekonomik büyüme ile inovasyon arasındaki nedensellik ilişkisi incelendiğinde; olasılık değeri 0.05'ten küçük olduğundan; H_1 hipotezi kabul edilmiştir. Dolayısıyla hem ekonomik büyümeden inovasyon değişkenine hem de inovasyon değişkeninden ekonomik büyümeye doğru nedensellik ilişkisi tespit edilmiştir. Burada ekonomik büyüme ile inovasyon arasında çift yönlü nedensellik ilişkisi bulunmaktadır. Ekonomik büyüme ile sermaye arasında ve ekonomik büyüme ile istidam arasında da çift yönlü nedensellik ilişkisi tespit edilmiştir.

Sonuç

Ekonomik büyümenin istikrarlı olması ülkeler açısından oldukça önemlidir. BRICS-T ülkelerinde inovasyon ve ekonomik büyüme ilişkisini incelediğimiz bu çalışmada nedensellik analizi kullanılmıştır. Nedensellik testi sonuçlarına göre hem ekonomik büyümeden inovasyon değişkenine hem de inovasyon değişkeninden ekonomik büyümeye doğru nedensellik ilişkisi tespit edilmiştir. Sonuçlar Sinha (2008), Dereli ve Salğar (2019) çalışmalarlarıyla benzerlik göstermektedir. Sonuç olarak ekonomik büyüme inovasyon faaliyetleri ile yakından ilişkilidir. Patentlere ayrılan harcamalar ve yatırımlar ekonomik büyümeyi teşvik edebilecektir ve ülkeler arasında rekabete karşı avantajlı konuma getirebilecektir.

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REDEFINING TEACHERS' PROFESSIONAL DEVELOPMENT: HOW VIRTUAL ENVIRONMENT SHAPE MOTIVATION AND SELF-EFFICACY

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Abstract

This paper investigated the effects of 'utilizing virtual learning environments (VLEs)' on teachers' professional development (TPD). A quasi-experimental design was employed to contrast two groups of serving teachers who took part in a teachers' professional development program on the use of technology. One of the groups received the professional development program in a traditional face-to-face (F2F) arrangement, while the other group received the same program in a virtual learning environments setup. In the end, the participants who had already received a pretest of self-efficacy and motivation were given post-tests of motivation scales, using a questionnaire with a reliability of 0.79 centered on their perceptions of the professional development program. The result showed that the VLEs group had significantly higher gains in self-efficacy and motivation when compared to the face-to-face group. In addition, the VLEs group showed greater satisfaction, engagement, and learning outcomes. The findings indicated that VLEs are an effective and innovative tool for TPD. Nevertheless, F2F could equally be employed for teachers' professional development as a significant increase was equally found in its mean and standard deviation between the pretest and the post-test scores.

Keywords: virtual environments, teachers' professional development, self-efficacy, motivation, technology integration.

Introduction

Technology integration is one of the key competencies that teachers need to develop to meet the demands and expectations of 21st-century education (Huang, Backman McGuire & Moore, 2019). Technology integration refers to the effective and meaningful use of technology tools and resources to support and enhance teaching and learning (Randall, Davies, 2014). Technology integration can offer several benefits for teachers and students, such as increasing: motivation, engagement, collaboration, differentiation, feedback, and assessment. However, technology integration also poses several challenges and barriers for teachers, such as lack of access, skills, confidence, support, and time. Although, most often; traditional teachers' professional development programs fail to meet the needs and the expectations of teachers, as they are often delivered in a more or less inactive and abstract manner. Therefore, there is a need to investigate alternative and innovative ways of providing teachers' professional development that can harness the benefits of technology utilization either as self-sponsored or employer-sponsored to address the challenges and opportunities of 21st-century education and improve teacher technology integration practices. Professional development (PD) is a process of continuous lifelong learning, and improvement that aims to enhance the knowledge, skills, attitudes, and beliefs of an individual (indeed.com, 2022) in this instance- the teachers' professional development can have a positive impact on teacher quality, student achievement, and school improvement; through improved confidence, skill development, increase in job opportunities, increase in hiring potential and networking opportunities such as seminars, webinars, conferences, workshops and so on (indeed.com, 2022). Nevertheless, not all professional development programs are effective and successful in achieving the above outcomes. Research has identified several characteristics of effective professional development programs, such as being relevant, collaborative, active, reflective, sustained, and situated. Unfortunately, many traditional professional development programs do not exhibit these characteristics, as they are often delivered in a one-size-fits-all, passive, and mostly presented without proper context. Therefore, there is a need to explore alternative and innovative ways of providing professional development that can address the limitations and shortcomings of traditional professional development programs. One of the ways to achieve professional development for teachers is the use of virtual learning environments (VLEs) as a platform for professional development. Virtual learning environments are software-based environments which allow users to interrelate with both the computing environment and the work of other users. Virtual learning environments can create, run, and

manage several isolated operating systems or applications on a single physical hardware system. Virtual learning environments can also provide immersive and realistic experiences for users by simulating physical environments and objects using 3D graphics, sound, and other features that tend to unfold teaching concepts to real-life situations. Some examples of Virtual learning environments are email, chat, web-based document sharing, virtual reality, augmented reality, and 3D printing (Girvan, 2018). Virtual learning environments can potentially offer several benefits for professional development, such as increasing access, flexibility, engagement, collaboration, feedback, and reflection. Virtual learning environments can also provide teachers with opportunities to practice and apply their skills in genuine and safe scenarios that bear a resemblance to their real classrooms. However, there is limited empirical evidence on the effectiveness and impact of using Virtual learning environments for professional development especially on teachers' self-efficacy and motivation.

Self-efficacy and motivation are significant psychological factors that control teachers' behaviour, performance, and satisfaction. Self-efficacy refers to the belief in one's capability to perform a given task efficiently and effectively or attain a specific goal with the greatest self-assurance. (Bandura, 1997. In Michael & Andrew, 2009). Motivation means the longing or the curiosity to engage in a given activity or pursue a specific goal (Andrea, & Melissa, 2023). Both self-efficacy and motivation are significant psychological factors that can be affected by a variety of intervening and extraneous variables, such as feedback, goal setting, rewards, recognition, and social support.

Therefore, this study intends to examine the effects of using virtual learning environments for professional development on teacher self-efficacy and motivation, compared to a traditional face-to-face professional development program. The study also seeks to explore teacher perceptions of the virtual learning environment -based professional program in terms of satisfaction, engagement, and learning outcomes. The study used a quasi-experimental design with two groups of serving teachers who participated in a professional development program on the utilization technology into their teaching profession.

Purpose of the Study

The purpose of this study was to compare the effects of using virtual learning environments (VLEs) for professional development (PD) on teachers' self-efficacy and motivation, with a traditional face-to-face professional development program. The study was also aimed to

explore teachers' perceptions of the virtual learning environment-based professional development program in terms of satisfaction, engagement, and learning outcomes. The study is significant because it can contribute to the literature on the use of virtual learning environments for professional development, and provide insights and recommendations for teachers, educators, policymakers, and practitioners who are interested in designing and implementing effective and innovative professional development programs that can enhance teachers' quality and students' achievement.

Objective of the Study

The objective of this study was to find: the effects of using virtual learning environments (VLEs) for professional development (PD) on teachers' self-efficacy and motivation. That is to find out teachers' perceptions of virtual learning environments-based professional development programs in terms of satisfaction, engagement, and learning outcomes.

The Research Question:

1. What is the mean difference between the Pretest and Post-Test of Teachers who use face to face for professional development in terms of satisfaction, engagement, and learning outcomes?
2. What is the mean difference between the Pretest and Post-Test of Teachers who use virtual learning environments for professional develop in terms of satisfaction, engagement, and learning outcomes?

The Research Hypotheses:

H0 1: There is no significant mean difference between Pretest and Post-Test of Teachers who use face to face for professional development in terms of satisfaction, engagement, and learning outcomes.

H0 2: There is no significant mean difference between the Teachers' Pretest and Post –Test using virtual learning environments for professional development in terms of satisfaction, engagement, and learning outcomes.

Research Design and Procedures

The research design was a quasi-experimental research design consisting of a control group and a treatment group (two groups): the treatment group made use of virtual environments (VLEs) for professional development (PD) and the control group made use of traditional face-to-face (F2F) for professional development (PD). The population of the study was 59, with a sample size of 40. The sampling technique was both purposive and census. Purposive sampling was used to eliminate 16 teachers from a population of 36 teachers in one of the schools, while census was used in the second school with a population of 23 and three were reported sick. The participants were teachers from two different schools (Alaka Grammar School, Ozoro and Emo-Eni Grammar School Ellu), both schools are located in Isoko North LGA Delta State, Nigeria. The researcher approached these teachers and they volunteered to take part in the professional development program on the topic of utilization of technology in the classroom. These two schools were selected because these schools have modern computer laboratories with all it entails to make use of the computers.

The professional development program was made up of four parts, each part lasting for one hour in each school, over four days which excluded an extra one hour of pretest and post-test respectively. The period was taken to start immediately after school hours. That is, from 2.00 pm to 3.00 pm. The researcher also voluntarily provided mineral drinks; sachet water and biscuits for the participants each day in addition to standby fuel for the school generator in case of light failure.

The parts or sections briefly covered the following topics:

- 1) Introduction to the use of technology
- 2) Pedagogical models and strategies for the use of technology
- 3) Appraisal and evaluation of the use of technology, and
- 4) Reflection and feedback on the use of technology.

The treatment group took part in the professional development program through a virtual learning platform that stimulates a virtual classroom, in which they could interact with the instructor and other participants using avatars (graphical representations of persons or characters in a digital environment, such as a video game, a chat room, or a virtual world, voice chat, text chat, and gestures). The control group participated in the professional development program through a face-to-face (F2F) classroom setting, in which they could

interact with the instructor and other participants through verbal and non-verbal communication format.

Before the professional development program, both groups completed a questionnaire that measured their self-efficacy and motivation for the utilization of technology. The questionnaire was designed by the researcher based on the Teacher Self-efficacy Scale (TSES) and the Motivational Strategies for Learning Questionnaire (MSLQ). The internal consistency of the questionnaire was tested using Cronbach Alpha and was found consistent at 0.79 before it was adopted for the experiment. At the end of the professional development program, both groups again completed the same questionnaire to measure their perceptions of the professional development program in terms of satisfaction, engagement, and learning outcomes. This time the questionnaire was titled differently, and based on the Course Experience Questionnaire (CEQ) and the Instructional Materials Motivation Survey (IMMS) though with the same content,

The data collected from the questionnaires (instrument) were analyzed using descriptive statistics: and t-tests, This was to compare the mean scores of the Pretest and Post-Test of each group's variable to find out whether there was a mean difference after the treatment.

Results

RQ1: What is the mean difference between the Pretest and Post-Test of Teachers who use face to face for Teachers' Professional Development in terms of satisfaction, engagement, and learning outcomes?

H0 1: There is no significant difference between the mean of Teachers' Pretest and Post –Test using F2F for professional development in terms of satisfaction, engagement, and learning outcomes.

Table 1 shows the mean and standard deviation of pretest and post-test results of face to face

PRETEST F2F	POST-TEST F2F		Items		N	\bar{X}_1	Std 1
N	\bar{X}_2	Std 2					
Average	20	3.5	1.05	20	3.5	1.06	

N = number of teachers for the professional development program

\bar{X}_1 = Mean of pretest

\bar{X}_2 = Mean of Post-test

Std 1 = Standard deviation for pretest

Std 2 = Standard deviation for Post-test

Table 2, shows the descriptive statistics and Paired Samples t-Test result for HO 1:

n	\bar{X}	Std	95% confidence interval		df	t	Sig.
			Lower	Upper			
7	2.0	0.72	1.59	2.42	13	10.485	<0.001

- n: is the number of pairs = 7.
- \bar{X} : the mean difference between the paired samples = 2.0.
- Std: is the standard deviation of the differences = 0.72.
- Lower: is the lower bound of the 95% confidence interval for the mean difference = 1.59.
- Upper: is the upper bound of the 95% confidence interval for the mean difference = 2.42.
- df: is the degrees of freedom for the t-distribution = 13.
- t: is the calculated t-value = 10.485.
- Sig: is the p-value associated with the t-value of 10.485 which is less than 0.001, which mean, the difference between the means is statistically significant.

Note, the 95% confidence interval for both lower and upper boundaries all fall to one side (not crossing the zero [0]): 1.59 and 2.42 for the lower and upper boundary respectively.

Therefore, we reject the null hypothesis and conclude that there is a significant difference between teachers' means pretest and post-test using face to face for professional development in terms of satisfaction, engagement, and learning outcomes. That is, the mean score of teachers' Pretest in the face to face for professional development was slightly higher or lower than their post-test in the professional development program which is 3.51 and 3.50, $p < 0.001$. The difference in scores within each group was similar (Std1 = 0.52 and Std2 = 0.49), and much smaller than the difference between groups ($t = 10.485$). The null hypothesis is

therefore rejected that is: $\mu_{F2F} \text{ Pretest} \neq \mu_{F2F} \text{ Post-Test}$ (There is a significant mean difference between Pretest and Post-Test of Teachers who use face to face for professional development in terms of satisfaction, engagement, and learning outcomes. $t(13, n = 7) = 10.485, P < 0.05 = 0.001$).

RQ 2: What is the mean difference between the Pretest and Post-Test of Teachers who used Virtual Learning Environments for professional development in terms of satisfaction, engagement, and learning outcomes?

H0 2: There is no significant difference between means of Pretest and Post-Test of Teachers using Virtual Learning Environments (VLEs) for professional development.

Table 3 shows the mean and standard deviation of pretest and post-test results of VLEs

	PERTEST VLE			POST-TEST VLE		
	N	\bar{X}_1	Std1	N	\bar{X}_2	Std2
Average	20	3.9	0.80	20	4.2	0.98

Table 4, shows the descriptive statistics, and paired Samples t-test result for HO 2:

95% confidence interval							
	n	$\bar{\tilde{X}}$	Std	Lower	Upper	df	t
Sig.	7	2.5	0.58	2.18	2.85	13	16.25
							<0.001

n: is the number of pairs = 7.

- $\bar{\tilde{X}}$: is the mean difference between the paired samples = 2.5.
- Std: is the standard deviation of the differences = 0.58.
- Lower: is the lower bound of the 95% confidence interval for the mean difference = 2.18.
- Upper: is the upper bound of the 95% confidence interval for the mean difference = 2.85.
- df: is the degrees of freedom for the t-distribution = 13.
- t: is the calculated t-value = 16.25.

- Sig: is the p-value associated with the t-value of 16.25 which is less than 0.001, which mean, the difference between the means is statistically significant.

Note, the 95% confidence interval for both lower and upper boundaries all fall to one side (not crossing the zero [0]): 2.18 and 2.85 for the lower and upper boundary respectively.

Therefore, the null hypothesis is rejected and concludes that there is a significant difference between teachers' means pretest and post-test using virtual learning environments for professional in terms of motivation and self-efficacy. That is, the mean score of teachers' Pretest for the virtual learning environments in the professional development was slightly higher or lower than their post-test, (3.51 and 3.50), $p = < 0.001$. The difference in scores within each group was (Std1 = 0.80 and Std2 = 0.98), and much smaller than the difference between groups ($t = 16.25$). The null hypothesis is therefore rejected that is: $\mu\text{VLEs Pretest} \neq \mu\text{VLEs Post-Test}$ (There is a significant mean difference between Pretest and Post-Test of Teachers who use virtual learning environments for Professional Development in terms of satisfaction, engagement, and learning outcomes. $t(13, n = 7) = 16.25, P < 0.05 = 0.001$).

