

6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY
RESEARCH & PRACTICES

PROCEEDINGS BOOK

April 3-5, 2022
Manhattan, New York City

Editors
Prof. Dr. Alenka Pavko Čuden
Samira KHADHRAOUI ONTUNC

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15.04.2022

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www.nyconference.org

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By

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Conference Identification

CONFERENCE NAME

6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY
RESEARCH & PRACTICES

DATE AND PLACE

April 3-5, 2022
Manhattan, New York City

ORGANIZATION

IKSAD - Institute of Economic Development and Social
Research &
Liberty Publishing House

PARTICIPANT COUNTRIES-36

USA, Turkey, Algeria, Morocco, Slovenia, Republic of Congo, Poland, Azerbaijan,
Kazakhstan, Spain, UK, India, Nigeria, Malaysia, Italy, Israel, Georgia, Italy, France,
South Africa, Holland, China, Ethiopia, Serbia, Kingdom of Eswatini, Iran, Panama, Hong
Kong, Romania, North Macedonia, Bulgaria, Indonesia, Iraq, Saudi Arabia, Belarus,
Albania

NUMBER OF ACCEPTED PAPERS: 165

NUMBER OF REJECTED PAPERS: 57

TOTAL NUMBER OF PAPERS FROM TURKEY: 80

TOTAL NUMBER OF INTERNATIONAL PARTICIPANTS: 85

EVALUATION PROCESS

All applications have undergone a double-blind peer review
process

CONFERENCE LANGUAGES

English, Turkish

PRESENTATION

Oral Presentation/ Face to Face and Virtual

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University of Szczecin

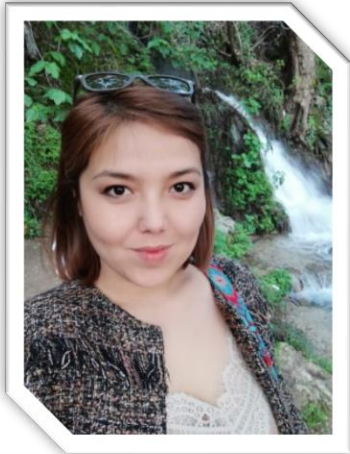


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Notre Dame University, Editor In Chief
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Middle East and North Africa

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Sanduni Perera

H5 Bahriye Gül...

H5 Bahriye Gülgün



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The Future of the Metaverse in Multidisciplinary Applications



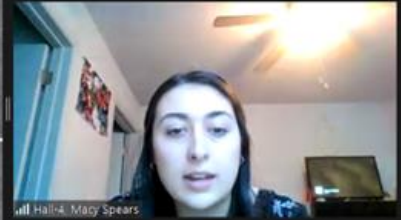
David John Wortley FRSA
360in360 Immersive Experiences



6th International New York Conference
on Evolving Trends in Interdisciplinary Research and Practices
April 3-5, 2022
Manhattan, New York

A COMPARISON BETWEEN GROUND PENETRATING RADAR AND A REBAR LOCATOR ON A REINFORCED CONCRETE STRUCTURE

Macy Spears
Dr. Saman Hedjazi
Georgia Southern University
Statesboro, GA, United States
Department of Civil Engineering and Construction



CONFERENCE GALLERY

Zoom Meeting - Hall 1

You are viewing Hall-1,Irem Güvendiren's screen

View Options

HALL 1 - irem.p...

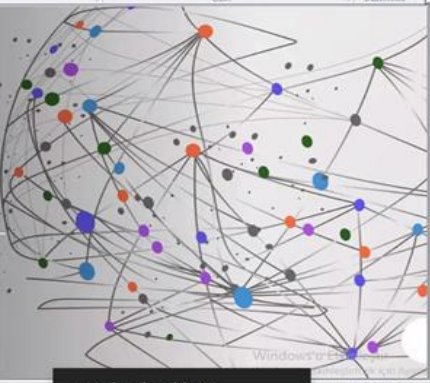
Recording...

Remaining : 09:36:19

1 unassigned participant

DETERMINING THE QUALITY INDEX OF ONLINE SHOPPING WEBSITES BY USING FUZZY LOGIC

Irem GÜVENDİREN
Advisor: Hakan ŞİMŞEK



Zoom Meeting - Hall 1

Recording...

Remaining : 09:47:00

H1 - Asst. Prof. Dr. Yusuf Özçevik

H1 - Observer-Jan

H1 - Hayreddin BOZTAŞ

Hakan Şimşek

H1 - Himmet Ufuk KULAVUZ

H1 - Soley Çapar

H1 - Ismet Kızgın

Kadir Can KARADEMİR

H1 - Ali Burak TEKVALCIN

H1 - Özama Kriewah


H1 - Irem Güvendiren

H1 - Tarık Koroğlu

HALL 1 - Seyfed...

2 unassigned participants

Müoe Erel-Ozcevik



Zoom Toplantısı - Hall 5

Kayıd ediyor...

Kalanı: 09:06:44

observed hall 5

HS - Nuray Özer

HS - Hilal Kılıç

Assist. Prof. Dr. Murat K.

H5 - Ash Güneş Gölbey

HS Bahriye Gülgün

Katılımcılar (13)

Q Katılımcı bul

observed h... (Oturum Sahibi, ben)

H5 - Ash Güneş Gölbey

Assist. Prof. Dr. Murat KIRANŞAN

Feryal AKAY

gulshah kacamaz akkurt

HS - Aylin Ağma Okur

HS Bahriye Gülgün

HS - Hilal Kılıç

H - S. Atakan Piri

HS - Kardelen Aydın

HS - Nuray Özer


H5 - Nesrin İNCEÖREN

H5 - Sanije TEKEREK

2.2 Ortaçağ Bahçeleri

Ortaçağın belirgin bir niteliği dışı kapankılığdır. Konutlar nasıl sokağa kapatılmışsa, kentler de çevre kırılara kapatılmıştır. Kent, dış dünyada, desteklendirilmiş ve kontrol kuleleriyle donatılmış duvarlarla ayrılarak, düşmana karşı korunmaya çalışılmıştır [8].

Saklı 17. Ortaçağ'da Bahçe Bozozu: Decemter. (Alınır: <https://taahkiyay.com.tr/ortancaagden-sonesama-bahceleri/>)



CONFERENCE GALLERY

DENEYSEL SONUÇLAR

DÜŞÜK YORULMA DAYANIMINDAKİ KIRIK YÜZEY GÖRÜNTÜLERİ

Zoom Toplantı - Hall 3

Katılımcılar (13)

- H3 H.. (Ortak oturum sahibi, ben)
- MA Msc.Engineer Abdulrezzak E...
- Cem Ersöz
- HS H3- Selma Akcay
- H3- Semih Tiknas
- HA H-3-Ece Alagök
- HO H3-Kamer Özgün
- H Hall 3- Huseyin Onder ALDEMİR
- M Hall-3 Meriç YILMAZ SALMAN
- HE Hall-3 Elvan Şimşek
- HD Hall-3, Dr. Esra TUĞRUL TUNÇ
- HD Hall-3, Dr. Mustafa TUNÇ
- HD Hall3-Emre Demir

6th INTERNATIONAL NEW YORK CONFERENCE ON EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES
April 3-5, 2022
Manhattan, New York City
Online & In Person Participation

Statistical Study on Discharge Capacity of Sharp Crested Rectangular Weirs

Mustafa TUNÇ
Fırat University
Faculty of Engineering
Department of Civil Engineering
ELAZIG

Zoom Toplantı - Hall 3

Katılımcılar (13)

- L.. (Ortak oturum sahibi, ben)
- RP Reyhan Polat
- G Göznel
- H-6 Hatice SONMEZ TUREL
- HM H-6 MELTEM TURAN
- HS Hall 6 - Gökhan Öztürk
- HE Hall 6 Tuğba Kiper
- HD Hall-6, Deniz KARADAN
- H-6 Res. Assit. Engin Kabatas
- HS Hall-6, Serdar ALTUN
- HS Hall-6, Şükriye Gökbuğ Kalaycıoğlu
- G Hall-6, Gulshan Aliyeva



Reyhan POLAT Photo Archive, Mehmet ÇINAR Collection, Sultanahmet, Istanbul, Turkey, 2017

2 atanmamış katılımcı

Katılımcılar (12)

- Sesi Aç
- Videoyu Başlat
- Katılımcılar
- Sohbet
- Ekran Paylaşımı
- Kayıt Duraklat/Durdur
- Ara Odaları
- Tepkiler
- Uygulamalar

CONFERENCE GALLERY

H-4 Observer

H-4 Observer

Kaydediliyor...

HALL-4_ZIOUAL Sarra

Hall-4 - Segbenu Jose...

Kalın: 09:55:33

7 atanmamış katılımcı

Katılımcılar (12)

Q Katılımcı bul

- HO H... (Ortak oturum sahibi, ben)
- H HALL-4_ZIOUAL Sarra
- Hall 4 - Alenka Pavko Čuden
- H4 HALL 4 - alphonse dorien makos...
- H4 HALL 4 - Houria EN-NACIRI
- HM Hall-4 Murat Özyay Taşkın
- HB Hall-4, BENAÏSSA Chaimae
- HF Hall4, Farhaoui Mohamed
- HM Hall-4, Macy Spears
- HS Hall-4, Segbenu Joseph ZOSU
- hall-4Youcef Becheffar
- E Sümer Esin Şenyurt- Hall 4

Conclusion

Hall 4 - Alenka Pavko Čuden

H-4 Observer

H-4 Observer

HALL 4 - Houria...

HALL 4 - Houria EN-NA...

Lafhim lahoussine Hall 4

Hall-4 Murat Öz...

Hall-4 Murat Özyay Taşkın

alphonse dorien makos...

Introduction

The essential need of saving fuel and resources for automobiles and buildings has prompted substantial research towards reducing drag around bluff bodies such as circular cylinders

H-4 Observer

H-4 Observer

Lafhim session...

Lafhim session 3 / Hall 5

hall-4Youcef Becheffar

HALL 4 - alphonse dorie

Faith Obafemi

Katılımcı bul

- HO H... (Ortak oturum sahibi, ben)
- hall-4Youcef Becheffar
- ES Esin Şenyurt- hall 4
- Faith Obafemi
- Hall 4 - Alenka Pavko Čuden
- H4 HALL 4 - alphonse dorien makos...
- H4 HALL 4 - Houria EN-NACIRI
- HM Hall-4 Murat Özyay Taşkın
- HF Hall4, Farhaoui Mohamed
- HM Hall-4, Macy Spears
- HS Hall-4, Segbenu Joseph ZOSU
- LS Lafhim session 3 / Hall 5

Meeting ID: 878 3074 4465
Passcode: 060606

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY
RESEARCH & PRACTICES**



**CONFERENCE
PROGRAM**

April 3-5, 2022
Manhattan, New York City



Meeting ID: 878 3074 4465

Passcode: 060606

6th INTERNATIONAL NEW YORK CONFERENCE ON EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES

Participant Countries: (36)

USA, Turkey, Algeria, Morocco, Slovenia, Republic of Congo, Poland, Azerbaijan, Kazakhstan, Spain, UK, India, Nigeria, Malaysia, Italy, Israel, Georgia, Italy, France, South Africa, Holland, China, Ethiopia, Serbia, Kingdom of Eswatini, Iran, Panama, Hong Kong, Romania, North Macedonia, Bulgaria, Indonesia, Iraq, Saudi Arabia, Belarus, Albania

IMPORTANT, PLEASE READ CAREFULLY

- ❖ 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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- ❖ The participant must be connected to the session 5 minutes before the presentation time.
- ❖ All congress participants can connect live and listen to all sessions.
- ❖ Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

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- ◆ Make sure your computer has a microphone and is working.
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**Before you login to Zoom please indicate your name surname and hall number,
exp. H-1, Prof. Dr. Enrique Mallen**



Meeting ID: 878 3074 4465
Passcode: 060606

OPENING SPEECH

03.04.2022

New York Local Time: 09:30

Ankara Local Time: 16:30

-Welcoming Speech-
Mustafa Latif Emek

President

Institute of Economic Development and Social Research (IKSAD)

HONORARY PRESIDENT OF CONFERENCE

Prof. Dr. Enrique Mallen

Sam Houston State University

*“Lessons from Picasso’s Multidisciplinary
Approach”*



03.04.2022 | HALL-1



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Asst. Prof. Dr. Yusuf Özçevik