Conclusion:

From the results presented, both types (face to face and virtual learning environments) could be used for professional development (PD) programs depending on the time allocated, available funds, and other materials. This is because both programs (face to face and virtual learning environments) showed an increase between the pretest and the post-test in mean and standard deviation. Though in the face-to-face (F2F) program, the increase in the mean and the standard deviation is statistically significant, $t(13, n = 7) = 10.485, P < 0.05 = 0.001$, which is an improvement of 10.5 per 1000, there could be improvement with an increase or reduction of other intervening variables. But, comparatively, based on these results, the virtual learning environments professional development program was more effective in enhancing teachers' knowledge of teaching and learning, as there was a significant greater increase in their mean score and standard deviation from the pretest to the post-test. At a p-value of 0.001 the virtual learning environments recorded an increase of 16.25 ($t[13, n = 7] = 16.25, P < 0.05 = 0.001$) as against 10.5 increase in the face to face ($t[13, n = 7] = 10.485, P < 0.05 = 0.001$). the proportionate ratio of face to face to virtual ;learning environments professional development programme is 5:8

Recommendation:

Based on the conclusion, the paper recommends that virtual learning environments should be optimized for teachers' professional development programs to provide teachers with opportunities to learn new ways of using technology in teaching and learning. However, the choice of the mode of delivery should depend on various factors such as availability, accessibility, cost, time, preference, and learning style of the teachers.

The paper also suggests that future research should explore other aspects of teachers' professional development such as attitudes, beliefs, knowledge, skills, and practices related to the utilization of technology in teaching and learning. Additionally, future research should use a larger sample size, a longer duration of intervention, and a more rigorous experimental design to increase the validity and reliability of the findings.

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**FORMULATION AND SPECTROSCOPY OF CU(II) NANO COMPLEXES OF
MONOBASIC TRI- OR BIDENTATE (Nno, No) AZO DYE LIGANDS**

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Abstract

A collection of copper(II) azo complexes with the formula $[CuL^{1-4}(nH_2O)] OAc \cdot xH_2O$ have been created utilizing azo dyes that contain the thiadiazole and triazole moieties. Thermal analyses molar conductance magnetic moment measurements, Elements, electronic mass, IR, and ESR spectra were used to describe azodyes and their metal complexes. IR spectra revealed tridentately organized ligands with a triazole moiety with copper(II) ion, naphthyl OH donor sites, azo group N-atoms, triazole moiety. Comparatively, azodyes with thiadiazole moiety had ON donor positions of the azo moiety's N-atom and the naphthyl OH. The TG curves were used to determine the thermodynamic activation constants ΔE^* , ΔH^* , ΔS^* , and ΔG^* . Electronic spectroscopy and transition electron microscopy included as analyze the produced spherical copper nanoparticles (TEM). The spectrum data revealed that the (OH) attaching group formed a surface complex between azodye ligands and colloidal copper nanoparticles. Resulting in greater surface area of the produced copper nanoparticle complexes, their stability constant of the produced copper nanoparticles complexes is higher than the equivalent bulk ones.

Keywords: Formulation ; spectroscopy ; Cu(II) nano complexes ; monobasic

Introduction

Metal complexes of heterocyclic azo compounds are widely used in various practical uses, including technology to operate, nonlinear optical components, and storage devices for molecular memory. Additionally, It's possible that heterocyclic azo dyes and their metal complexes are important. Because of their bioactivity and analytical uses. Nowadays, much emphasis has been placed on and 1,3,4-thiadiazole ,1,2,4-triazole derivatives are a significant family of N-including aromatics. The heterocycles have piqued the interest of researchers as a result of their bioactive components like antitumor,antimycotic,anti-inflammatory, antibacterial, antimicrobial, and powerful agents of antifungal. These derivatives, on either side, are a significant characteristic of heterocyclics that exhibit a wide range of biocidal actions, presumably attributed to the combination of the toxophoric ANACAS group. Metal complexes of these derivatives are now of attention, owing to their importance in metal connections with biomolecules. Nanoparticle coordination chemistry is a relatively young area of modern chemistry. Nanoparticles are massive pseudomolecules with a complicated internal structure; they consist mainly of a core and a shell. They often contain active surface centers. Cu(II) nanoparticles are attractive because of their low cost (compared to Ag and Au), catalytic, optical, mechanical, magnetic, and electrical properties. The thermal conductivity properties differ from those of solid metals. We have successfully synthesized and reported Cu(II) complexes with four azo dyes ranging from 1-methyl-1H-1,2,4-triazole-3-amine, 5-phenyl-1H-1,2,4-triazole- 3 -amine, 5-methyl-1,3,4-thiadiazole-2-thiol or 2-amino-5-(ethylthio)-1,3,4-thiadiazole with β -naphthalene. Favorable conditions also for the complex structure, complexation and spectroscopic measurement of Cu(II) ions in ongoing work on heteroazo dyes and their complexes with metals. It is also important to examine the financial institutions of the tested azo dyes based on elemental analysis, magnetic moments, spectral techniques (UV-Vis, ESR and IR), conductivity and thermal properties. Having aroused our interest in the interaction between metal nanoparticles and organic ligands, we investigated the interaction between the investigated azo ligand and the colloidal solution of copper nanoparticles.

2.Experimental

2.1. Materials and analyses The solvents and reagents were of sample solution purity and employed just as specified. Sigma–Aldrich provided starting material. The onductivity studies for the synthesized solid Cu(II) azo complexes were taken using a Hana model 1331 conductometer. In this study, Hg[Co(SCN)₄] was used as a calibrant for the Sherwood

Scientific Magnetic Susceptibility Balance. Shimadzu Qp-2010 plus mass spectra were recorded. Perkin–Elmer model 2400 automated analyzer was used for (C, H, and N) analysis. We used Shimadzu TG-50 thermal analyzer to record both TG and DTG curves. A spectrophotometer of Shimadzu UV-visible acquired UV-Vis absorption spectra. The observations were made in a nitrogen environment with a heating rate of $10^{\circ}\text{C min}^{-1}$ using platinum crucibles. The morphology of the copper nanoparticles was studied using a JEOL-JEM-100SX transmission electron microscope. Image analysis provided the particle size and size distribution. Also, the spectrophotometer of IR- generated as a KBr disk. The Cu ion content was calculated using an atomic absorption spectrophotometer.

Preparation of the ligands

1-Methyl-1H-1,2,4-triazole-3-amine (0.134g, 1mmol), 5-Phenyl-1H-1,2,4-triazole-3-amine (0.133g, 1mmol), 2-Amino-5-methyl-1,3,4-thiadiazole (0.115g, 1mmol) or 2-amino-5-(methylthio)-1,3,4-thiadiazole (0.147g, 1mmol) a was dissolved dissolved in 3 ml (1 M) HCl solution and slowly dissolved until diazotization (0.069 g, 1 mmol) NaNO_2 in a mixture of ice and water (6 mL). The resulting diazonium salt solution was mixed with β -naphthalene (0.144 g, 1 mmol), diluted in 30 mL of sodium hydroxide solution (30%) and cooled to $5-0^{\circ}\text{C}$ in an ice bath. The colored solids were sucked off and rinsed with bidistilled water, refined by recrystallization, finally the cleaned binders were dried in a desiccator over anhydrous CaCl_2 . The purity of azo dyes was originally determined by m.the constancy p, then the elementary search and finally the differential equations (diagram 1).

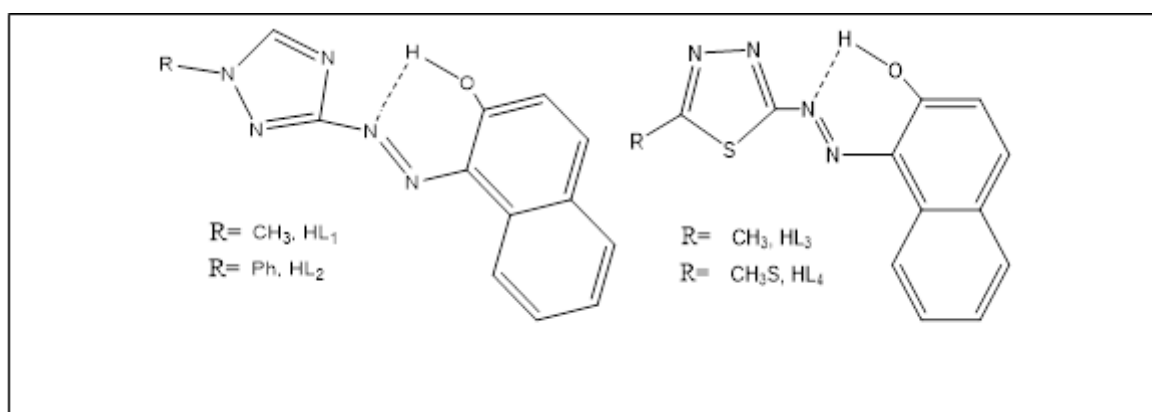
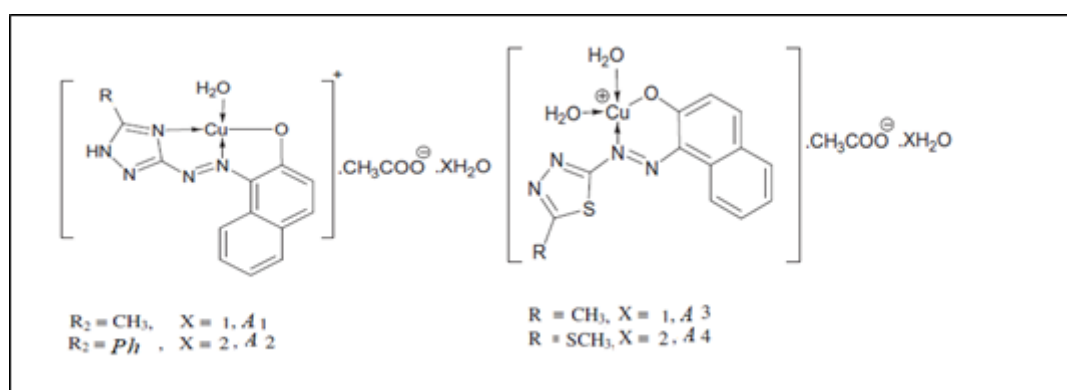


Fig.1. Structure of azo-dye ligands (HL₁₋₄).

2.4. Synthesis of solid complexes

The formed colored solids were suction purified and rinsed with bidistilled water many times, refined by recrystallization, and finally, the purified ligands were dried in a desiccator over anhydrous CaCl_2 . Thus, the dyes' purity (azo dyes) (Scheme 2) was determined using the m.p constancy, followed by means of elemental analysis, and then lastly differential equations. Next, to defining the end of the response, the reaction mixture was stirred over many hours utilizing TLC plates. Finally, to extract Cu(II) complexes, the precipitated particles were recovered by filtering, over anhydrous CaCl_2 and rinsed with twice distilled water in a dried desiccator.

Table 1 provides detailed information about every complex.



Scheme 2. Structure of complexes (A1–A4).

2.5. Synthesis of copper nanoparticles

The reaction was performed in an open 125 ml flask. Dropwise adding of a 10ml amount of 0.003 M $\text{Cu}(\text{NO}_3)_2$ generated in solution of IPA (approximately 1 drop/s) to 0.090 M of CTAB/IPA solution in a typical reaction. Specifically, a dropwise (1 drop/s) addition of (0.003 M) $\text{Cu}(\text{NO}_3)_2$ generated in solution of IPA (10ml) to (0.090 M) of solution CTAB/IPA. Then, use a board of magnetic stir, the reaction mixture was vigorously swirled. After adding 2 ml $\text{Cu}(\text{NO}_3)_2$, the changed colour after adding 5 ml copper nitrate, and dark violet after adding the entire volume of $\text{Cu}(\text{NO}_3)_2$. The emergence of colour revealed the existence of Cu nanoparticles. A spectrum measured minutes after the colour appeared revealed the plasmon absorption at 560 nm. The product remained stable for a week when sealed in a vial. After one week, however, the violet colour and plasmon band began to fade.

3. Results and discussion

3.1. UV.-vis. Spectra of ligands and their complexes Figure 2 displays the UV.-vis. spectra of compounds in methanol. The absorption spectra readings were calculated by subtracting the

absorption maxima of the azo-copper complexes from the ligand. UV.-vis. spectra of azo bonds, using electronic spectroscopy, except for HL₂, showed just two bands. The frequency range 210-800 nm revealed three major absorption bands. The 1st peak observed in the reign (220–280)nm is attributed to a moderate energy $\pi-\pi^*$ transformation within the moiety of phenyl representing the (¹La→¹A) state. The 2nd peak detected in the 285–345nm reign is due to decreased energy $\pi-\pi^*$ electronic transition of the phenyl ring and heterocyclic structure. Both solvent and substituent kind utilized have little effect on these two bands. The 3rd peak in the reign 460–550 nm represents the n- π^* electronic transition in which the electron system is involved and charge transfer. Cu(II) complexes spectra showed that the significant ligand-associated band had moved to higher-frequency wavelengths. The peaks at 540, 570, 580, and 600 nm differed by a bathochromic change of LMCT. The resulting finding supports modern molecular orbital theory by suggesting that the Cu(II) central ion influences the complexes bands according to this hypothesis. Any factor affecting the electronic density of a conjugated system, electron negativity, for instance. the radius, or the metal(II) ion's electrical configuration, must result in a band variation.

3.2. Mass spectroscopy

The spectrum of mass for HL¹ revealed a molecular ion peak [M]⁺ at m/z = (253,76%) corresponding to its molecular mass of C₁₃H₁₁N₅O. Fragments of the molecular ion [M]⁺ occur at various sites. However, the base peak was observed at m/z = (130, 100%), indicating the chemical formula C₉H₆O. The peaks represented the other fragmentation at m/z = 114, 83, and 69. Peak [M]⁺ at m/z=(316, 64 %) indicated that HL² had a molecular mass of C₁₈H₁₃N₅O, which provided a starting peak at m/z=(298,100%) because of OH-radical loss followed by H-radical loss, respectively. The peak fragments lose C₁₀H₆ to generate a peak at m/z= (172, 42 %), which then loses N₂ and C₆H₅ H-radical is then made to increase a 2nd peak at m/z = (68, 48%), which corresponds to C₂H₂N₃. This molecular mass was represented by HL³ with the empirical formula C₁₃H₁₀N₄OS at m/z = (270). This peak was also the starting peak, with 100% abundance of relative. A peak confirmed a fragmentation ion at m/z =145 (32%) corresponding to the formula of C₁₀H₇O. N₂ gas may leak from the fragment ion with m/z =100(56%), due to the C₂N₂S formulas, the CH₃ group produces a fragment ion at m/z =84(40 %). Finally, the peak of molecular ion [M]⁺ at m/z = (302,48 %) for HL⁴ is related to the formula C₁₃H₁₀N₄OS₂. This ligand is more plentiful than the previous ones. A large, great peak at m/z = (159, 100%) announced the break of connection between the azo group and the ring of naphthalene.

3.3. The production of Cu(II) complexes in solution

"The continuous variation method" CVM, "mole-ratio method" (MRM) was used to determine the structure of the complexes in solution. According to the findings, Cu (II) complexes developed in solution at a molar ratio of 1:1 (M/L). Harvey and Manning's Equation was used to derive the conditional formation constants stated in Table 2. The (DG) of Cu(II) complexes production was also computed. Conductometric titrations revealed a 1:1 (M/L) Cu(II) complex stoichiometry. The rise in conductance has demonstrated a covalent association to the O-atom of the OH moiety, which is the reaction between azo dyes and Cu(II) ion. In addition, specific absorptivity, Beer's law's validity limits, molar extinction coefficient, correlation coefficient, and standard deviation were determined. Cu(II) ion-dependent EDTA ligand measurement revealed that possible Cu(II) titration indicators are ligands for this ion-dependent titration. Table 2 demonstrated that the existing spectrophotometric approach could determine the Cu(II) ion. The obedience to Beer's law and Ringbom plot is shown in Fig 3. The absorption of long-wavelength absorption peaks produces Cu (II) complexes. For cells with a 1 cm optical path length, the equation of Benassi–Hildebrand (B–H) was used to calculate the formation constant of azo-complexes with a 1:1 stoichiometry (acceptor-donor):

$$\frac{[L_0]}{A - A_0} = \frac{1}{\epsilon_{ML} - \epsilon_L} + \frac{1}{(\epsilon_{ML} - \epsilon_L)K[M_0]}$$

ϵ_L and ϵ_{ML} , respectively, are the coefficients for the molar extinction and Cu complexes. A_0 and A are free ligand absorbents and Cu complexes at the ligand and Cu complexes' given wavelength. Also, $[M_0]$ is the Cu ion concentration, $[L_0]$ is the initial ligand concentration and the final coefficients.