Authors	Affiliation	Presentation title
İrem PALABIYIK Ali Çağın ÖZTÜRK	FG Tekstil Konfeksiyon San. Tic. A.Ş, Turkey	DEVELOPMENT OF OZONE EFFECTING SYSTEM WITHOUT USING HARMFUL CHEMICALS
Hakan Şimşek İrem Güvendiren	Antalya Bilim University, Turkey	DETERMINING THE QUALITY INDEX OF ONLINE SHOPPING WEBSITES BY USING FUZZY LOGIC
Osama Ali Ehbil Kriewah Serkan Islak	Kastamonu University, Turkey	PRODUCTION AND CHARACTERIZATION OF Cu-Cr-B 4 C- CNF HYBRID COMPOSITES BY POWDER METALLURGY METHOD
Serkan Islak Osama Ali Ehbil Kriewah	Kastamonu University, Turkey	CHARACTERIZATION OF Mo 5 SiB 2 BASED SiC REINFORCED COMPOSITES
Müge Erel-Özçevik	Manisa Celal Bayar University, Turkey	ANALYTICAL DELAY MODEL OF BLOCKCHAIN SYSTEM
Soley Çapar Seyfeddin Emre Türkmen Asst. Prof. Dr. Yusuf Özçevik	Manisa Celal Bayar University, Turkey	A GAME-BASED SOFTWARE ECOSYSTEM FOR VIRTUAL LABORATORY CONSTRUCTION
Kadir Can Karademir Mehmet Ayberk Çakar İsmet Kizgin Tarık Koroğlu Asst. Prof. Dr. Yusuf Özçevik	Manisa Celal Bayar University, Turkey	THE EFFECT OF DATASET BALANCING FOR SOFTWARE BUG PREDICTION
Hayreddin BOZTAŞ Bengü AKIN Esmâ KESKİN Hayrettin AHLATCI İsmail ESEN Yunus TÜREN	Karabuk University, Turkey	INVESTIGATION OF THE CORROSION BEHAVIOR OF CERAMIC PARTICLE REINFORCED AZ91 AND ZK60 COMPOSITES
Himmet Ufuk KULAVUZ Ali Burak TEKYALÇIN	Kmc / Meko Metal Research and Development Engineer İzmir, Turkey	An Investigation of Material Thickness Behavior in Roll Form Process using Finite Element Method

(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.



Meeting ID: 878 3074 4465
Passcode: 060606

03.04.2022 | HALL-2



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Asst. Prof. Dr. Canan ERKAN

Authors	Affiliation	Presentation title
Ayşe Güngör Hasan Aksoy	Toros University, Turkey Gaziantep University, Turkey	THE EFFECT OF COMPANY DEMOGRAPHY ON COMPANY PERFORMANCE; AN APPLICATION IN MERSIN FREE ZONE AND ORGANIZED INDUSTRIAL ZONE
Lect. Ahmet Yavuz Şahin Res. Assist. Muhammed Turğut	Istanbul Gelisim University, Turkey Tarsus University, Turkey	AFTER MEGA PROJECT KANAL ISTANBUL, ISTANBUL LOGISTICS VILLAGE LOCATION PROPOSAL
Dr. Niyazi Okan ÇOBAN	Independent Researcher, Turkey	A SATISFACTION PERSPECTIVE FOR PERFORMANCE-BASED PAY SYSTEM: COMPARING DIFFERENCES IN THE EMPLOYEES
Murat Basal	Istanbul Gelisim University, Turkey	CONSUMERS IN LUXURIOUS RESTAURANTS NEED UNIQUE
Dr. Serdar ÖZÖZEN	Independent Researcher, Turkey	EVALUATION OF CARBON PRICING MECHANISMS AGAINST THE IMPACTS OF GLOBAL WARMING AND CLIMATE CHANGE RESULTING FROM EMISSIONS OF GREENHOUSE GASES: CARBON TAX AND EMISSION TRADING SYSTEM (ETS)
Asst. Prof. Dr. Canan ERKAN	Dokuz Eylül University, Turkey	TURKEY'S STRATEGIC PREFERENCES IN INDUSTRIALIZATION
Asst. Prof. Dr. Canan ERKAN	Dokuz Eylül University, Turkey	Activities Done Under Social Responsibility Projects Before Pandemic
Ece Tosunoglu	Izmir University of Economics, Turkey	THE IMPORTANCE OF SUSTAINABILITY IN TERMS OF THE BALANCE OF PRODUCTION AND CONSUMPTION
Ecrin Çifci Feyyaz Zeren	Yalova University, Turkey	EXAMINATION OF THE RELATIONSHIP WITH CO2 EMISSION OF FOREIGN DIRECT INVESTMENTS AND RENEWABLE ENERGY: AN APPLICATION ON DEVELOPED AND DEVELOPING COUNTRIES
Assoc. Prof. Önder BÜBERKÖKÜ	Van Yuzuncu Yil University, Turkey	FORECASTING THE VOLATILITY OF EXCHANGE RATES USING UNIVARIATE AND MULTIVARIATE GARCH MODELS: THE TURKISH CASE

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03.04.2022 | HALL-3



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Mustafa Tunç

Authors	Affiliation	Presentation title
Ece Alagok Elvan Simsek Asst. Prof. Emre Demir Asst. Prof. Kamer Ozgun	<i>Antalya Bilim University, Turkey</i>	EFFECTS OF PEDESTRIAN TRAFFIC CHANGES DUE TO COVID-19 PANDEMIC: A CASE STUDY IN ANTALYA, TURKEY
Meriç Yılmaz Salman Halil Hasar	<i>Firat University, Turkey</i>	PIPELINE FAILURE DETECTION AND MONITORING METHODES
Mustafa Tunç	<i>Firat University, Turkey</i>	STATISTICAL STUDY ON DISCHARGE CAPACITY OF SHARP CRESTED RECTANGULAR WEIRS
Mustafa Tunç	<i>Firat University, Turkey</i>	A PRELIMINARY STATISTICAL ANALYSIS FOR DISCHARGE COEFFICIENT OF V-NOTCH WEIRS
MSc. Engineer Ece Aydan AYDINLI MSc. MSc. Engineer Abdulrezzak ERDEM MSc. Student Esmâ KESKİN Prof. Dr. Hayrettin AHLATCI	<i>Karabuk Iron and Steel Industry and Trade Inc., KARDEMİR, Karabuk, TURKEY</i>	INVESTIGATION OF THE MECHANICAL PROPERTIES AND FATIGUE BEHAVIOR OF COMPOSITE MATERIALS WITH ISOPHYTALIC POLYESTER MATRIX MANUFACTURED BY GLASS FIBER REINFORCEMENT
Esra Tuğrul Tunç	<i>Firat University, Turkey</i>	A PREPARATORY STUDY ON THE STATISTICAL PREDICTION OF SILICA FUME CONCRETE STRENGTH
Esra Tuğrul Tunç	<i>Firat University, Turkey</i>	A PRELIMINARY STATISTICAL STUDY FOR ESTIMATION OF FLY ASH CONCRETE STRENGTH
MSc. Semih TIKNAS Assoc. Prof. Dr. Abdullah ÖZKAN Asst. Prof. Dr. Vildan ÖZKAN	<i>Iskenderun Technical University, Turkey</i>	EXPERIMENTAL STUDY: USING OF GRAPHENE OXIDE TO ENHANCING RHEOLOGICAL AND FILTRATION PROPERTIES OF WATER-BASED DRILLING FLUIDS
Cem Ersoz Sena Kilic Huseyin Onder Aldemir	<i>Ozyegin University, Turkey</i>	EXPLORING TURKEY'S AIRPORT NETWORK STRUCTURE: A COMPLEX NETWORK APPROACH
Selma Akçay	<i>Cankiri Karatekin University, Turkey</i>	EFFECT OF WINGLETS ON FLOW AND HEAT TRANSFER IN A PERIODIC GROOVED CHANNEL

(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.



03.04.2022 | HALL-4



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Prof. Dr. Alenka PAVKO ČUDEN

Authors	Affiliation	Presentation title
ZIOUAL Sarra Khelfaoui Youcef	University Abderrahmane Mira, Algeria	Mechanical and microstructural characterization of a deposit made by thermal projection, for use in the aeronautical industry
Chaimae BENAÏSSA Belkacem BOUHADI Abdelhamid ROSSI	Abdelmalek Essaâdi University, Morocco	CONTRIBUTION TO THE CHARACTERIZATION OF THE PHYSICO-CHEMICAL QUALITY OF GROUNDWATER IN THE AL HOCEIMA REGION (MOROCCO)
Houria En-naciri Lahoussine Lafhim	Sidi Mohammed Ben Abdellah University, Morocco	DUALITY THEORY FOR OPTIMISTIC BILEVEL OPTIMIZATION
Prof. Dr. Alenka PAVKO ČUDEN	University of Ljubljana, Slovenia	RECENT DEVELOPMENTS IN FUNCTIONAL SPORTSWEAR
Youcef Becheffar Hayriye Sevil Ergür	University of Tiaret, Algeria Eskişehir Osmangazi University, Turkey	NON-NEWTONIAN STEADY FLOW FLUIDS OVER A PAIR OF GROOVED CYLINDERS IN TANDEM ARRANGEMENT
Pr. C. Slimani M. Farhaoui	Sidi Mohamed Ben Abdellah University, Morocco	Effects of climate change on real estate value
Alphonse Dorien Makosso	Marien Ngouabi University - Republic of Congo	Rethinking African feminist discourses: A Gynocriticism approach to Ifeoma Okoye's Behind the Clouds, Daniel Mengara's Mema and Lola Shonehin's The Secret Lives of Baba Segi's Wives
Murat Özay TAŞKIN Sümer Esin ŞENYURT	Wroclaw University, Poland	Comparative Analysis of Economic Competition Between Emerging China and USA
Segbenu Joseph ZOSU Elkanah Olaosebikan OYETUNJI Kasali Aderinmoye ADEDEJI	Lagos State University, Nigeria	DEVELOPMENT AND UTILIZATION OF MONO-COMMODITY MULTI-LOCATION MODEL FOR MANUFACTURING INDUSTRY
Faith Obafemi	Independent Researcher, Lagos, Nigeria	SMART CONTRACTS AND CRYPTOCURRENCY AS THE LEGAL AND MONETARY ENGINE FOR SPACE
Macy C. Spears Saman Hedjazi	Georgia Southern University, USA	A COMPARISON BETWEEN GROUND PENETRATING RADAR AND A REBAR LOCATOR ON A REINFORCED CONCRETE STRUCTURE

(All speakers required to be connected to the session 10 min before the session starts)
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03.04.2022 | HALL-5



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Assist. Prof. Dr. Murat KIRANŞAN

Authors	Affiliation	Presentation title
Aylin AGMA OKUR	Tekirdağ Namık Kemal University, Turkey	NUTRIENT CONTENTS AND ANTI-NUTRITIONAL FACTORS OF LUPINE SEEDS, AND USAGE POSSIBILITIES IN BROILER NUTRITION
Dr. Tuğba Hilal Kılıç Prof. Dr. Nuray Özer	Directorate of Marmara Forestry Research Institute, Turkey Tekirdağ Namık Kemal University, Turkey	INVESTIGATIONS ON NEW PATHOTYPES OF SUNFLOWER DOWNY MILDEW (<i>Plasmopara halstedii</i>) IN TURKEY AND ON THE ROLE OF STOMA MORPHOLOGY FOR RESISTANCE TO THE DISEASE
Nuray Özer Temine ŞABUDAK	Tekirdağ Namık Kemal University, Turkey	EFFECTS OF METABOLITES IN THE PERICARP AND SEEDS OF SOME SUNFLOWER GENOTYPES SHOWING DIFFERENT TOLERANCE TO DOWNY MILDEW DISEASE ON SEED-BORNE <i>Bipolaris cynodontis</i>
Bahriye Gülgün Aşlı Güneş Gölbeç	Ege University, Turkey Izmir Democracy University, Turkey	THE HISTORICAL PROCESS OF WORLD GARDENS DESIGN EXAMPLES FROM THE LANDSCAPE ARCHITECTURE PERSPECTIVES
Bahriye Gülgün Gülşah Kaçmaz Akkurt	Ege University, Turkey Burdur Mehmet Akif Ersoy University, Turkey	RESTORATION, REHABILITATION, CREATION AND ENHANCEMENT METHODS TO WETLANDS AND APPLICATION EXAMPLES
Mehmet Sönmez	Gaziantep University, Turkey	SYNTHESIS AND CHARACTERIZATION OF SUBSTITUTED CARBOXAMIDE LIGAND AND SOME METAL COMPLEXES
Assist. Prof. Dr. Murat KIRANŞAN	University of Gumushane, Turkey	REMOVAL OF RADIOACTIVE SUBSTANCES IN THE LIQUID NUCLEAR WASTE WITH DIFFERENT SPECIES OF CLAY
Assist. Prof. Dr. Murat KIRANŞAN	University of Gumushane, Turkey	APPLICATIONS OF ELECTRO-FENTON PROCESSES: DEGRADATION OF THE DISPERSE DYES IN THE INDUSTRIAL WASTEWATER
Assist. Prof. Saniye Tekerek	Kahramanmaraş Sutcu Imam University, Turkey	INVESTIGATION OF PHOTON SHIELDING PERFORMANCES OF SOME SELECTED BINARY ALLOYS
Feryal Akay Mehmet Hayrullah Akyıldız Nesrin İnceören	University Of Dicle, Turkey	INVESTIGATION OF THE EFFECT OF LAVENDULA GROWN IN DIFFERENT SOIL TYPES ON OXIDATIVE STRESS AND ANTIOXIDANT SYSTEM: A CASE OF DİYARBAKIR