Table 1: Spectrophotometric data (ϵ , a), For Cu(II) with HL1–4, the Sandell sensitivity (S), standard deviation (SD), correlation coefficient (CC), and Beer's law range are all positive

<i>Data</i>	<i>HL¹</i>	<i>HL²</i>	<i>HL³</i>	<i>HL⁴</i>
λ_{max} (nm)	540	550	560	580
Beer's range (ppm)	0–2.31	0–3.84	0–3.80	0–3.76
Ringbom range (ppm)	-0.08 to 0.27	0.28 – 0.56	0.20–0.61	0.24–0.62
CC	0.99986	0.9973	0.9964	0.9961
SD	0.00543	0.02654	0.02785	0.01965
ϵ ($\mu\text{mol}^{-1} \text{cm}^{-1}$)	18.9×10^3	13×10^3	10.6×10^3	11.1×10^3
a ($\text{ml g}^{-1} \text{cm}^{-1}$)	0.334	0.197	0.179	0.184
S ($\mu\text{g cm}^{-2}$)	0.004	0.006	0.0054	0.0067
MRM	1:1	1:1	1:1	1:1
CVM	1:1	1:1	1:1	1:1
CM	1:1	1:1	1:1	1:1
Log β_n	5.76	5.43	5.11	7.31
ΔG^*	7352	7105	6894	8875
$Y_x 10^{-5}$	5	5	5	5
$X_x 10^{-5}$	5	5	5	5
K (bulk-copper)	35,764	23,378	13,535	8312
K (nano-copper)	35E+7	131E+7	30E+7	81E+7

ΔG^* , Gibbs free energy; X represents the concentration of the prepared sample (mol L^{-1}); β_n , complex stability constant; “EDTA-titration” denotes the presence of EDTA in the sample. Y represents the concentration of the sample. (mol L^{-1}) was calculated through practical means. “EDTA-titration”.

Under 1:1 donor-acceptor complexes, Equation (1) is valid. A straight line is obtained when only a 1:1 complex is generated; a curve is obtained when a system contains a mixture of 1:1 and 1:2 complexes. Then, To obtain a linear plot, we must employ another equation. The data of the formation constant (K) for Cu(II) complexes are determined using plots of $[L_0]/(A A_0)$ vs. $1/[M_0]$. Figure 4 Table 2 displays the results. The findings showed that copper (II) complexes with ligands are more stable than copper(II) complexes with ligands., led to the expansion of two rings that provide more stability than one ring, providing adequate proof to the proposed structure of the produced complexes

3.4. Solid copper complexes are being studied for their properties

The proposed formulae $[CuL^{1-4}(nH_2O)]AcO \cdot xH_2O$ were confirmed by the elemental analyses shown in Table 1, where $n = 1$ for A1, A2; $n = 2$ for A3, A4, and $x = 1$ for A1, A3; $x = 2$ for A2, A4 Table 1. The majority of organic solvents are insoluble in Cu complexes, except for DMF and DMSO. Table 2 shows molar conductivity data that are in the electrolyte region (1:1).

Table(2): Several physical characteristics and microanalysis techniques

Compounds	formula	Molecular Weight	Colour	Yield%	M.P. °C	%Elemental Analysis Found			
						% (Calculated)			
						C	H	N	M
HL ¹	C ₁₃ H ₁₁ N ₅ O	253.27	orange	70	197	61.13 (61.65)	3.54 (4.38)	27.13 (27.65)	-
[Cu L ¹ (H ₂ O)]AcO.H ₂ O(A1)	C ₁₅ H ₁₇ CuN ₅ O ₅	410.88	Light violet	60	286	42.95 (43.85)	3.90 (4.17)	16.76 (17.05)	14.76 (15.47)
HL ²	C ₂₀ H ₁₃ CuN ₅ O	315.34	red	65	170	52.83 (53.15)	3.88 (3.82)	17.05 (17.71)	-
[Cu L ² (H ₂ O)] AcO. 2H ₂ O (A2)	C ₂₀ H ₂₁ CuN ₅ O ₆	490.00	violet	75	265	48.34 (48.93)	3.90 (4.31)	4.18 (14.26)	12.39 (12.94)
HL ³	C ₁₄ H ₁₂ N ₄ OS	284.34	Pink	72	180	61.83 (59.14)	3.87 (4.25)	24.03 (19.76)	-
[Cu L ³ (H ₂ O) ₂] AcO .H ₂ O (A3)	C ₁₅ H ₁₈ CuN ₄ O ₆ S	445.94	violet	81	273	40.84 (40.40)	3.99 (4.07)	12.11 (12.56)	14.53 (14.25)
HL ⁴	C ₁₄ H ₁₂ N ₄ OS ₂	316.40	Redith Orange	68	205	53.23 (53.15)	3.67 (3.82)	17.13 (17.71)	-
[Cu L ⁴ (H ₂ O) ₂] AcO.2H ₂ O(A4)	C ₁₅ H ₂₀ CuN ₄ O ₇ S ₂	495.01	Dark violet	78	289	36.75 (36.51)	4.26 (4.09)	19.12 (18.93)	10.97 (10.73)

IR spectra

The IR spectra of compounds were compared., evidence for complex formation was established. Table 3 shows the most distinctive bands and their assignments. For example, the bands in the range 1460-1500 cm^{-1} associated with ν (N=N) stretching were displaced to a smaller number of different frequency bands 1443-1464 cm^{-1} indicating N=N as evidenced by the formation of new bands the ν (Cu-N) bond in the region 426-464 cm^{-1} . Because of ν (C=N) of triazole nitrogen, the IR spectrums of HL₁ and HL₂, respectively, showed a frequency of 1655 and 1670 cm^{-1} . This band was reduced to a lower frequency in the complexes, demonstrating the engagement of N-azomethine in the chelation of the Cu(II) ion. The vibrational mode of ν (O-H) was observed at 3456-3480 cm^{-1} , caused by the presence of lattice water in complexes A1–A4. The appearance of bands in the spectra of all complexes at 3323–3311, 1709–1686, 845–819, and 624–582 cm^{-1} were due to the pooled water's ν (O-H), δ (H₂O), ρ_r (H₂O), and ρ_w (H₂O) vibrations, respectively. The phenolic ν (C-O) band was observed in the region 1250–1282 cm^{-1} in the free ligands HL¹⁻⁴ and (as a moderate to the high band) in complexes A1–A4 Cu-O bonds through hydrolysis. The emergence of ν (Cu-O) at 520–545 cm^{-1} showed coordination via O- phenolic moiety. According to the initial results and micro-analyses, the triazole azo is associated with the Cu(II) ion via N-azo moiety, N-triazole. O-phenolic, the HL₁, and HL₂ act as monobasic tridentate ligands. The chelation centres for the thiadiazole of ligands are the O-phenolic moieties and N- azo moieties, respectively. Thus, the ligands HL₃ and HL₄ act as monobasic bidentate ligands shown in Scheme 2.

Table 3: IR data (cm^{-1}) of the significant compounds.

Compound	ν OH	ν (NH)	δ (H_2O)	ν (C=N)	ν (N=N)	ν (C-O)	$\rho_r(\text{H}_2\text{O})$ $\rho_w(\text{H}_2\text{O})$	ν (C-S)	ν Cu-N) ν (Cu-O)
HL ¹	-	-	-	1655	1460	1265	-	-	-
[Cu L ¹ (H ₂ O)]OAC.H ₂ O (A1)	3456 3323	-	1709	1634	1448	1280	834 595	-	443 520
HL ²	-	3160	-	1673	1485	1250	-	-	-
[Cu L ² (H ₂ O)]OAC. 2H ₂ O (A2)	3463 3318	3158	1686	1651	1464	1276	845 611	-	464 434
HL ³	-	-	-	1593	1470	1282	-	634	-
[Cu L ³ (H ₂ O) ₂]OAC.H ₂ O (A3)	3480 3311	-	1701	1590	1443	1294	819 624	631	456 539
HL ⁴	-	-	-	1586	1500	1270	-	627	-
[Cu L ⁴ (H ₂ O) ₂] AcO.2H ₂ O (A4)	3476 3320	-	1694	1584	1456	1297	840 582	628	451 545

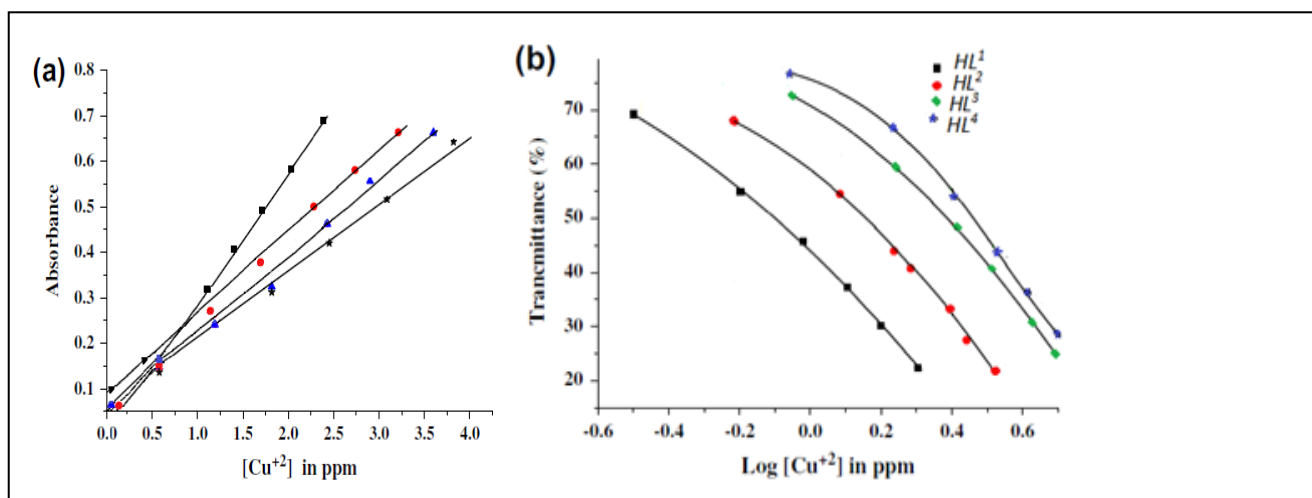


Fig. 3. (a) Beer's law is observed for complexes of (L₁₋₄) with Cu(II). (b) Cu(II) compounds with (L₁₋₄) ringbom plots.

3.4.2. TGA studies of Cu(II)-complexes (A1–A4) were performed, and reasonable degradation was observed. Table 4 illustrates the mass loss, possible shards, and reign of temperatures for all Cu(II)azo- complexes investigated. In addition, the complex A1's thermogram is used to illustrate [Cu L¹(H₂O)]OAC.H₂O is complex. Therefore, complex A1 is used as a reflective thermogram. This complex [Cu L¹(H₂O)]OAC.H₂O thermally disintegrates four steps over a 25–800 °C temperature range. The 1st step takes place at 32.78–151.74 °C with a mass loss estimate of approximately due to the loss of lattice H₂O molecules. The 2nd step occurs within the temperature range 151.74–182.83 °C. It results in a mass loss of approximately 4.17% (calcd. 4.32%) due to the loss of H₂O chelated molecules. Therefore, this stage requires 143.643 kJ mol⁻¹ as activation energy. The 3rd degeneration stage involved losing hetero ring at 182.83–460 °C with an approximated weight loss of 16.75% (calcd. 16.80%). This stage requires 287.543 kJ mol⁻¹ as activation energy. The 4th degradation step responsible for the pyrolysis of the HL¹ molecule with the last CuO remains was the loss of C₁₀H₆, acetate, and N₂ gas within the temperature range 460–700.65 °C with an estimated weight loss of 2.42% (calcd. 52.38%). This stage has 89.4 kJ mol⁻¹ as activation energy. In the neutralization of Horowitz-Metzger and Coats-Redfern. The kinetic and thermodynamic parameters for the stages of thermal degradation were investigated.

Table 4 :Thermochemical analysis (DrTGA and TGA) results for Cu(II) complexes(A1-A4)

Compounds	(TGA)				DrTGA (°C)
	Step	Temperature (°C)	wt. % loss (calcd.)/found	Assignment	
A1	1st	32.76–151.74	(4.38)/4.23	Loss of H ₂ O lattice	90
	2nd	151.74 – 182.83	(4.32)/4.17	Loss of H ₂ O coordinated	172
	3 rd	182.83–460	(16.80)/16.75	Loss of hetero ring	251
	4th	460–700.65	(52.38)/52.42	Loss of (N ₂ , C ₁₀ H ₆ , CH ₃ COO)	532
A2	1st	25.53–140.32	(7.33)/7.51	Loss of H ₂ O lattice	75
	2nd	140.32– 174.64	(3.66)/4.02	Loss of H ₂ O coordinated	165
	3 rd	174.64– 450	(14.06)/14.19	Loss of hetero ring	231
	4th	450–650.31	(43.83)/43.76	Loss of (N ₂ , C ₁₀ H ₆ , CH ₃ COO)	447
A3	1st	30.34–150.63	(4.01)/4.15	Loss of H ₂ O lattice	80
	2nd	150.63– 180.53	(4.21)/4.19	Loss of H ₂ O coordinated	165
	3 rd	180.53– 440	(28.58)/28.79	Loss of hetero ring	240
	4th	440–670.32	(38.87)/38.76	Loss of (N ₂ , C ₁₀ H ₆ , CH ₃ COO)	468
A4	1st	35.42–153.76	(7.27)/7.31	Loss of H ₂ O lattice	85
	2nd	153.76– 186.65	(7.21)/7.18	Loss of H ₂ O coordinated	187
	3 rd	186.65– 430	(26.70)/26.79	Loss of hetero ring	242
	4th	430–680.54	(43.43)/43.55	Loss of (N ₂ , C ₁₀ H ₆ , CH ₃ COO)	486

Coats–Redfern equation: Where α denotes the decomposed fraction, β denotes the rate of heat, The absolute temperature is indicated by T, while the universal gas constant is R., A is the pre-exponential Arrhenius constant, while E_a is the activation energy. Thus, the expression $(AR/\beta E_a) (1-2RT/E_a)$ is nearly constant, as is the value of $(1-2RT/E_a)$.

$$\text{For } n = 1: \log \left[\frac{-\log(1 - \alpha)}{T^2} \right] = \log \left(\frac{AR}{\beta E_a} \right) \left(1 - \frac{2RT}{E_a} \right) - \left(\frac{E_a}{2.303RT} \right) \quad (2)$$

$$\text{For } n \neq 1: \log \left[\frac{1 - (1 - \alpha)^{1-n}}{T^2(1 - n^2)} \right] = \log \frac{AR}{\beta E_a} \left(1 - \frac{2RT}{E_a} \right) - \left(\frac{E_a}{2.303RT} \right) \quad (3)$$

For $n = 1$, a straight line with a slope equal to $(-E_a/2.303R)$ was obtained by plotting $\log(-\log(1-\alpha)/T^2)$ vs. $1000/T$, this can be used to compute activation energy. Moreover, an intercept equal to $\log(AR/\beta E_a)$ can also be used to calculate the Arrhenius pre-exponential factor. For $n \neq 1$, plotting $\log(-\log(1-\alpha)/T^2)$ vs. $1000/T$ provided a straight line with a slope of $(-E_a/2.303R)$, an intercept equal to $\log(AR/\beta E_a)$, and A and ΔE .

Table 5 :Heat capacity of Coats–Redfern and Horowitz–Metzger procedures were used to create complexes.

Complexes	Thermodynamic parameters								
	Step	Method	n	CC	E* (kJ mol ⁻¹)	H* (kJ mol ⁻¹)	A (S ⁻¹)	-ΔS (J mol ⁻¹ K ⁻¹)	ΔG* (kJ mol ⁻¹)
A1	1st	CR	1	0.96432	22.78862	555.46018	25.96638	0.107027	63.69622
		HM	2	0.98654	32.65213	29.47437	179.9404	0.203803	107.3714
	2nd	CR	1	0.98214	143.643	138.8779	7.86E-05	0.337091	287.875
		HM	0	0.99864	155.9365	152.1046	8.98E+15	0.123567	354.4321
	3rd	CR	1	0.98655	287.543	293.543	6.97E-10	0.56532	530.8087
		HM	2	0.98987	321.876	315.765	9.43E+21	0.28750	465.3245
	4th	CR	1	0.97876	485.8762	485.8642	5.45E-12	0.76532	897.9471
		HM	2	0.99098	596.7651	521.0089	3.62E+30	0.65479	487.7653
A2	1st	CR	1	0.99123	13.8766	10.75433	4.59 E-10	0.14568	39.6531
		HM	2	0.99543	20.4321	17.13215	1.854 E+09	0.38765	123.4322
	2nd	CR	1	0.98432	165.5432	148.7643	7.23E-06	0.43789	290.5436
		HM	2	0.99212	178.0985	157.5466	8.54E+14	0.08712	180.9870
	3rd	CR	1	0.98311	289.9876	276.4321	1.37E-16	0.76589	478.890
		HM	2	0.99012	265.5432	269.8976	2.48E+26	0.30651	357.244
	4th	CR	0	0.98098	256.874	207.5325	0.00542	0.43268	475.0973
		HM	0	0.99234	205.653	213.7752	4.54E+12	0.01986	296.2471
A3	1st	CR	1	0.08761	13.6542	7.190359	0.00980	0.08400	54.7658
		HM	2	0.98876	19.6633	16.75734	2.11E+07	0.54387	109.4907
	2nd	CR	1	0.98875	176.2058	135.3973	6.87E-07	0.76544	296.3386
		HM	2	0.99109	154.3956	187.0164	9.68E+14	0.18765	178.4394
	3rd	CR	1	0.97543	228.8568	249.8750	1.76E-12	0.56239	456.2740
		HM	2	0.99123	203.0972	257.3784	1.43E+24	0.42152	396.9432
	4th	CR	0	0.98763	220.1205	219.5421	0.085432	0.50678	513.5799
		HM	0	0.99613	265.8644	243.5727	1.43E+12	0.00321	234.2147
A4	1st	CR	1	0.98543	14.11830	9.105993	3.65E+10	0.08764	39.95431
		HM	2	0.99321	20.67633	15.43717	2.3589	0.54321	120.0323
	2nd	CR	1	0.96543	20.78862	72.9875	31.9543	0.37237	70.98754
		HM	2	0.97321	35.35261	43.6432	182.8652	0.78383	114.8543
	3rd	CR	1	0.97789	23.22688	23.19573	1.78E+12	0.006273	63.9876
		HM	0	0.98907	37.05813	45.68131	5.954506	0.467805	161.3125
	4th	CR	1	0.98654	200.28264	321.9196	6.98E-10	0.63210	627.9812
		HM	2	0.99532	309.0355	387.3867	8.51E+22	0.21885	427.5105

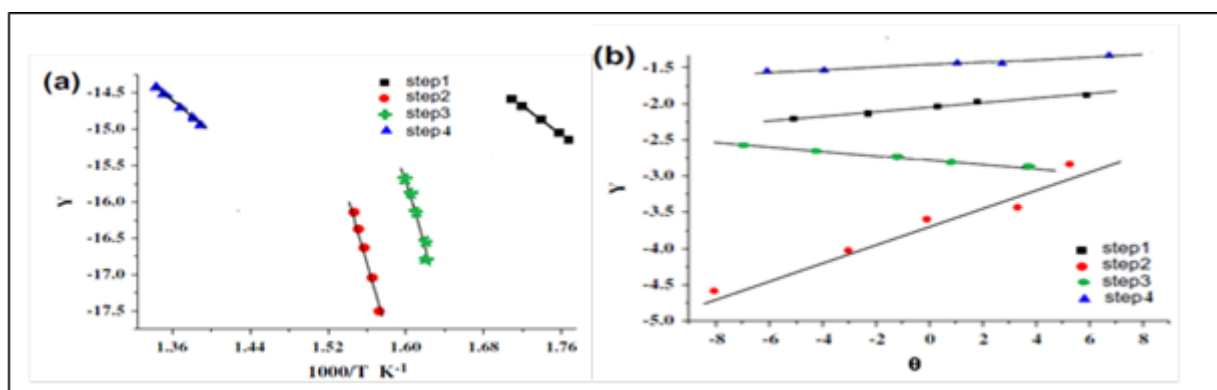


Fig1. (a) Use the Coats–Redfern equation to display $Y = \log(-\log(1-T_2))$ vs. $1000/T$ (k_1) for the different decomposition steps of complex A2. (b) shows the Horowitz–Metzger decomposition of complex A2 using the Horowitz–Metzger equation.

Horowitz–Metzger equation:

$$\text{For } n = 1: \log[-\log(1 - \alpha)] = \frac{E_a \theta}{RT_s^2} \quad (4)$$

$$\text{For } n \neq 1: \log \left[\frac{1 - (1 - \alpha)^{1-n}}{1 - n} \right] = \log \left(\frac{A}{\beta} \frac{RT_s^2}{E} \right) - \frac{\theta E_a}{RT_s} \quad (5)$$

$$\Delta H = E - RT$$

$$\Delta S = R \ln[Ah/KT]$$

$$\Delta G = \Delta H - T\Delta S$$

The findings lead to the following conclusions:

- 1- The activation complexes have more energy data. Second, they demonstrate because of their covalent nature, the investigated compounds are extremely stable.
- 2- The final residue's free energy is greater than the first compound's was revealed by higher than the value of the first compound. Thus, all of the degradation stages are non-spontaneous.
3. With each consecutive level of a complex's breakdown, the data of ΔG increased. Thus, increasing the ΔG data of a complex indicated that the subsequent ligand was being eliminated slower than the primary ligand. Likewise, it was because the data of $T\Delta S$ increase from one stage to the next that overrides the data of ΔH .
4. The ΔS data (-) showed a better ordered complex than a reactant or a sluggish reaction.
5. The endothermic nature of the breakdown process is indicated by the data (+) of ΔH .

6. In Table 5, the approximation method (Horowitz–Metzgar) provided higher kinetic parameter values than the integral method (Coats–Redfern). This is because the obtained data has been subjected to various mathematical approaches

3.4.3. Mechanistic aspects

On the assumption that $g(\alpha)$ is constant, the thermal decomposition mechanism is assigned, that is dependent on the reaction mechanism. According to the Equation, using Satava's nine forms of $g(\alpha)$, the integral approach (Coats–Redfern) was employed to elucidate the thermal decomposition mechanism in each stage.

$$\ln[g(\alpha)/T^2] = \ln(AR/\beta E) - E/RT$$

The significance of the various symbols are well-known: where β is the heating rate, α is the fraction decomposed, T is the absolute temperature, R is the universal gas constant, E is the activation energy, A is the Arrhenius pre-exponential and $g(\alpha)$ is the kinetic mode. As a function of $(1/T)$, the quantity $\log[g(\alpha)/T^2]$ is displayed. For each of these nine forms, as well as the form of $g(\alpha)$, the correlation coefficient was determined. The maximum value for correlation is used as the reaction mechanism. The TGA process was repeated for the Cu(II) complex C1 at various rates of heating, namely 5, 10, and 15 C/min.

At heating rates of 10 and 15 C/min or 5 C/min, respectively, 2 or 3 distinct and the thermal decomposition reaction has well-defined steps. First, the decomposition is analyzed using the Coats–Redfern method. Second, The activation energy (E) and the Arrhenius pre-exponential function were calculated using the slope and intercept (A). Next, the slope and the intercept were used to calculate the activation energy (E) and the Arrhenius pre-exponential (A). Additionally, the outcomes indicated that, except step II, the heating rate increased the thermodynamic functions of activation of the thermal decomposition.

3.4.4. Measurements of magnetic moments and electronic spectra

Cu(II) complexes (A1–A4) influential electronic absorption bands recorded as Nujol mull are shown in Table 3. Magnetic moments exist in complexes of Cu(II). Table 1 proposed square planar organization for complexes A1, A2, A3, and A4. Cu(II) complexes have a magnetic moment. For complexes A1, A2, A3, and A4, Table 1 suggested square planar chelation. Two bands within 15,152–17,786 and 22,342–25,324 cm^{-1} , usually in a square planar geometry location that can be allocated $^2B_{1g} \rightarrow ^2E_{1g}$ and $^2B_{1g} \rightarrow ^2E_g$ respectively, exhibited the Cu(II) complexes spectrum in the solid-state.

3.4.5. ESR spectra

The ESR spectra of Cu(II) complexes (C1–4) were recorded at room temperature (25°C) and are displayed in Table 3. Complex ESR spectra are characterized dx^2-y^2 ground state with type of axial symmetry and monomeric structure, most prevalent for Cu(II) complexes. Cu(II)-azo complexes had two different g data in their ESR spectra. Because the azo and metal ions are covalently bound, all complexes have positive g -data compared to the free electron (2.0023). The $g_{11} > 2.3$ data suggest that the bonding of metal-ligand in the complex is covalent.

Additionally, the expression $G = (g_{11} - 2) / (g_{\perp} - 2)$. If $G > 4$, the exchange interaction is negligible, whereas if $G < 4$, the stable complexes exhibit a significant exchange interaction. The g -data of Cu(II)-complexes with a $^2B_{1g}$ ground state can be expressed as ($g_{11} > g$) by

$$k_{11}^2 = (g_{11} - 2.0023)\Delta_2/8\lambda$$

$$k_{\perp}^2 = (g_{\perp} - 2.0023)\Delta_1/2\lambda$$

$$k^2 = [k_{11}^2 + 2k_{\perp}^2]/3$$

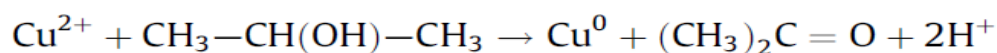
Where k_{\perp}^2 and k_{11}^2 are the components of perpendicular and analogous of the factor of orbital lowering k , the electronic transitions $^2B_{1g} \rightarrow ^2B_{2g}$ and $^2B_{1g} \rightarrow ^2E_g$ are represented by Δ_2 and Δ_1 , respectively. The computed data of k_{\perp}^2 and k_{11}^2 due to $k_{\perp} < k_{11}$, that is convincing proof for the assumed $^2B_{1g}$ state of the ground. The fact that k is lower than the unit shows covalence, which aligns with the conclusion drawn from the g_{11} data. All complexes $k_{\perp} > k_{11}$ had bonding of in-plane π , $k_{\perp} \sim k_{11} \sim 0.77$, which Hathaway claims is significant, and bonding of out-plane π , Hathaway claims is not significant.

3.5. Cu- nanoparticle coordination

Classical coordination chemistry is concerned with metal complexing, chelation numbers, ions, and electronic information structure, efficient charge, coordinating impact, ligands, size, and charges, distribution of charges, orbitals, appropriate for forming a bond with a metal ion, and appropriate for forming metal-ligand

To some extent, these concerns arise, when the chelation object is a spheroidal particle containing 10^3 to 10^5 atoms rather than a single metal ion or several combined ions as (atoms). Only the surface ions (atoms) of a particle will interact with its surroundings (ligands), not the atoms. The ligand of organic- nanoparticle interaction has the same fundamental interactions as the classic metal ion composition: acceptor-donor sites, the electrocution of ions and vacant metal orbitals, and the covalent connection. However, here dispersion interactions and nanoparticle surface spatial screening are far more critical.

The chemical process is copper(II) nitrate reduction with isopropyl alcohol:



According to TEM Fig. 3, the technique yields particles with a size of 20 nm. At 560 nm, the plasmon absorbance. From the ligand absorption spectra in the absence and existence of colloidal Cu^0 nanoparticles at various concentrations.

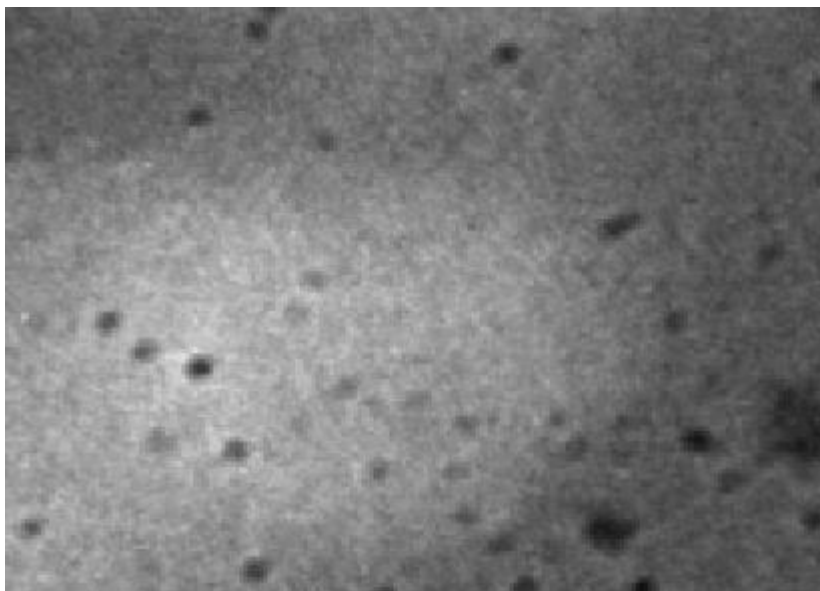


Fig.2:Transmission electron microscopy image of prepared copper nanoparticles,

We found that as the concentration of colloidal Cu^0 nanoparticles increases, The absorption of ligands (HL_{1-4}) consistently decreases due to ligand adsorption on the surface of Cu^0 nanoparticles as colloidal, a new peak has appeared. Thus, we result in the surface complex's configuration up to where the Cu^0 surface is saturated with ligand molecules.

Concentration There is no increase in the absorption spectrum, as evidenced by the image of TEM.

Equation (6) can be used to compute the equilibrium for complicated composition between azo-ligands and Cu^0 nanoparticles, where K_{app} symbolizes the apparent constant of association (see Scheme 3)

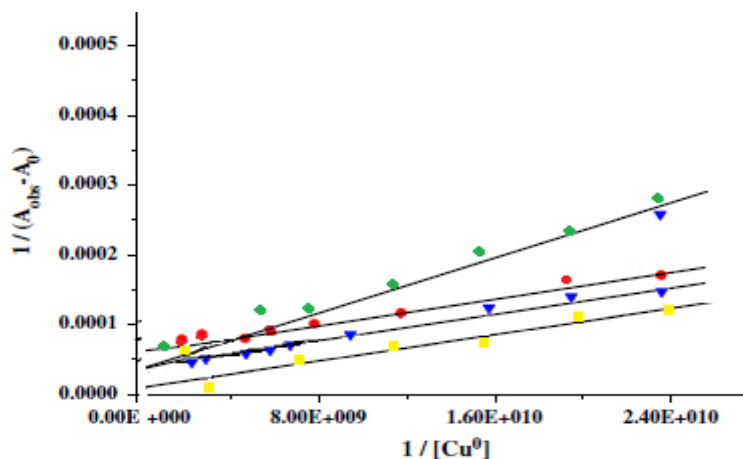
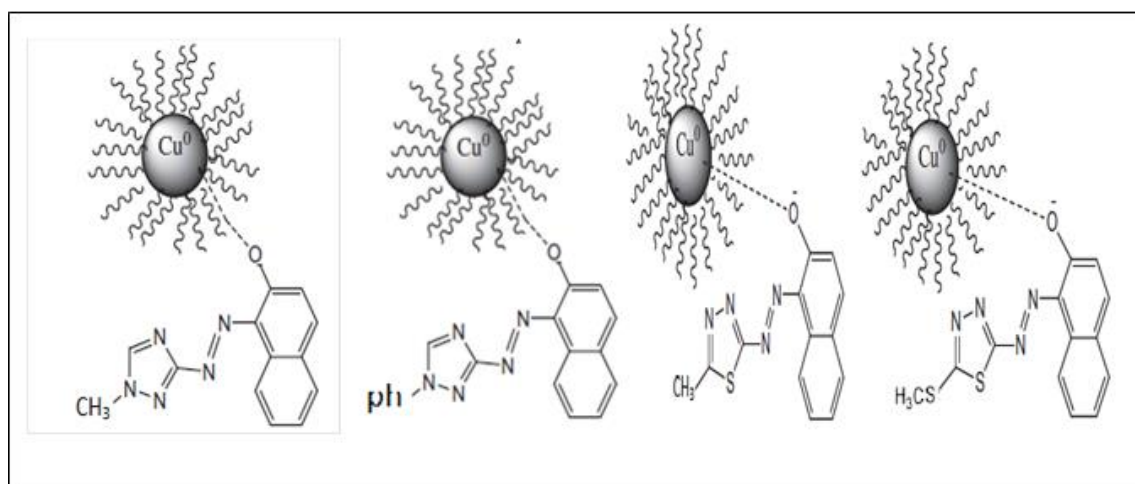
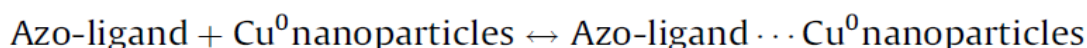


Fig. 3. According to equation of the Hildebrand and Benesi, the reciprocal concentration of colloidal copper nanoparticles coordinated with (HL¹⁻⁴) and the linear dependence of 1/(A_{obs} A₀) on the reciprocal concentration.