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Meeting ID: 878 3074 4465
Passcode: 060606

03.04.2022 | HALL-6



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Assoc. Prof. Gökhan Öztürk

Authors	Affiliation	Presentation title
Engin KABATAŞ Tuğba KİPER	Kırklareli University, Turkey	CLIMATE CHANGE TARGETS WITHIN THE FRAMEWORK OF DEVELOPMENT PLAN AND STRATEGY DOCUMENTS
Engin KABATAŞ Tuğba KİPER	Kırklareli University, Turkey	THE CONCEPT OF CLIMATE CHANGE IN PLANNING AND DESIGN APPROACHES
Res. Assist. Reyhan POLAT	Mimar Sinan Fine Arts University, Turkey	EXAMINATION OF THE QUALITY-DIMENSION RELATIONSHIP IN HEREKE SILK CARPETS THROUGH THE INTERPRETATION OF "THE LAST SUPPER" WOVEN IN DIFFERENT QUALITIES
Assoc. Prof. Gökhan Öztürk Lect. Göksel Çetin	Bolu Abant İzzet Baysal University, Turkey Tokat Gaziosmanpaşa University, Turkey	OUTCOMES OF A PROJECT DEVELOPED TO PROVIDE QUALITY INSTRUMENT INFRASTRUCTURE
Assoc. Prof. Gökhan Öztürk Asst. Prof. Ş. Göktuğ Kalaycıoğlu	Bolu Abant İzzet Baysal University, Turkey Tokat Gaziosmanpaşa University, Turkey	OPINIONS OF MUSIC TEACHER CANDIDATES ON INSTRUMENT TRAINING
Assoc. Prof. Hatice SÖNMEZ TÜREL Meltem TURAN	Ege University, Turkey	THE IMPORTANCE OF CEMETERIES IN CITIES AND THEIR PLANNING - DESIGN PRINCIPLES
Deniz Karadan Emine Malkoç True	Ege University, Turkey	THE PLACE OF URBAN IMAGES IN URBAN SILHOUETTES AND THE CHANGES IN THEIR PERCEPTIONS
Serdar ALTUN Merve MAMACI	University of Bergamo, Italy Fenerbahçe University, Turkey	A REVIEW ON WORKPLACE VIOLENCE AGAINST HEALTHCARE WORKERS: CONSEQUENCES AND PREVENTION
Gulshan Aliyeva	Baku State University, Azerbaijan	ASSESSMENT OF DEPRESSION AMONG OLDER INMATES

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Meeting ID: 878 3074 4465
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04.04.2022 | HALL-1



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Veli BATDI

Authors	Affiliation	Presentation title
Assoc. Dr. Sadreddin Huseyn	Baku Engineering University, Azerbaijan	GOD CHARACTER IN AZERBAIJANI LITERATURE
Veli BATDI Aylin AYDIN Tarık TALAN	Gaziantep University, Turkey	THE PROLIFERATION OF MOBILE LEARNING: AN OVERVIEW OF LEARNING TOOLS, OPPORTUNITIES AND LIMITATIONS
Yusuf GÖZAÇIK Recai MİMAROĞLU Tuğçe ÇALCALI	Dicle University, Turkey Ministry of National Education, Turkey Giresun University, Turkey	INVESTIGATION OF SPORTS INJURY PREVENTION AWARENESS OF INDIVIDUALS INTERESTED IN COMBAT SPORTS
Neil Collins Elaine Sharplin Aziz Burkhanov	Nazarbayev University, Kazakhstan	Consent Of The Governing: Research Ethics In Autocracies
Elif KARAGÜN Müge SARPER KAHVECİ Gökhan ÇAKMAK	Kocaeli University, Turkey	METAPHORICAL PERCEPTIONS OF PROFESSIONAL ATHLETES FROM VARIOUS BRANCHES TOWARDS THE CONCEPT OF FAIR PLAY
Güler Tüzün Elif KARAGÜN Müge SARPER KAHVECİ	Kocaeli University, Turkey	METHODS OF PHYSICAL EDUCATION TEACHERS WORKING IN PRIMARY EDUCATION IN ORDER TO COPE WITH NEGATIVE BEHAVIORS OF STUDENTS
Ph.D. Research Assistant Çağatay AKDOĞAN	Trakya University, Turkey	THE NEW ACTOR OF TRANSMEDIA STORYTELLING IN MARKETING COMMUNICATION: METAVERSE
MS. Anushervon Norov Dr. Assist. prof. Başak Akar	Ankara Yıldırım Beyazıt University, Turkey	VORUKH VILLAGE CASE: UNMARKED BORDERS BETWEEN TAJIKISTAN AND KYRGYZSTAN
Canan DEMİRCİ MURSALOĞLU	Istanbul Gelisim University, Turkey	POLITICAL VIOLENCE IN CYPRUS
Yunus ŞAHİNLER Ayhan ÇELİK Ahmet OTMAN Serkan ÜSTÜNDAĞ Hüseyin BUĞA	Dumlupınar University, Turkey Ministry of Youth and Sports, Ankara, Turkey Gaziosmanpaşa University, Turkey Kırıkkale University, Turkey Atatürk University, Turkey	EXAMINATION OF MENTAL SKILLS LEVELS IN PHYSICALLY DISABLED ATHLETES