Scheme 3. The interactions of L1-4 with the surface of colloidal Cu⁰.



$$K_{app} = \frac{[\text{Azo-ligand} \cdots \text{Cu}^0 \text{ nanoparticles}]}{[\text{Azo-ligand}] \cdot [\text{Cu}^0 \text{ nanoparticles}]} \quad (6)$$

According to Benesi and Hildebrand the variation in the strength of the absorption peak resulting from the surface complex formation was used to calculate K_{app}.

$$A_{obs} = (1 - \alpha)C_0\varepsilon_{\text{azo-ligand}} + \alpha C_0\varepsilon_{\text{complex}}$$

Eq. (7) can be written as Eq (8), where α is the degree of association between Cu⁰ nanoparticles and azo-ligand, The measured absorbance of a solution containing varied concentrations of colloidal Cu⁰ nanoparticles is denoted by A_{obs}, α is the degree of

association between azo-ligand and Cu⁰ nanoparticles, and A_{obs} is the observed absorbance of a solution containing different concentrations of colloidal Cu⁰ nanoparticles. Moreover, α represents the degree of connection between the azo-ligand and the Cu⁰ nanoparticles. The molar extinction coefficients at the given temperature are $\epsilon_{\text{complex}}$ and $\epsilon_{\text{azo-ligand}}$. As a result, in the water Equation (7), Azo-ligand and formed complex wavelengths, respectively, can be written as Equation (8), where A_c and A⁰ denote the complex with a C⁰ concentration and the ligand absorbance:

$$A_{obs} = (1 - \alpha)A_0 + \alpha A_c \quad (8)$$

$$(K_{app}[\text{Cu}^0 \text{ nanoparticles}] / (1 + K_{app}[\text{Cu}^0 \text{ nanoparticles}])). \quad (9)$$

$$\frac{1}{A_{obs} - A_0} = \frac{1}{A_c - A_0} + \frac{1}{K_{app}(A_c - A_0)[\text{Cu}^0 \text{ nanoparticles}]} \quad (10)$$

Based on the strong linear relationship between 1/(A_{obs} - A₀) and the reciprocal, the increase in absorbance was due to surface complex absorption, i.e., donor–adaptor behavior. Colloidal Cu⁰ nanoparticle concentration (stock solution) = 8.46 10⁹ mole HL⁻¹), The intercept is equal to 1/K_{app}(A_c-A₀), while the slope is 1/K_{app}(A_c-A₀) (A_c- A₀). That obtained from this graphic, derives the apparent association constant (K_{app}).

Conclusion

The some heterocyclic azo compounds reaction with Cu(OAc)₂ resulted in coordination. Furthermore, the IR spectra revealed ligands with triazole moiety coordinate with the copper (II) ion tridentately with ONN donor sites. Azo-dyes containing a thiadiazole moiety coordinate with the copper (II) ion and ON donor sites in a bidentate manner. The UV spectra, magnetic moments, conductance, and thermal analysis are used to determine the structure of the complexes. Spectrophotometry is also used to investigate the reaction between the solution of Cu(II) ion and azodyes. We determine the constants of stability and stoichiometry. The findings suggest which the azo dyes under investigation can be used as a spectrophotometric indicator to determine Cu(II) ion. The interaction between azo dyes under investigations and the Cu nanoparticles are regarded. The data of spectral showed the surface complex formation between colloidal copper nanoparticles and azodye ligands by the (OH) anchoring moiety. The prepared copper nanoparticle complexes' stability constant has been calculated.

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KOZAK-TÜRKİYE SAHİPLİ FISTIK ÇAMI PLANTASYONLARINA GENEL BAKIŞ

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Özet

Fıstık çamı sert kabuklu bir meyve türüdür ve ekonomik değeri yüksektir. Akdeniz ülkelerinde doğal olarak yayılış gösteren tür, en uygun ve kaliteli yetiştirme koşullarını Kozak Bölgesi'nde bulmaktadır. Kozak Bölgesi fıstık çamı plantasyonları aynı zamanda dünyada özel mülkiyete ait tek fıstık çamı ormanıdır. Bölgedeki devlet ormanları ile iç içedir. Çalışmalar orman işletmeciliği ile koordineli yürütülmektedir. Ürünlerin toplanması ve ağaçların bakımları kontrollü bir şekilde yapılmaktadır. Kozak Kooperatifi bünyesinde çalışmalar yürütülüyor. Köy İdaresi etkili bir otoritedir. Bölge halkının sosyo-ekonomik yapısı elde ettikleri yüksek gelir sayesinde oldukça yüksektir. Kendine özgü bir yapı sergiler. Kadınlar yapı içerisinde önemlidir. Bu çalışmada fıstık çamı yetiştiriciliğinin teknik özelliklerinin yanı sıra bölgenin sosyo-ekonomik durumu ve fıstık çamı plantasyonlarının örnek olma durumu değerlendirilmiştir. Fıstık çamı ağaçlandırmalarının olumlu yönleri ve karşılaşılabilecek olumsuz yönleri tartışılmıştır. Bölgedeki sorunlar tespit edilerek çözüm önerileri sunulmaya çalışıldı. Sorunların çözümünde rol oynayabilecek paydaşlar ve olası iyileştirmeler ve bunların etkileri tartışılmaktadır.

Anahtar Kelimeler: Fıstık çamı, Kozak, Sosyo-ekonomik durum, Orman, Kırsal Kalkınma

**EVALUATION OF OWNED STONE PINE PLANTATIONS IN KOZAK REGION OF
TURKIYE**

Abstract

Stone pine is a type of hard-shelled fruit and has high economic value. The species, which spreads naturally in Mediterranean countries, finds the most favorable and high-quality growing conditions in the Kozak Region. The Kozak Region stone pine plantations are also the only privately owned stone pine forest in the world. It is intertwined with the state forests in the region. There are a total of 8 villages in the region. The works are organized together with forest management. Collection of products and maintenance of trees are carried out in a controlled manner. Studies are carried out under the Kozak Cooperative. Village Administration is an effective authority. The socio-economic structure of the people of the region is quite high thanks to the high income they earn. It exhibits a unique structure. Women are important within the structure. In this study, the technical characteristics of stone pine cultivation, as well as the socio-economic situation of the region and the exemplary status of stone pine plantations were evaluated. The positive aspects of stone pine plantations and the negative aspects that may be encountered are discussed. Problems in the region were identified and solution suggestions were tried to be presented. Stakeholders who can play a role in solving problems and possible improvements and their effects are discussed.

Keywords: Stone pine, Kozak, Socio-economy, Forest, Rural development

GİRİŞ

Türkiye birçok odun dışı orman ürünlerinin bulunduğu zengin orman kaynaklarına sahiptir. Çam fıstığı, kestane, ardıç, mahlep, safran, funda ve daha birçok çiçekli ve yapraklı türler bunlar arasında sayılabilir. Ülkemizde toplam orman alanı 21.678.134 ha dır. Fıstık çamı orman alanı ise 89.028 ha dır. Ülkemiz orman alanların yalnızca %0,40 fıstık çamı ormanıdır (Anonim 1). Bu ürünlerin değerlendirilmesi ve toplanmasında orman ekosistemlerine zarar verilmemesi; kendi doğal ortamlarının korunarak değerlendirilmeleri önemlidir.

Fıstık çamı altın değerinde bir ağaç olup (Batur 2015), özellikle dünyanın en kaliteli fıstık ağaçlarının yetiştiği Kozak Bölgesinde öne çıkmaktadır. Bu bölgede gelişmeler 1940'lerden sonra hız kazanmıştır. Kozak coğrafik konum olarak Ege Denizi'nin kuzeyinde, Bergama'nın 20 km kuzeybatısında yer almaktadır. Doğuda Madra Dağı, Yaylacık Dağı ve Bezirgan Dağı, kuzeyde Dede Dağı, batıda Eşirik Çayı, güneyde Kozak Çayı (Madra) ve Sakar Dağı ile çevrilidir. Dağların ortasında, Kozak çayının nemli iklimi ile güzel bir mikroklima alanıdır (Batur 2015, Eriz ve ark., 2022).

Kozak bölgesi, Türkiye'nin batısındaki İzmir ilinin Bergama ilçesinin eteklerinde yer almaktadır. Halkı okuryazar olan Kozak, eğitim, nüfus planlaması (doğum kontrolü), ulaşım altyapısı açısından örnek bir bölgedir. Bölge halkının ana geçim kaynakları tarım ve ormancılıktır. Arazinin neredeyse %50'si dik ve taşlık olduğundan ve üretim alanları oldukça dağınık olduğundan hasat makinelerle değil insan emeğiyle yapılmaktadır (Eriz ve ark., 2022). Bölgedeki sınırlı su kaynakları tarımsal üretimi sınırlandırmaktadır (Sülüoğlu, 2004). Fıstık çamı yetiştiriciliğinin yüksek değerli bir orman ürünü olarak yaygınlaştırılması bölgenin kalkınmasına yardımcı olmuştur. Ekonomik getirisi, kolay pazarlanabilirliği, düşük girdi maliyetleri ve yılın yaklaşık yarısında yalnızca küçük bir işgücü kullanılarak hasat edilebilmesi yetiştiriciliğine ilgiyi artırmıştır.

Fıstık Çamının Genel Özellikleri

Fıstık Çamı ağaçlarından kozalak toplama süresi uzundur. Hasat Aralık ayında başlar ve Mayıs ayına kadar sürer. Nisan ortasından sonra sıcaklıkların artmasıyla koniler açılır ve ürün kayıplarına neden olur. Ağaçtan yapılan "keye" adı verilen uzun ucu çengel şeklinde sırkılarla toplama yapılır (Akgül, 2016). Fıstık çamı kozalak hasadı bir meslektir. Toplayıcılar önceki yılların kuruyan ve kesilen dallarının uzantılarını merdiven gibi kullanarak tırmanırlar. Kozalıklara vurarak aşağı indirirler. Sadece 3 yaşındaki olgun kozalakların alınmasına özen gösterilmektedir (Akgül, 2016). Düşen kozalaklar daha sonra kadınlar tarafından toplanarak kurutma alanlarına taşınıyor. Kozalaklar güneş ışığı altında kurur ve kendiliğinden açılır.

Fıstık çamı ağaçlarının tohumları fide üretiminde rahatlıkla kullanılabilir. 20-25 yaşındaki ağaçlar ortalama 50 kozalak verir, kozalak başına 60 gram tohum verimi olur.

Kozalakların Olgunlaşması ve Hasadı

Fıstık çamı büyük bir şemsiyeye benzer ve İngilizcede "Umbrella Pine" olarak bilinmektedir. Uzun boylu ağaçlardır, uzun ömürlüdür (Anonim 4). Kozak bölgesindeki köylüler ürünün olgunlaşmasını bekleyerek uygun dönemde hasat yapar. Bu konuda orman işletme müdürlüğü ile iletişim sağlanmaktadır. Kozalak içindeki meyveler tam olgunlaşmadan hasat izni verilmemektedir. Genellikle Kasım ortasından sonra hasat başlamaktadır.

Fıstık Çamı ağaçlarından kozalak toplama süresi uzundur. Hasat Mayıs ayına kadar sürer. Nisan ortasından sonra sıcaklıkların artmasıyla koniler açılır ve ürün kayıplarına neden olur. Ağaçtan yapılan "keye" adı verilen uzun ucu çengel şeklinde sıırıklarla toplama yapılır (Akgül, 2016). Fıstık çamı kozalak hasadı bir meslektir. Toplayıcılar önceki yılların kuruyan ve kesilen dallarının uzantılarını merdiven gibi kullanarak tırmanırılar. Kozalıklara vurarak aşağı indirirler. Sadece 3 yaşındaki olgun kozalakların alınmasına özen gösterilmektedir (Akgül, 2016). Düşen kozalaklar daha sonra kadınlar tarafından toplanarak kurutma alanlarına taşınıyor. Kozalaklar güneş ışığı altında kurur ve kendiliğinden açılır. Fıstık çamı ağaçlarının tohumları fide üretiminde rahatlıkla kullanılabilir. 20-25 yaşındaki ağaçlar ortalama 50 kozalak verir, kozalak başına 60 gram tohum vermektedir.

Fıstık çamı hasadı ülkemizde geleneksel yöntemle yapılmaktadır. Hasadı yapan kişi hiçbir güvenlik önlemi almadan ağaca tırmanmakta ve keye yardımı ile kozalıklara vurarak düşürmektedir. Fıstık çamı kozalakları makineli hasada uygundur. Hasat platform yardımı ile dalı sarsma şeklinde yapılabilir. Bu şekilde keye ile vurarak verilen zarar önlenir. Aynı zamanda çamkese böceğinin artışı azaltılmış olur (Akgül 2016).

Kozak Bölgesinin Ekolojik Profili

Kozak'ın iklimi, Ege kıyı bölgelerine göre kışların daha sert ve yazların daha sıcak olduğu karasal Akdeniz iklim tipidir. Kozak hem kışın ilk karını hem de baharın ilk yağmurunu görür. Yaz aylarında gündüzler sıcak, geceler soğuk olur. Karasal iklimin karakteristik özelliği olan gece ve gündüz arasındaki sıcaklık farkı burada çok yaygındır. Yaz aylarında gündüzler sıcak, geceler soğuk olur. Karasal iklim hüküm sürmektedir ve gece-gündüz sıcaklık farkı belirgindir. Yaylanın rakımı 500 ile 1.000 metre arasındadır (Sulusoglu 2004). Kozak'ın ana kayası granittir ve toprak bileşimi, kumlu, çakıllı toprakları tercih eden, son derece sert ağaçlı bir bitki olan fıstık çamı'nın yetiştirilmesi için dünyadaki en uygun toprak bileşimidir. Kozak'ın ana bitki örtüsünü karasal Akdeniz ikliminin hâkim olduğu bölgelerde

Çam türleri, fıstık çamları, meşeler ve yabancı armutlar, sulak alanlar ve nehir kıyılarında ise kavak vb. ağaçlar oluşturmaktadır. Eski yıllarda yaylanın batısındaki köylerde yoğun üzüm ekimi, doğu köylerinde ise bahçecilik yaygınken, o zamandan beri her ikisinin de yerini fıstık çamı almıştır (Eriz ve ark., 2022). En geniş ve ürün açısından kaliteli coğrafi dağılımı Anadolu'da bulunur. Portekiz'in doğu kısımlarına kadar uzanan geniş bir yayılım alanı vardır. Batı Anadolu'daki Kozak doğal ormanlık bölgesi özellikle Fıstık Çamlarının yetişip geliştiği bölgedir (Sülüşoğlu, 2004).

Kozak'ta Arazi Mülkiyetinin Oluşması ve Arazi Mülkiyetinin Şahıslara Verilmesi

Ormancılık literatüründe fıstık çamı (*Pinus pinea*), ana orman ağaçları kategorisinde yer alan pinus familyasının bir üyesidir. Orman köylüleri, özellikle Anadolu'nun batı kesimlerinde uzun yıllardan beri Fıstık Çamının faydalarından yararlanmaktadır. Padişah Tapu Kayıtları köylülere ilk kez Osmanlı İmparatorluğu döneminde verilmiştir. Türkiye Cumhuriyeti'nin kuruluşundan sonra ormanlık alan ilk kez 18 Şubat 1937 tarihli ve 3116 sayılı Orman Kanunu'nda şu şekilde tanımlanmıştır: "Kendi kendine yetişen veya insan eliyle yetiştirilen ve herhangi bir fayda sağlayan ağaç ve çalılar topluluğudur. Bir tür orman getirisi veya verimi, habitatlarıyla birlikte orman olarak tanımlanmaktadır." Ancak yasada Fıstık Çamlarına ilişkin özel bir madde veya hüküm yer almamıştır. 1940 kadastro çalışmalarından sonra halkın yoğun talebi üzerine Fıstık Çamları'nın statüsünün belirlenmesine yönelik çalışmalar hızlanmıştır. 1945 yılında yürürlüğe giren 4785 sayılı Devletleştirme Kanunu'nun 2 (B) maddesinde özel fıstık çamı ormanlarının Millileştirme Kanunu kapsamı dışında bırakıldığı belirtilmektedir. Fıstık çamları 8 Eylül 1956 tarih ve 6831 sayılı Orman Kanununda muafiyet maddesinde yer almış ve özel arazilerde yetişmesi veya yetiştirilmesi ve orman şartlarına uygun olması şartıyla ormanlık alan tanımı dışında tutulmuştur.

Fıstık Çamı ormanları ile ilgili özerklikler tanıyan kanun ile ilgili açıklayıcı maddeler:

Tanım yalnızca kanunun yürürlüğe girdiği tarihte şahıslara ait arazilerde olduğu tespit edilen fıstık Çamlarını ilgilendirmektedir; kanun bu toprakların dışında kalan fıstık çamlarını kapsamamaktadır. İlgili bir maddede ayrıca; Türkiye Cumhuriyeti Anayasası'nın 169. maddesinde "1945 yılında devlet ormanları içinde bulunan ve sahibi bulunmayan/bilinmeyen fıstık çamlarının bu tarihten sonra özel mülkiyete dönüştürülmesi kabul edilmez" denilmektedir. Bu durumun gelişmesinde ve kanunlaşmasında Kozak halkının kendi topraklarına sahip çıkmasının, Osmanlı Devleti zamanından bu yana sahalarında düzenli bir bakım yapmalarının ve gelir seviyelerini koruyarak artırmalarının büyük önemi

bulunmaktadır. Bölge halkının eğitimli olmasının da bunda katkısı yadsınamaz. Türkiye’de ve dünyada tek sahipli orman arazisi statüsüne sahiptir (Sülüsoğlu 2004).

Kozak Fıstık Çamı Ormanlarının Yönetim Sistemi

- Kişilerin tapulu arazileri,
- Devlet ormanları

olmak üzere üç farklı arazi mülkiyeti türü bulunmaktadır.

Bölgede tüm ağaç kesimleri orman idaresinden izin alınmak suretiyle kontrollü yapılabilmektedir.

İhracat ve İthalat Durumu

Kozak Bölgesindeki fıstık çamı üretiminin ana dayanağı ihracattır. En fazla fıstık çamı ihracatı yapan ülkeler Çin, Kuzey Kore, Türkiye, Rusya Federasyonu, İspanya ve Portekiz’dir. Türkiye üretiminin önemli bir kısmını ihraç etmektedir.

2021 yılında 34 ülkeye çam fıstığı ihraç edilmiş, İtalya 29 milyon dolarla ilk sırada yer almıştır. İhracat yapılan diğer ülkeler arasında Almanya ve Birleşik Arap Emirlikleri 2. Ve 3. Sırada yer almıştır. Geçmiş yıllarda ağırlıklı olarak AB ülkelerine ihracat gerçekleştirilirken, son dönemde Orta Doğu ülkelerindeki pazar payımız artış göstermiştir (Anonim 2).

Üretilen fıstık çamı kooperatif aracılığı ile veya toptancılara doğrudan satılmaktadır. Üretimin bir kısmı iç pazarlarda değerlendirilirken, üretilen çam fıstığının %85’i ihraç edilmektedir (Anonim 3). Türkiye genelinde 84.809 hektar alanda Çam fıstığı bulunmaktadır. 2022 yılı içerisinde 1.141 ton çam fıstığı üretimi gerçekleşmiştir. TÜİK verilerine göre çam fıstığının son 3 yıldaki ihracat miktarları incelendiğinde ortalama 565 ton çam fıstığı ihracatına karşılık 33.107.813 dolar ülke ekonomisine döviz girdisi sağlanmıştır (Anonim 3).

Fıstık çamı ithalatı son yıllarda artmıştır. 1993 yılından bu yana Çin’den fıstık ithalatı yapılmaktadır. 2000 yılından sonra İtalya, İspanya ve Özbekistan’dan ithalat başlamıştır. Bu durum üreticiler açısından risk oluşturmaktadır.

Kozak Fıstık Çamı Ormanlarında Geçmişten Günümüze Risk Değerlendirilmesi

1920’de yılındaki arazi kayıtlarında bölgede 20.000 hektarlık Fıstık Çamı kaydedilmiş, ancak 1931’de yapılan bir araştırmaya göre on yıldan biraz daha uzun bir süre içinde bu alanlar yarıya inerek yalnızca 10.000 hektar kalmıştır. 1940 yılında eyalet Orman Kadastro Komisyonları ormanlardaki arazi kullanım haklarına ilişkin talepler üzerine 7.486,9 hektarı saf Fıstık Çamı ormanı olmak üzere toplam 9.424,4 hektar Fıstık Çamı ormanı kaydedilmiştir. Kozak’ta Fıstık Çamı yetiştiriciliğinin bugünkü ekonomik değerine ulaşana kadar geçen

yıllarda bölgedeki demir madenleri, ev yapımı amaçlı kesimler, bahçe çiti, ısıtma, odun kömürü üretimi ve endüstriyel amaçlı kesimler; kontrolsüz otlatma gibi amaçlarla Fıstık Çamı ormanları tahrip edilmiştir (Sülüsoğlu 2004).

Kozak'taki madenlerden çıkan duman ve çamur, bölgelerde çevre sorunu oluşturmaktadır. Taş ocaklarında yapılan patlatma işlemleri yeraltı su seviyesinin düşmesine neden olmaktadır. Yüzey örtüsünün bozulması erozyonu şiddetlendirmektedir. Bütün bu faktörler fıstık çamı yetiştiriciliğini olumsuz etkilemektedir. Kuraklık Son yıllarda Kozak ormanlarını tehdit eden en önemli faktörlerden biridir. Ağaç dikim yoğunluğu sorun olmakta, düzgün gövdeler oluşturulamamaktadır. Ürün kalitesi düşmekte ve özellikle devlet ormanlarındaki dikimlerde kalite azalmaktadır (Batur, 2015). Bölgede yangın neredeyse oluşmamaktadır. Oluşsa bile kısa sürede söndürülmektedir. Köylüler bu konuda oldukça hassastır. Kuraklık nedeniyle kozalakların içlerini dolduramaması son yıllarda yaşanan diğer bir problemdir.

SONUÇ VE ÖNERİLER

Depolama koşullarının iyileştirilmesi, standardizasyonun sağlanması ve marka oluşturulmasına yönelik adımlar çok önemlidir. Çam fıstığının işlendikten sonra yarı mamul veya işlenmiş ürün olarak pazarlanması da gelirleri artıracaktır. Reklam ve tanıtım da ihmal edilmemelidir. Kozak modellerine benzer modellerin oluşturulması, ikincil ürünlerde kırsal kalkınmanın yanı sıra Türkiye'nin diğer bölgelerinde Fıstık Çamı üretilen alanlar için de büyük önem taşıyor. Orman köylülerine öncelikli olarak diğer odun dışı ürünlere yönelik eğitimler verilmesi gerekmektedir. "Kozak modeli" bunun için iyi bir anahtar olabilir.

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SUMAK (*Rhus coriaria* L.)'İN ÖNEMİ VE KULLANIM ALANLARI

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ÖZET

Sumak bitkisinin yaprak ve meyveleri, içerdikleri çeşitli maddelerden dolayı uzun yıllardır ilaç hammaddesi olarak kullanılmaktadır. Sumak yapraklarının antiseptik, ishal ve kan kesici özellikleri ile ateş düşürücü özelliklerinden yararlanılarak enfüzyonu ilaç sanayinde kullanılmaktadır. Hazmı kolaylaştırma ve içeriğinde bulunan tanen ile şeker hastalarındaki şekeri düşürme ve ishali durdurma etkisine sahiptir. Ayrıca sumak boya sanayide kumaş ve derilerin sarı renge boyanmasında değerlendirilmektedir. Baharat olarak meyve ezilerek toz hale getirilir ve yemeklere ekşi bir tat vermesi için kullanılmaktadır. Türün bu geniş kullanım alanları gibi önemli özelliği de deri, boya, tıp ve gıda endüstrisinde yaygın bir kullanım alanının olmasıdır. Ülkemizde birçok tıbbi ve aromatik bitki doğadan toplanmakta ve bir kısmının da belirli ölçüde tarımı yapılmaktadır. Sumak türünün ormancılığımızda ve kamuoyunda hak ettiği konuma ulaştırılması ve beklenen ekonomik, sosyal ve kültürel faydaları yerine getirebilmelerini sağlanması için türün öncelikle ülkemizdeki doğal yayılış alanları, ekolojik istekleri, birlikte bulunduğu türlerle olan ilişkileri ile tohum ve fidan üretim esaslarının daha kapsamlı bilimsel araştırmalarla ortaya konulması gerekmektedir.

Anahtar kelimeler: Sumak, Kullanımı, Kültürü, Yayılışı

THE IMPORTANCE AND USAGE AREAS OF SUMAC (*Rhus coriaria* L.)

ABSTRACT

The leaves and fruits of the sumac plant have been used as pharmaceutical raw materials for many years due to the various substances they contain. The infusion of sumac leaves is used in the pharmaceutical industry, taking advantage of their antiseptic, diarrheal and anticoagulant properties, as well as their antipyretic properties. It facilitates digestion and has the effect of reducing blood sugar and stopping diarrhea in diabetic patients with the tannin it contains. Additionally, sumac dye is used in the industry to dye fabrics and leather in yellow color. As a spice, the fruit is crushed into powder and used to give a sour taste to dishes. An important feature of the species, such as its wide usage areas, is that it is widely used in the leather, dye, medicine and food industries. In our country, many medicinal and aromatic plants are collected from nature and some of them are cultivated to a certain extent. In order to bring the sumac species to the position it deserves in our forestry and in the public opinion, and to ensure that it can fulfill the expected economic, social and cultural benefits, the natural distribution areas of the species in our country, its ecological demands, its relationships with the species it co-occurs with, and the principles of seed and sapling production must be revealed through more comprehensive scientific research.

Keywords: Sumac, Utilization, Culture, Distribution

GİRİŞ

Tıbbi ve aromatik bitkiler tarih boyunca hem tıbbi hemde gıda amaçlı olarak kullanımı ve önemi de gün geçtikçe artmaktadır. Bu bitkilerin kök, yaprak, çiçek ve meyve gibi kısımlarından elde edilen özler tıp alanında kullanılan pek çok ilacın ana maddesini oluşturmaktadır. Ayrıca, bu bitkiler gerek hastalıkların tedavisinde ilaç olarak gerekse beslenme, kozmetik, güzel koku ve tat vermeleri için de kullanılmaktadır (Faydaoğlu ve Sürücüoğlu, 2011). Bu bitkiler tedavi amaçlı işlenmemiş veya işlenerek bir veya daha fazla bitkilerin bileşiminden oluşup insan sağlığına faydalı olabilecek madde ve ürünleri içermektedir. Bundan dolayı tıbbi ve aromatik bitkilerin işlenmemiş, işlenmiş bitkisel ürünler ve şifalı ot ürünleri olarak üç şekilde bulunmaktadır (Van Overwalle, 2007).

Doğa ile iç içe yaşayan insanlar doğayı gözlemlerken, bitkileri nasıl kullanılması gerektiğini öğrenmiş ve deneme yanılma yöntemleri ile bitkilerin faydalı veya zararlı etkilerini inceleyerek günümüze aktarmıştır (Akın, 2022).

Sumak Güney Anadolu'da baharat olarak tüketildiği gibi sumak ekşisi olarak da sıklıkla tüketilmektedir (Tiryaki, 2010). Sumak, sumak ekşisi akıtı ürünleri bölgenin yaprak sarma, lahana sarma, dolma çeşitleri, kaşık salatası, paça, kısır çeşitleri, etli tencere yemekleri, piyaz gibi yemeklerinde sıklıkla kullanılmaktadır. (Çelik ve Özkaya, 2022).

Ülkemizde tıbbi bitkiler doğadan toplama ve kısmen de kültürü yapılarak yetiştirilen bitkilerden oluştuğundan, bu bitkilerin devamlı olarak doğadan bilinçsizce toplanması doğal vejetasyonun bozulmasına, endemik bitki türlerinin yok olmasına ve son zamanlarda önemli bir sorun olan erozyonun artmasına ayrıca neden olabilmektedir (Özhatay ve Atay, 1997).

Sumak (*Rhus coriaria* L.), Anacardiaceae familyasından şifalı ve çok yıllık yabani bir bitki türüdür. Doğal yetişme ortamı olarak ılıman ve tropikal bölgelerde, yol kenarı, yamaç, çalılık ve ormanlık alanlarda kendiliğinden büyüme gösterebilmektedir. Ülkemizin genellikle batı ve güney kesimlerinde bulunmakla birlikte Marmara, Ege, Doğu Anadolu, Güney Doğu Anadolu bölgeleri ve Karadeniz Bölgesinin kıyı kesimlerinde de görülebilmekte ve "titre, somalık, tutum, tatari, tetri, somak" gibi farklı isimlerle de anılmaktadır (Dalby, 2003; Nayeypour ve Asadi-Gharneh, 2019; Rayne ve Mazza, 2007; Ünver ve Özcan, 2006).

Antosiyantinler, doğal olarak renklendirme sağlayan, pek çok meyve, sebze ve çiçeğin rengini kırmızı veya maviye boyayan, özellikle üzüksü meyvelerin renginden sorumlu flavonoid yapısındaki fenolik maddelerdir. Farklı formlarının (pelargonidin, siyanidin, peonidin, delfinidin, petunidin ve malvidin) başka şekerlerle oluşturduğu glikozitler nedeniyle doğada

birçok çeşidi bulunmaktadır (Gradinaru ve ark., 2003). Antosiyaninler sumak meyvelerinde bol miktarda bulunur (AbouReidah ve ark., 2014).

Antioksidanlar, hücreleri hasardan korumak ve vücutta oluşabilecek oksidatif stresi azaltmak için çalışır, serbest radikalleri temizleyerek etkisiz hale getirebilir. Hidrojen atomu vererek veya metalleri şelatlayarak oksidanların etkisini engelleyebilir (Prakash ve ark., 2007). Antioksidanlar, kontrolsüz büyüme sonucu oluşan tümör riskini azalttıkları gibi, hücre yıkım seviyesini düşürdüklerinden ötürü sağlıklı yaşam şansını artırmaktadırlar (Niki, 1987). Bu durum, beslenmedeki daha doğal ve güvenilir antioksidan kaynaklarına yönelik talebi arttırmaktadır.

Sumak bitkisi içeriğinde bulunan organik asit, protein, uçucu yağ, mineral, vitamin ve fenolik gibi bileşikler barındırmaktadır. Bahsi geçen bileşikler farklı alanlarda insan sağlığının iyileştirilmesi yönünden önemli olmaktadır. Günümüzde gıda endüstrisinde öncelikli olarak insan beslenmesinde sentetik bileşiklerin yerini alabilecek antioksidan yeteneği olan bitki bileşenlerine önem verilmektedir. Sumak bitkisi, fenolik bileşiklerden gallik asit ve türevleri bakımından zengin olmasından dolayı güçlü ve önemli bir antioksidan kaynağına sahip olup; meyvelerinin yağ ve yağ asitleri bakımından da zengin olmasından ötürü onu oksidatif bozulmalara karşı daha dayanıklı ve uzun süre saklanabilir hale getirmektedir (Chakraborty ve ark., 2009; Mavlyanov ve ark., 1997; Rad ve ark., 2020; Sakhr ve Khatib, 2020; Karaduman, 2022).