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04.04.2022 | HALL-2



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Dr. L.R.K. Krishnan

Authors	Affiliation	Presentation title
Peter Baliuskas Prof. Dr. Juan Llopis Jose Gasco Reyes Gonzalez	University of Alicante, Spain	TURNAROUND AS A BUSINESS STRATEGY TO REVERSE AN ECONOMIC CRISIS
David Wortley	360in360 Immersive Experiences, Alderton, United Kingdom	The Future of the Metaverse in Multidisciplinary Applications
Nithuna Marene Dr. L.R.K. Krishnan	VIT Business School, Chennai, India	Impact of the Pandemic on Employee Motivation and Performance in the IT Industry
Abir Ghosh Dr. Sudipta Majumdar	ICFAI University Jharkhand, India	ROLE OF CORPORATE TOWARDS ACHIEVING SUSTAINABILITY – A CRITICAL REVIEW OF UNDERLYING FACTORS
Abdulgaffar Muhammad Maryam Ammani Lawal Labaran Fatima Adam Halima Ibrahim Aisha Ajoke Abdussalam Zainab Sani Sambo	Independent Researcher Kaduna State University, Nigeria Ahmadu Bello University, Zaria, Nigeria Nigerian Defence Academy	ECONOMIC ANALYSIS OF CROP PRODUCTION AND FOOD SUSTAINABILITY IN NIGERIA (2001-2020)
Abdulgaffar Muhammad Maryam Ammani Lawal Labaran Fatima Adam Halima Ibrahim Aisha Ajoke Abdussalam Zainab Sani Sambo	Independent Researcher Kaduna State University, Nigeria Ahmadu Bello University, Zaria, Nigeria Nigerian Defence Academy	ENERGY SECTOR ANALYSIS IN NIGERIA (1999-2020): A PARADIGM SHIFT FOR GLOBAL COMPETITIVENESS
S. Priyadarshini Dr. L.R.K. Krishnan	VIT Business School, Chennai, India	AI-INDUCED WORK PRACTICES ENHANCING PRODUCTIVITY AND ENGAGEMENT FROM BOARD ROOM TO SHOP FLOOR
Pooja Srinivasan Dr. L.R.K. Krishnan	VIT Business School, Chennai, India	EFFECTIVENESS OF AI IN EMERGING HUMAN RESOURCE PRACTICES IN THE IT INDUSTRY
Gazali Ibrahim Nazatul Faizah Binti Haron Sharafuddeen ibrahim abubakar	Universiti Sultan Zainal Abidin, Malaysia	CAUSES OF PROJECTS ABANDONMENT IN NIGERIA (2002 – 2020): AN EMPIRICAL INVESTIGATION
Assoc. Prof. Nino khutchua Assoc. Prof. Tamar Gambashidze	Georgian Aviation University, Georgia	The European Green Egreement and its impact on civil aviation sector

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04.04.2022 | HALL-3



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Dr. Rabia DEMİR

Authors	Affiliation	Presentation title
Selinay Şenkal Neşe Başak Türkmen Muhterem Aydın Aslı Taşlıdere Şahin Yılmaz Hande Yüce Fikrettin Şahin Ayşegül Doğan	Yeditepe University, Turkey Inönü University, Turkey Fırat University, Turkey	PARATHYROID ORGANOID TRANSPLANTATION INTO PARATHYROIDECTOMIZED RATS
Dr. Kərimova Rəna Cabbar kızı Shahmammadova Sevinc Osman kızı Dr. Bayramov Adil Allahyar oğlu Dr. Məşədiyeva Bayramova Səbinə Ənvər kızı Yaqubova Vəfa Nadir kızı	Azerbaijan Medical Univeristy	THE CAUSE OF HEPATIC SHOCK
Dr. Kərimova Rəna Cabbar kızı İskəndərova Zülfiyyə Şamil kızı Əzizova Əsmət Nizami kızı Rzayeva Sürəyya Cabbar kızı Ələkbərova Mehriban Qəni kızı	Azerbaijan Medical Univeristy	NITROGEN, IMPORTANT FOR HUMAN LIFE, IS ONE OF THE MAIN SUBSTANCES FOR LIFE
Gülen Kavak Prof. Dr. Özlem Övayolu	Gaziantep University, Turkey	THE PHYSICAL ACTIVITY LEVELS OF GERIATRIC INDIVIDUALS WITH DIABETES
Assist. Dr. Tarlana Jafarova Assist. Dr. Aybeniz Qojayeva Assist. Dr. Churaman Zeynalova Assist. Dr. Arzu Hajiyeva	Azerbaijan Medical University	THE IMPORTANCE OF HORMONAL AND ANTIBACTERIAL DRUGS IN THE TREATMENT OF ISTHMIC-CERVICAL INSUFFICIENCY
Asst. Prof. Ayça Tanrıverdi	Kahramanmaraş Sutcu Imam University, Turkey	TEMPERATURE-DEPENDENT ZnO PARTICLES SYNTHESIS
Assist. Prof. Nazan Eras	Mersin University, Turkey	THE IMPORTANCE OF BIOMARKERS IN THE TREATMENT OF PATIENTS WITH METASTATIC COLORECTAL CANCER
Zeynep Cemile Özlü Dr. Öğr. Üyesi Sibel Bölek	Health Sciences University, Turkey	INVESTIGATION OF ANTIVIRAL AND ANTIMICROBIAL PROPERTIES OF FUNCTIONAL DAIRY PRODUCTS
DVM Zeliha Keskin Alkaç Nurse Şevda Maçın Yerlikaya DVM Fatih Ahmet Korkak Dr. Betül Dağoğlu Hark Prof. Dr. Sadettin Tanyıldızı Prof. Dr. Gürdal Dağoğlu	Fırat University, Turkey Tatvan State Hospital, Turkey	PHARMACOKINETICS OF DICLOFENAC AND INTERACTION WITH SULFONAMIDE-TRIMETHOPRIM IN SHEEP
Elif ÜNER Hasibe KADIOĞLU	Marmara University, Turkey	ROLE OF LAUGHTER THERAPY IN SCHOOL HEALTH SERVICES

Meeting ID: 878 3074 4465
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Murat Yolcu Elif İpek Satar	<i>Dicle University, Turkey</i>	EFFECT OF ATRAZINE, A TRIAZINE HERBICIDE, ON PHOSPHOLIPID SUBCLASSES FRACTION IN THE LIVER OF <i>Oreochromis niloticus</i>
Valiyeva Giyafat	<i>Zarifa Aliyeva National Center of Ophthalmology, Azerbaijan</i>	The role of nitric oxide and its structural components as a mediator of inflammation in dacryocystitis in newborns and children under 15 months