Sumak meyvesin yağ ve yağ asitleri içeriği yönünden zengin olması gıdalarda kullanım açısından değerli kılınacağı düşünülmektedir. Ayrıca, sumakta bulunan yağ, yüksek oranda tekli doymamış yağ asidi içeriğine sahip olduğundan dolayı oksidatif bozulmalara daha dayanıklı ve daha uzun süre saklanabilir özelliğine sahip olduğunu göstermektedir. Bu da sumak yağının, özellikle zeytinyağı ile karıştırılarak salata ve yemeklerde kullanıldığında iyi bir ürün olabileceği ve bu sayede zeytinyağının da raf ömrüne katkı sağlayabileceği ifade edilmektedir (Doğan ve Akgül, 2005; Kızıl ve Türk, 2010).

Sumak bitkisinin sap, yaprak ve kabuklarının yüksek oranda tanen içeriğinden dolayı ipek, deri ve yünlü kumaş boyamalarında değerlendirilmiştir (Güvenç ve ark., 2017; Gezer ve Yücedağ, 2006; Göktürk ve ark., 2006; Güvenç ve ark., 2017). Ayrıca yüksek tanen içeriği açısından sumak özleri ve izolatlarının, gıda kalitesini ve et ve süt gibi ürünlerin oksidatif stabilitesini arttırdığı yapılan birçok çalışmada belirtilmektedir (Batiha ve ark., 2022). Sumak'ın antiviral, antimikrobiyal, antiinflamatuvar ve antioksidan özelliklerinin yanı sıra serbest oksijen radikali temizleyici etkisi, karaciğer hasarına karşı koruyucu etkisi,

antihemolitik, lökopeni ve antifibrojenik etkileri olduğu çeşitli bilimsel araştırmalarla ifade edilmiştir (Singh ve ark.,2007; Ebrahimzadeh ve ark., 2010; Hamdan ve ark., 2017; Alpsoy ve ark., 2019; Hüseyinova ve Mammadoya, 2020).

Halk arasında bitkinin kök ve yapraklarını mide hastalıklarında ve olgun meyvelerini böbrek taşlarını düşürmek için kullanılmaktadır. Ayrıca bitkinin taze yaprakları ise ayakkabının tabanına bırakılarak derideki çatlakları gidermek için, meyvesinin ise çiğnenerek ağız yarası veya mide kramplarında tercih edildiği ifade edilmektedir (Güner, 2012; Tuzlacı, 2006; Tuzlacı 2011). Sumak yaprakları Dioscorides ve İbni Sina tarafından hemoroit, ağız yaraları, ishal, göz hastalıkları, el ve ayak çatlaklarının tedavisi için önerilmiştir. Bu bitki türünün yaprakları ve meyveleri Anadolu'da ağız yaraları ve şeker hastalığına karşı halk arasında yaygın bir şekilde tüketilmektedir (Kurucu ve ark., 1993).

Sumağın vitamin bileşimi ile ilgili yapılan çalışmalarda piridoksin, askorbik asit, tiamin ve riboflavin, siyanokobalamin, nikotinamid ve biyotin bakımından zengin olduğu rapor edilmiştir (Alsamri ve ark., 2021). Kanser araştırmalarına dair yapılan bilimsel raporlar, sumağın tümör büyümesi ve hayatta kalması üzerindeki inhibitör rolüne dair güçlü kanıtlar ortaya koyduğu ifade edilmektedir (Mirian ve ark., 2015).

Yapılan çalışmalarda, sumak tüketiminin insan ve hayvanlarda güvenli olduğu ve yan etki göstermediği rapor edilmiştir (Wu ve ark., 2018).

Sumak meyvesinin olgun meyvelerinin kimyasal özellikleri üzerine yapılan çalışmalarda; taze meyvelerde %2,6 protein içeriği, %7,4 yağ içeriği, %14,6 lif içeriği, %1,8 kül bulunduğu rapor edilmiştir (Özcan ve Haciseferoğulları 2004; Raodah ve ark. 2014).

Türkiye'de sumak meyvesi üzerinde yapılan bir çalışmada, sumak sulu metanol ekstresinin en yüksek verim yüzdesi ve toplam fenolik içeriği (Bozan ve ark., 2003) ve bunun devamında etil asetat ve sulu özütlerde yüksek düzeyde fenolik içerik belirlenmiştir (Raodah ve ark. 2014). Sumağın güçlü bir antimikrobiyal ve antifungal etkisi bulunmaktadır, bu nitelikler sadece terapötik olarak değil, aynı zamanda gıda endüstrisinde de önemli bir yer tutmaktadır ve ürünlerin raf ömrünü artırmak ve kalitesini korumak için sumağın doğal bir koruyucu olarak kullanılması gerekmektedir (Gülmez ve ark., 2006).

Rhus türleri geniş bir kök sistemi oluşturduklarından dolayı yol kenarlarındaki dolgularda, afet sebebi aşınmış sığ olmayan toprakların ağaçlandırılmasında, maden topraklarının iyileştirilmesinde ve diğer iyileştirme amaçlı ağaçlandırmalarda erozyon kontrolü çalışmalarında önem ihtiva etmektedir (Brinkman, 1974; Humphrey, 1983).

SONUÇ ve ÖNERİLER

Sentetik ilaçların oluşturduğu zararlı yan etkilerini en aza indirmek için bitkisel takviyelerin kullanılması gerekmektedir. Sumak meyvesi bitkisel takviye olarak alternatif tıpta, antioksidanlar, flavonoidler ve hidrolize olabilen tanenler içermesinden dolayı kullanılabilir örnek bir bitkidir. Sumak tozunu günlük hayatımızda kullandığımız diğer baharatlarla birlikte tüketmemiz gerektiği söylenilebilir. Devamlı olarak kullanılmasında hiçbir sakınca yokken, sağlık açısından faydaları yapılan çalışmalar ve elde edilen verilerle belirtilmiş olan sumak meyvesinin beslenmemize bulunduğu katkılardan dolayı günlük besin tüketimimizdeki yeri çok önemli olmaktadır.

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**DESTİNASYON MARKALAŞMASINDA GASTRONOMİ TURİZMİNİN
ÖNEMİ: SUMADA ÖRNEĞİ**

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ÖZET

Turizm endüstrisi, tüm dünya ülkelerinde olduğu gibi, Kuzey Kıbrıs ekonomisinin de mihenk taşlarından birini oluşturmaktadır. Günümüzün modern dünyasında yaşanan teknolojik yenilikler, potansiyel turistlerin aradıkları bilgiye saniyeler içinde ulaşmasını olası kılmıştır. Tüm bu gelişmeler dâhilinde gezginlerin yapacakları seyahatlerden beklenti düzeyleri artmış, amaçları çeşitlilik göstermeye başlamıştır. Bu anlamda alternatif turizm modelleri arasında yer gastronomi turizmi kapsamında yapılan seyahatlere olan ilgi, gün geçtikçe artmaktadır. Kuzey Kıbrıs, yüzyıllar boyunca ev sahipliği yaptığı birçok uygarlığın da etkisinde kalarak gastronomi turizmi kapsamında değerlendirilebilecek çok değerli kültürel miras değerlerine sahiptir. Kıbrıs, sayısız otantik yemeklerinin yanı sıra, kendine özgü içecekleri de kültüründe barındıran bir adadır. Bu yiyecek ve içeceklerden bazıları yüzyıllar boyunca varlığını sürdürmeyi başarmış, kimileri ise unutulmaya yüz tutmuştur. Kıbrıslıların eskiden evlerinde ürettikleri bilinen Sumada, bademden üretilen bir çeşit şerbettir. Eski dönemlerde, kahvehanelerde kahvenin yanında, düğünlerde ikram olarak sunulduğu bilinir. Çalışmada gastronomi turizminin önemi vurgulanırken, adanın gastronomi miras öğelerinden olan içeceklerine değinilmiş özellikle unutulmaya yüz tutmuş olan kültürel içeceği Sumada'ya yer verilmiştir. Ayrıca çalışmada, Kuzey Kıbrıs'a özgü kültürel değerlerden Sumada'nın bir kültürel miras öğesi olarak değerlendirilmesi ve destinasyon markalaşması adına atılacak adımlarda hak ettiği değere kavuşması ve turizme kazandırılması adına önerilerde bulunulmuştur.

Anahtar kelimeler: Kıbrıs, Kültürel Miras, Gastronomi Turizmi, Destinasyon Markalaşması, Sumada

**IMPORTANCE OF GASTRONOMY TOURISM IN DESTINATION BRANDING:
THE CASE OF SUMADA**

ABSTRACT

The tourism industry, as in all countries worldwide, is one of the pillars of the economy of North Cyprus. The technological advancements in the modern world enable potential tourists to access the information they seek within seconds. In light of these developments, travelers' expectations for their trips have increased, and their purposes have become more diverse. In this sense, the interest in travels within the scope of gastronomy tourism, which is among alternative tourism models, is growing day by day. North Cyprus, influenced by many civilizations it has hosted for centuries, possesses numerous valuable cultural heritage values that can be evaluated within the framework of gastronomy tourism. Cyprus is an island that harbors various authentic dishes and distinctive beverages within its culture. Some of these foods and drinks have managed to survive for centuries, while others are on the verge of being forgotten. Sumada, a cultural beverage traditionally made by Cypriots in their homes and derived from almonds, is one such example. In the past, it was known to be served alongside coffee in coffeehouses and offered as a treat at weddings. This study emphasizes the importance of gastronomy tourism and delves into the island's gastronomic heritage, particularly focusing on cultural beverages. The research highlights Sumada, a cultural beverage that is on the brink of being forgotten, as a cultural heritage element specific to North Cyprus. Furthermore, the study offers recommendations for Sumada, as a cultural heritage element unique to North Cyprus, to be valued and integrated into tourism initiatives to enhance destination branding.

Keywords: Cyprus, Cultural Heritage, Gastronomy Tourism, Destination Branding, Sumada.

Giriş

Gastronomi kelimesi, anlam olarak Yunanca mide anlamına gelen “gastro” mide ve kural, yasa anlamında kullanılan “nomos” kelimelerinin birleşmesinden oluşmuştur. Günümüzde bir bilim dalı olan gastronomi, antropoloji, sosyoloji, ekonomi, kimya, ziraat, çevre-bilim, tıp bilimleri ve özellikle turizm gibi çeşitli bilim dallarıyla etkileşim halindedir (Göker, 2011). Gastronomi sadece bir yemek kültürünü ifade etmenin ötesinde, yeme-içme ile ilgili tüm kural ve normları ifade eder ve kültür, tarih, yetenek ve tecrübe ile harmanlanmıştır (Aksoy, 2015). Bunun dışında gastronominin kültürlere ve bölgelere ait yerel ürünler, yaşam tarzı, örf adet ve geleneklerle de şekillendiği söylenebilir. Bu nedenle gastronomi kavramı kültür ve gelenekleri, özgünlük, sürdürülebilirlik ve turizm anlamında ise farklı deneyimleri içerdiğini söylemek yanlış olmaz. (Küçükömrler, Şirvan, Sezgin, 2018).

Turizm sektörü, ekonominin diğer sektörleriyle yakın ilişkilidir; birbirlerinin faaliyetlerini karşılıklı olarak desteklerler. Dünya genelindeki önemi göz önüne alındığında istihdam konusunda önemli bir rol oynadığı ve işsizliği azaltarak diğer sektörlerden fazla işgücünü çektiği açıktır (Nica, 2011).

Gastronomi turizmi, seyahatinde tamamen veya kısmen yerel ürünleri tatmak veya gastronomi ile ilgili etkinliklere katılmak amacıyla turizm faaliyetinde bulunan turistler ve ziyaretçiler için oldukça önemli bir kavramdır (Gheorghe, Tudorache, Nistoreanu, 2014).

Bir bölgeye ait bitkiler ve bu bitkilerin yerel halk tarafından kullanım şekli, somut olmayan kültürel miras kapsamında değerlendirilir. Günümüzde bölgelere ait geleneksel yiyeceklerin genellikle kırsal bölgelerde olmak üzere özellikle de bölge kültürünü yansıtan törensel gün ve gecelerde yapılarak korunduğu görülmektedir. Kültür turizmine ağırlık veren bölgelerde ise bu yiyecek ve içecekler ziyaretçilerin ilgisini çekmek amacıyla restoranlarda sunulmaktadır (Sorcaru, 2019) Gastronomi turizmi, alternatif turizmin önemli bir parçasıdır ve özellikle bu bağlamda gastronomi öğeleri, Avrupa'da fuarlar ve festivallerde yoğun bir şekilde tanıtılmaktadır. (Kendir, Güvenç, 2010).

Günümüz teknolojisinin etkisiyle, turistler, aradıkları bilgiye saniyeler içinde ulaşmakta ve ilgi alanları doğrultusunda daha fazla seyahat etmektedirler. Bu anlamda daha deneyimli oldukları ve seyahat etmek için daha fazla bütçe ve boş zaman ayırdıkları görülmektedir. Yoğun iş hayatı insanları turizm aracılığıyla, günlük rutinlerinden kaçabilmeleri ve özgürlüklerini hissederek yeni bir dünyaya kısa süreliğine de olsa dalabilmelerine olanak tanır. Bu bakış açısıyla gastronomi turizminin, bu kapsamındaki faaliyetler ile bölge ekonomisinin gelişmesinde önemli bir paya sahip olduğu söylenebilir.

Geleneksel otantik yiyecekler ve içeceklerin şüphesiz turistik çekicilikleri yüksektir. Daha önemlisi, yıl boyunca yüksek sezona ve hava durumuna bağlı olmadan ziyaretçilerin kullanımına sunulur. Belirli meyve veya bitkilerin yalnızca belirli dönemlerde taze yiyeceklerde ve içeceklerde kullanıldığı bazı durumlar olmasına rağmen, yiyecekler ve özellikle içecekler genellikle tüketilmeden önce uzun süre saklanabilir veya korunabilir. Bununla birlikte unutulmamalıdır ki geleneksel yiyecek ve içecekler, günümüzde turistlerin aradıkları otantik bir deneyimlerin önemli bir parçasıdır (Sorcaru, 2019).

Günümüzde bireyler, ziyaretler konusunda hızlı bir arayış geliştirmiş gibi görünmektedir. Dünyada ziyaret yerleri, adalar, deniz kenarı şehirler, ünlü tarihleri olan yerler, çeşitli doğal özellikleri veya rezervleri sergileyen destinasyonlar, politik istikrarsızlık yaşayanlar ve genellikle tamamen farklı kültürlerle sahip olanlar gibi stratejik bazı değişkenlere sahiptir. Bu nedenle, ziyaretçilerin belirli bir destinasyonu seçmeleri şaşırtıcıdır. Öte yandan, medya ve reklamcılık, ziyaretçilerin zihinleri üzerinde güçlü bir etkiye sahiptir. İnsanlar, pazarlamacılar tarafından tasarlanan çeşitli görüntülere maruz kalarak, belirli yerler ve sunulan ürünler ile etkilenirler. Görseller, insanlara o kadar çok gösterilmektedir ki bu durum, onların asıl istekleri olmayan bir ilgi geliştirmelerine neden olmaktadır (Ekonde, 2010). Bu anlamda destinasyon markalaşması ve tanıtım, bölge kültürlerini tanıtmada ve turizm ekonomisine kazandırmada çok önemli bir faktör olarak karşımıza çıkar.

Bazı görüşlere göre adını adada yetişen kına çiçeği bitkisinden (Kypros) aldığına inanılan Kıbrıs adası başka görüşe göre adını sahibi olduğu en önemli yer altı zenginliklerinden olan bakır madeninden (Lat. cyprum / cuprum) alan (Gürsoy, 2002) Kıbrıs adası, tarih sahnesine çıktığı dönemden itibaren birçok uygarlığa ev sahipliği yapmıştır. Adanın ismi Mısır ve Hititliler tarafından Alasya ve Asi, Fenikeliler tarafından Hettim, Asurlular tarafından ise Yatnana olarak anılmıştır (Akçay, 2018,138).