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04.04.2022 | HALL-4



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Amina Mumtaz

Authors	Affiliation	Presentation title
Rodolfo Reda Alessio Zanza Dario Di Nardo Maurilio D'Angelo Luca Testarelli	University of Rome La Sapienza, Rome, Italy	MINIMIZE CEMENT EXCESS IN DENTISTRY
Małgorzata Waniek	WSB University, Dąbrowa Górnicza, Poland	The impact of COVID 19 pandemic on mental health
Yuval Arbel Yifat Arbel Amichai Kerner Miryam Kerner	Western Galilee College, Acre, Israel Bar Ilan University, Ramat Gan, Israel 1 University Street, Netanya, Israel Israel Institute of Technology	COVID19 VACCINATION: ACCESSIBILITY OR LITERACY? ISRAEL AS A CASE STUDY
El khayari Abdelmajid Rour Elhabib	Moulay- Ismail University, Morocco	The development of the snail farming sector in Morocco by determining the optimal conditions for endemic snails
Elmira Panakhova Ulduz Hashimova Nigar Huseynova Arzu Allahverdiyeva Khuraman Miryusifova Kamala Javadova	Institute of Physiology named A.I.Garayev, Baku, Azerbaijan	THE CATALEPSY PHENOMENON IN ALZHEIMER'S DISEASE EXPERIMENTAL MODEL
Otar Koniashvili Gvantsa Khachiashvili Naga Harika Korapati	Tbilisi State Medical University, Georgia	UNDERSTANDING THE PHENOTYPIC SPECTRUM OF DYSTONIA 24 (DYT24) CAUSED BY ANOCTAMIN 3 GENE (ANO3) MUTATION AND DISTINGUISHING FEATURES FROM OTHER PRIMARY DYSTONIAS IN ADULT POPULATIONS
Amina Mumtaz	PCSIR Laboratories Complex, Ferozepur Road, Lahore-Pakistan	Derivatization of drug with Transition Metals and its effect on Biological Evaluation
Gauri Parvathy Pramodhiya Sanduni Perera Rushali Prasad Naga Harrika Korrapati Gigi Gorgadze	Tbilisi State Medical University, Medicine, Tbilisi, Georgia	COMPUTER VISION SYNDROME AMONG MEDICAL STUDENTS DURING THE COVID-19 PANDEMIC

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04.04.2022 | HALL-5



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Dr. Serkan Gokalp

Authors	Affiliation	Presentation title
Dr. Muzaffer Zafer Ayar Kardelen Aydın	Karadeniz Technical University, Turkey	POSTCOLONIAL REPRESENTATION OF MIMICRY, HYBRIDITY AND UNHOMELINESS IN ABDULRAZAK GURNAH'S THE LAST GIFT
Leyla DİLEK	Kurtalan Distric Directorate of National Education, Turkey	THE ANALYSIS OF EXCLAMATIONS IN GAGAUZ TURKISH IN A SEMANTICAL CONTEXT
Dr. Serkan Gokalp	Mersin University, Turkey	STUDENTS' PARENTS' EXPECTATIONS OF THE STAKEHOLDERS IN THE SCHOOLS ABOUT THE PREVENTION OF CLIMATE CHANGE
Nazlı Bulut	Başkent University, Turkey	CHALLANGES OF ONLINE LEARNING: THE REASONS STUDENTS BEING UNCOOPERATIVE IN ONLINE EDUCATION CONCEPTS IN PREPARATORY SCHOOLS
Assoc. Prof. Dr. Vesile Şemşek	Kırşehir Ahi Evran University, Turkey	MEVLEVISM IN TURKISH CULTURAL HISTORY AND ON HIS CONTRIBUTION TO WORLD CIVILIZATION
Mustafa Koç	Istanbul University, Turkey	DISCOURSE ANALYSIS OF GERMAN-SOVIET NONAGGRESSION PACT IN FINLAND PRESS: EXAMPLE OF TURKEY
Uzm. Ceylan AKCAN	Akdeniz University, Turkey	PHILOSOPHY FOUNDATIONS OF LIFE PRACTICE IN STOACIANS
Kamal Salayev	The Institute of Caucasian Studies of ANAS, Azerbaijan	GENOCIDE COMMITTED BY ARMENIA AGAINST AZERBAIJAN
Ecenur PEKÇETİN Assist. prof. Dr. Yusuf BİLGE	Istanbul Sabahattin Zaim University, Turkey	INVESTIGATION OF PERSONALITY DISORDERS IN DSM-5 IN TERMS OF PSYCHOLOGICAL RESILIENCE, SELF-CONTROL, AND LOCUS OF CONTROL
Assist. Prof. Dr. Barış KANDEĞER Cüneyt TELSAC	Yuzuncu Yil University, Turkey	"DEMOCRACY AND PARTICIPATION" AN IMAGINATION OF THE LOCAL
Cüneyt TELSAC Assist. Prof. Dr. Barış KANDEĞER	Yuzuncu Yil University, Turkey	SUSTAINABLE URBANIZATION
Roya Mirzabayova	Azerbaijan National Academy of Sciences	A COMPARATIVE ANALYSIS OF HURUFISM: ON THE INVESTIGATION OF ORIENTALIST ELIAS GIBB

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04.04.2022 | HALL-6



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Dr. Miloudi Mohamed

Authors	Affiliation	Presentation title
Ehsanul Kabir Saman Hedjazi	Georgia Southern University, USA	IMPACT OF CYLINDER SIZE ON SURFACE ELECTRICAL RESISTIVITY
K. Sindhu Priya	Vels Institute of Science, India	Characterization of Carbon Nanoparticle with its antimicrobial and anticancer activity of few Aquatic plants
Benchettou oumaima Bentbib Abdeslam hafid Bouhamidi abderahman	University Littoral, Cote d'Opale, Calais, France University Cadi Ayyad, Marrakech, Morocco	An accelerated tensorial double proximal gradient method for total variation regularization problem
R. O. Anyasi H. I. Atagana J. O. Anyasi Raymond	University of South Africa, Florida, South Africa Tshwane University of Technology, Pretoria, South Africa	Enzymes and its effect in endophytes enhanced PAH-degradation in phytoremediation
J. O. Anyasi Raymond R. O. Anyasi M Ikpefua SC Ajah	Tshwane University of Technology, Pretoria, South Africa University of South Africa, Florida, South Africa	Impacts of water pollution in the environment
Dr. Miloudi Mohamed Dr. Miloudi Houcine Prof. Dr. Bendaoud Abdelber Dr. Benhadda Nassireddine Prof. Dr. Rami Abdelkader Dr. Gourbi Abdelkader	APELEC Laboratory, AZUR University, Algeria APELEC Laboratory, UDL University, Algeria ABB University, Algeria	CONTRIBUTION TO THE STUDY OF CONDUCTED ELECTROMAGNETIC EMISSIONS IN STATIC CONVERTERS CONNECTED TO AN ELECTRIC NETWORK
Anisha Cotta Priyanka Padiyar Varsha Turkar	Don Bosco College of Engineering, Holland	Phase-wise Assessment Criteria for Effective Implementation of Final Year Engineering Project
Arpita Das Showmen Saha	NIT, Durgapur, West Bengal, India	COMPARATIVE SIMULATION OF VARIOUS NANOCOMPOSITE CEMENT MATRIX
Dushyant Dr. Attiya Baqai	Mehran University of Engineering and Technology (MUET), Jamshoro Pakistan	DETECTION OF RESPIRATORY DYSFUNCTION WITH WEARABLE SENSOR USING TINYML
Khaled Athmani Abdelmalek Hasseine	University of Biskra, Algeria	Solution of two-component population balance equation for simultaneous growth and aggregation by Adomian decomposition Method