Dünyanın sekseninci (<https://vividmaps.com>), Sicilya (25710 km²) ve Sardinya'dan (24090 km²) sonra Akdeniz'in üçüncü büyük adası (9251 km²) olarak karşımıza çıkmaktadır. (Koday, 2010, s. 17). Adanın komşuları kuzeyinde Türkiye (70 km), doğusunda Suriye (102 km), ve Lübnan (165 km), güney doğusunda İsrail (233 km), güneyinde Güney Kıbrıs Rum Yönetimi ve Mısır (347 km), kuzey batısında ise Yunanistan (835 km) olarak sıralanabilir (KKTC Enformasyon dairesi, <https://pio.mfa.gov.ct.tr>). Jeopolitik önemi itibarıyla birçok devletin hükümdarlığına katmak istediği adanın ele edilen bilgilere göre Hititlerden günümüze kadar en az on beş kez el değiştirdiği bilinmektedir (Mor, Çitçi, 2011, s.227). Milattan önceki yıllardan günümüze kadar gelen tarihi süreç içinde Mısırlılar, Hititler,

Fenikeliler, Asurlar, Persler, Makedonyalılar, İyonyalılar, Ptolemeler, Romalılar, Bizanslılar, Lüzinyanlar, Venedikliler ve Osmanlılar uzun veya kısa süreli adanın sahibi ve yöneticileri olmuşlardır (Özyürek, Karamanoğlu, Özler, Selçuk, Taş, Beratlı, Gergin, 2014, s. 2). Bahsi geçen uygarlıklara yüzyıllar boyunca ev sahipliği yapmış olan adanın, bu uygarlıkların kültürlerinden, örf ve adetlerinden, değerlerinden, dilinden, dini adetlerinden, yiyecek ve içecek alışkanlıklarından veya mimarisinden etkilenmemesi mümkün görünmemektedir. Bu anlamda adanın, bir medeniyetler beşiği olarak bir çok kültürü bünyesinde barındırdığını, kendine has ada kültürünü oluştururken, ev sahipliği yaptığı medeniyetlere kendi kültürünü sunmanın yanında, hakimiyeti altına girdiği uygarlıklarında kültürlerinden etkilenmiş olduğunu söylemek yanlış olmaz (Özerden, Ilgaz, 2022). Bu kültürel değerlerin belki de başında gastronomi kültürü gelmektedir. Ada halkı yüzyıllar boyunca birlikte yaşadığı uygarlıkların yiyecek ve içecek kültürlerinden kendi karakteristik yapısına uygun olanlarını içselleştirmiş ve kendi kültürünün bir parçası haline getirmiştir. Fakat ne yazık ki bazı kültürel değerler zamanla yok olmaya yüz tutmuştur. Bunların en çarpıcı örneklerinden biri yerel bir içecek olan sumadadır.

Çalışmada, Kıbrıs adasının gastronomi kültürüne ait yerel içeceklerine değinilmiş, özellikle de unutulmaya yüz tutmuş içeceklerden sumadanın kullanım şekli ve kullanıldığı alanlar araştırılmış, gastronomi turizmi anlamında değerlendirilmesi ve somut olmayan kültürel miras kapsamında hak ettiği değeri kazanması adına görüş ve önerilere yer verilmiştir.

Kıbrıs Gastronomi Kültürü Değerleri Kapsamında İçecekler

Daha önce de değinildiği üzere Kıbrıs, tarih sahnesine çıktığı günlerden günümüze kadar gelen süre zarfında birçok uygarlığa ev sahipliği yapmıştır. Bu süreçte kendi kültürünü hâkimiyeti süren medeniyetlere taşıırken aynı zamanda bu medeniyetlerin kültürlerinden de etkilenmiştir. Son yüzyıla bakıldığında, adanın yaşayan yerel iki toplumu olan Kıbrıslı Türkler ve Kıbrıslı Rumlar arasında yaşanan savaş, 1974 yılında sona ermiş, yapılan nüfus mübadelesine göre Güney Kıbrıs'ta yaşayan Türk halkı kuzeye, kuzeyde yaşayan Rum halkı da adanın güney kısmına göç etmek durumunda bırakılmıştır. Savaş sonucu göçmen durumuna düşen halk, farklı farklı köylere yerleştirilmiştir. (Koday, 1995). Her ne kadar adanın genel kültürü Kıbrıslı Rumlar ile Kıbrıslı Türkler açısından büyük benzerlikler gösterse de bölgesel anlamda bazı farklılıkların olduğu bilinmektedir. Yerleştirildikleri köylerde 1974 yılından itibaren hayatlarını idame ettirmekte olan her iki bölge halkı, beraberlerinde getirdikleri bölgesel kültürü de yerleştirildikleri yeni yerleşim yerlerinde yaşatmaya çalıştıkları görülmektedir (Adalier, 2020).

Kıbrıs Şarabı

Yapılan çalışmalara göre tarihi bulgular, (Bozkurt, 2011; Şah, 2017; Sadrazam & Öznur, 2013) Kıbrıs'ta üzüm yetiştiriciliğinin çok uzun bir geçmişi olduğunu göstermektedir. Halk arasındaki yaygın söylence ise Kıbrıs adasının yüzyıllar boyunca şarap adası olarak bilindiği yönündedir. Hatta Osmanlı İmparatorluğunun padişahlarından II. Selim'in 1571 de adayı fethetme sebebinin adada yetişen mükemmel nitelikteki şaraplar olduğu halk arasında söylenegelen efsanelerdendir. Yapılan arkeolojik kazılar ile adada bağcılık ve şarap üretiminin M.Ö. 2000 yıllarına dayandığı, hatta bu üretim sayesinde, deniz aşırı ülkelere gemilerle ihracat yapıldığı ortaya çıkmıştır. Romalıların adaya hâkim oldukları dönemde şarap üretiminin var olduğu bilinir. Şu an Kıbrıs'ın güneyinde yer alan Güney Rum Kesiminde yapılan arkeolojik kazılarda, M.Ö. III. yüz yıl ile tarihlenen paralar bulunmuştur. Bu paraların üzerinde asma yaprağı baskısının bulunduğu resmi kaynaklarda yer almaktadır. (Şah, 2017; Altan, 2016). 1200 yılının ikinci yarısında adanın en önemli şarabını tadan Fransız Kralı Philippe Augustus Commandaria şarabını “*Kralların şarabı, şarapların kralı*” olarak nitelendirmiştir. Kıbrıs'ta üretilen şaraplar arasında öne çıkan “Commandaria” isimli şarap Kıbrıs'ta üretilmiş, Kıbrıs'ın ilk şarabı olarak bilinir ve 1947 yılında Guinness rekorlar kitabında yer almıştır (Şah, 2017;Altan, 2016).

Zivanya

Kıbrıs adasına özgü bir diğer içecek ise zivaniyadır. Üzümünden elde edilen zivaniya, saf spirtodur. Soğuk kış günlerinde “bodiri” olarak isimlendirilen küçük bardaklarda servis edilir. Aynı zamanda vücut ağrılarının giderilmesi amacıyla medikal alanda da kullanılır. Kıbrıs halkı, vücudun ağrıyan yerlerini, özellikle gripal enfeksiyondan kaynaklanan ağrılarda zivaniya ile ovarak ağrıdan kurtulma yolunu seçerler. Renksiz ve berrak bir içkidir. Kuzey Kıbrıs'ta içki üretimi yarı resmi ve özel kuruluşlar tarafından yapılmakta ve 70cl ile 35 cl olmak üzere iki farklı hacimde içki şişeleri içinde satışa sunulmaktadır (Altan, 2016). Alkol derecesi çok yüksek olan bir içecek olmasından dolayı adanın İngiliz hâkimiyetinde olduğu dönemde kısa bir süreliğine de olsa evde yapılması yasaklanmıştır. Sıkılıp suyu alınan üzüm posası, kaplara konularak yaklaşık iki hafta bekletilir. Daha sonra zivaniya kazanlarına konularak kaynatılır. Kaynayan ve buharlaşan alkol, suyun içindeki borudan geçerken soğur ve damıtılır. İlk çıkan zivaniyanın alkol derecesi çok yüksek olduğundan, içilmez ve daha çok dezenfektan olarak kullanılır (Yeniasır, Gökbulut,2020).

Cyprus Brandy (Kapsula, Anglia, 31)

Kıbrıs halkının günümüzde hala tüketmekte olduğu bir diğer içecek ise bir çeşit konyak olan Otuzbir'dir. Halk arasında aha çok Otuz bir, Kapsula, Anglia ya da Kıbrıs Brandy'si olarak isimlendirilen bu içeceğin kullanımı oldukça yaygındır.(KK1). Bodiri diye adlandırılan küçük bardaklarda içilen konyaklar, Kıbrıs Türklerinde meyhane kültürünün en önemli parçalarından biridir (Şah, 2017, s. 15).

Güllü Süt ve Gül Şerbeti

Gül şurubu, Kıbrıs'ta özellikle sıcak yaz gecelerinde serinlemek için içilen geleneksel içeceklerdendir. Gül şurubu, geçmiş yıllarda Kıbrıslı hanımlar tarafından evlerde yapılarak, buzdolabında muhafaza etmekteyken günümüzde daha çok marketlerden hazır olarak bulunmakta ve temin edilmektedir. Ayrıca Kıbrıs kültürünün bir parçası olan gül şurubu günümüzde hem kahvehanelerde tüketilmekte hem de evlerde ikram edilmektedir. Güllü süt ise günümüzde de varlığını koruyan bir içecek olup, gül şurubu ile sütün karıştırılması ile elde edilir. Özellikle çocuklarına sütü sevdirmeyi amaçlayan anneler tarafından kullanılır. Tadı farklılaşan ve rengi pembeleşen süt, Kıbrıslı çocuklar tarafından bolca tüketilmektedir (Yeniasır, Gökbulut, 2020).

Bir Kültürel Miras Değeri Olarak Sumada

Sumada, Kıbrıs Türklerinde özellikle kahvehane kültürünün önemli bir parçası olarak dikkat çekmektedir. Acı bademden yapılan sumada, günümüzde özellikle kış gecelerinde tüketilen sıcak bir içecektir. (Şah, 2017, s. 342). Kahvehanelerin dışında soğuk kış gecelerinde, insanların birbirlerini ziyaret ettiklerinde sunulan sumada, aynı zamanda sosyalleşmenin de önemli bir aracı konumundadır (Yeniasır, Gökbulut, 2020).

Tarihi, Roma dönemine kadar uzanan ve özellikle 1364 yılında Polonya'da düzenlenen Kraków Kongresi'nde Kıbrıs Kralı I. Peter tarafından Polonya Kralı Büyük Casimir'e egzotik bir lezzet olarak verilmiş olan sumada (Dembinska, 1999), başta Kıbrıs adası olmak üzere birçok Akdeniz adasında (Sakız Adası, Girit, Nisiros, Andros, Sifnos, Kithira ve Lefkad) nişan ve düğünlerde ikram edilen geleneksel bir içecektir. Yunanistan'ın Sakız ve Nisiros adalarında benzer bir şurup soumáda (Yunanca: σουμάδα) olarak bilinmekte ve kullanılmaktadır. Farklı bir formu Malta'da "ruġġata" adıyla bilinir ve badem ve vanilya özünden yapılır. Ayrıca içine tarçın ve karanfil eklenir (<https://www.tasteatlas.com>). Özellikle Girit adası, sumadayı destinasyon markalaşmasında ileri seviyeye taşımış ve Girit geleneksel içeceği adı altında "Girit Badem içeceği-Soumada" olarak tanıttıklarını yapmaktadır. (<https://cretashop.gr/>, <https://www.uniquecreta.com>)

Yapılışı: Kabukları kırılan bademler, iç kabuklarının kolayca çıkarılabilmesi için sıcak suda bekletilir. İç kabukları soyulan bademler, havandan dövülür. Bir tencere içine bir litre su, bir kilogram şeker, yarım limon suyu eklenerek kaynatılır ve şurup hazırlanır. Ardından dövülmüş bademler hazırlanan şurubun içine eklenir. Kısa bir süre kaynadıktan sonra bademlerin tüm aromasının şuruba geçebilmesi için en az yirmi dört saat, en fazla ise kırk sekiz saat bu şerbetin içinde bekletilir. Şerbetin içinde bekletilen bademler süzülür ve kalan şerbet şişelere doldurulur. Konsantre olarak şişelenen sumada, içilmek için hazırdır. Konsantre bir içecek olduğundan sunumu için kullanılacak bardağa bir parmak kadar koyulan sumadanın üzeri sıcak servisler için sıcak su ekleyerek ve üzerine tarçın serpiştirilerek hazırlanır. Sıcak yaz gülerinde soğuk sunumu da yapılabilen sumada için elde edilen konsantre, bardağa yine bir parmak kadar koyulduktan sonra üzerine soğuk su ve buz eklenerek servis edilir (Altan, 2021, <https://www.google.com>, Özçil, A. & Özçil, İ.E, 2019). Bir enerji deposu olan sumadanın sağlık açısından çok sayıda faydası vardır. İçerdiği potasyum normal kan basıncının korunmasına yardımcı olurken, magnezyum içeriği ise tükettiğimiz besinlerin enerjiye dönüştürülmesine ve krampların önlenmesine etki eder. Aynı zamanda bir antioksidan olan E vitamini ve bağışıklık sisteminin işleyişine ve tiroid metabolizmasına yardımcı olan selenyum da içerir (<https://gastronomytours.com>).

Sonuç ve Öneriler

Alana özgü çalışmalar araştırıldığında, maalesef Kuzey Kıbrıs'ta sumada ile ilgili yeterli sayıda yayına rastlanamamıştır. Yapılan yazın taramasında sumada da dahil olmak üzere Kuzey Kıbrıs'ın içecek kültürüne ait bir tek çalışma göze çarpmaktadır. Yeniasır ve Gökbulut (2020) tarafından yürütülen bu çalışmanın sonuçlarına göre, Kıbrıs Türk kültüründe sosyal hayatın önemli bir parçası konumunda bulunan bazı içecekleri halk, adaya özgü olarak kabul edip sahiplenirken (limonata, Neskafe, sütlü çay, kefir),bazıları ise (güllü süt, gül, şerbet, sumada) günümüzde popüler kültürün etkisiyle unutulmaya yüz tutmuştur.

Kültürel miras öğeleri bir toplumun kimliği, karakterini ortaya koyan öğeleri içerir. Somut ya da soyut olsun, bu mirasa gereken önemin verilmemesi ve zamanla unutulması o toplumu toplum yapan kimliğinin yok olmasında önemli faktörlerden biri olarak karşımıza çıkar. Bu anlamda Kıbrıs'ın gastronomi kültürel mirası öğelerinden sumadanın hak ettiği değeri koruması ve ileriki kuşaklara aktarımı konusunda bazı önlemler alınabilir. Buna göre; öncelikle Kuzey Kıbrıs'a ait gastronomi miras öğelerinden içeceklerin envanteri çıkarılmalıdır. Bu envanter ile unutulmaya yüz tutan içecekler belirlenerek tanıtım faaliyetleri arttırılabilir. KKTC Başbakan Yardımcılığı Turizm Kültür Gençlik ve Çevre Bakanlığı

önderliğinde, Kıbrıs Türk Oteciler Birliği (KITOB), Kıbrıs Türk Restorancılar Birliği (Res-Bir)'in, ve akademisyenlerin bir araya gelerek gastronomi miras öğelerinin korunması adına yapılacak çalıştaylar ve bu çalıştaylarda belirlenecek yol haritaları oldukça faydalı olacaktır. Kuzey Kıbrıs'ın kültürel mirasını oluşturması ve bu mirasın öncelikle çocuklara aktarılması kapsamında sumada, çocuklara okullarda ikram edilebilir ve farkındalık sağlanabilir. Kuzey Kıbrıs'ın kültürüne ait içecekler okulların müfredatına eklenebilir. Üniversitelerin bünyesinde açılacak gastronomi yarışmaları ile sumada ile hazırlanacak alkollü ve alkolsüz içecekler yarışması düzenlenebilir ve kazanan ürün Kuzey Kıbrıs'ın tanıtım içeceği olarak festivallerde ve yurt dışı fuarlarında tanıtılabilir.

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