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05.04.2022 | HALL-1



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Prof. Dr. Radmila Janičić

Authors	Affiliation	Presentation title
Maria Ghani	Southwest Jiaotong University, Chengdu, China	DOES ECONOMIC POLICY UNCERTAINTY INFORMATION PASS ON THE STOCK MARKET VOLATILITY
Sintayehu Assefa Prof. Abebe Ejigu Dr. Gemechu Nemera	Arba Minch University, Ethiopia Mekelle University, Ethiopia	THE MODERATING ROLE OF ENTERPRENEURIAL ORIENTATION IN THE EFFECT OF ANTECEDENTS ON EXPORT PERFORMANCE OF TEXTILE AND GARMENT EXPORTING ENTERPRISES IN ETHIOPIA
Prof. Dr. Radmila Janičić	University of Belgrade, Serbia	Holistic Marketing in Sending Messages by Arts
Prof. Dr. Kalu O. Emenike	University of Eswatini, Kingdom of Eswatini	Linkages between Stock Markets in Southern Africa Custom Union before and during COVID-19 Pandemic
Małgorzata Zakrzewska	Cracow University of Economics, Poland	TOWARDS THE DEVELOPMENT OF THE CONCEPT OF SUSTAINABLE PROJECT MANAGEMENT
Ajit Mishra Swati Sharma	University of Bath, UK Institute of Economic Growth, Delhi	Breaking glass-ceiling for women using vertical ties: evidence from Indian garment manufacturing
Gvantsa Geliashvili	Caucasus International University, Georgia	THE STRATEGIC MANAGEMENT ISSUES AND CSR PRACTICES IN GEORGIA DURING COVID PANDEMIC
Małgorzata Kosala Małgorzata Zakrzewska	Cracow University of Economics, Poland	ATTITUDES OF STUDENTS IN THE CONTEXT OF DIGITAL COMPETENCES AND DISTANCE LEARNING
Dr. Ishrat Jahan	Galgotias University, UP, India	Where are Indian Women?
Sheraz Ahmad Choudhary	University of Sussex, Pakistan	IMPACT OF HEALTH INDICATORS ON ECONOMIC GROWTH: APPLICATION OF ARDL MODEL ON PAKISTAN'S DATA SET
Konyrbayeva Sarash Sahikyzy	Al-Farabi Kazakh National University, Almaty, Kazakhstan	ANALYSIS OF THE PEDAGOGICAL EDUCATION QUALITY IN HIGHER EDUCATION ON THE PROFESSIONAL TEACHER STANDARD BASIS

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05.04.2022 | HALL-2



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Prof. BLANCHET, Luiz Alberto

Authors	Affiliation	Presentation title
Vorya Shabrandi	University of Guilan University, Iran	Requirements for Transition and Changing Place of the Islamic Republic of Iran As the New Power of Emergence in the Post-American World
Alexsander SICHINAVA Dali SEKHNIASHVILI Irine MAMALADZE Nazi CHIKOIDZE	Georgian Technical University, Georgia	MOTIVES FOR FOREIGN DIRECT INVESTMENTS IN GEORGIA AND THEIR IMPACT ON THE ECONOMY
Katja Meško Kuralt	University of Maribor, Slovenia	THE IMPACT OF GENETICALLY MODIFIED ORGANISMS ON THE PROBLEM OF WORLD HUNGER
Prof. BLANCHET, Luiz Alberto	Pontifical Catholic University of Paraná	THE SPACES OF IDEOLOGY AND TECHNOLOGY IN CONFLICT RESOLUTIONS
Irene Ancelm Dr. L.R.K. Krishnan	VIT Business School, Chennai, India	Pandemic induced Work from home Disrupting Non Work Domain Elements
AKINNAWONU, Omotayo ABE, Oluwadamilola	Adekunle Ajasin University, Nigeria National Open University of Nigeria	Socio-Economic Impact of the N-power Scheme on the Beneficiaries in Okitipupa Local Government Area of Ondo State
Assoc. Prof. Michael A. Radin	Rochester Institute of Technology, School of Mathematical Sciences, New York, USA	Critical Factors to Innovations & Business Start Up – Introducing & Designing Our First Creative Idea

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05.04.2022 | HALL-3



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Prof. Dr. Cojocar Manole

Authors	Affiliation	Presentation title
Mirza Muhammad Faran Ashraf	<i>The University of Hong Kong</i>	DNA Nanotechnology for Modulating the Growth and Development of Neurons
Major Giurgiu Gheorghe Prof. Dr. Cojocar Manole	<i>Deniplant-Aide Sante Medical Center, Biomedicine, Bucharest, Romania Titu Maiorescu University, Faculty of Medicine, Bucharest, Romania</i>	Gut dysbiosis in dogs with spinal cord injury: Impact of Polenoplasmin
Dr. Binyam Zigta	<i>Wachemo University College of Natural and Computational Science, Ethiopia</i>	Effect of MHD Blood Flow with Velocity, Thermal and Concentration Slip Boundary Layer
Hilda. A. Emmanuel-Akerele	<i>Anchor University Lagos, Nigeria</i>	ISOLATION OF PLASTIC DEGRADING BACTERIA FROM DUMPSITES IN LAGOS
Dr. Osarumwense Peter Osarodion	<i>Ondo State University of Sciences and Technology, Nigeria</i>	Synthesis, anti-inflammartory activity of 3-amino 5-methoxyl-2-methyl quinazolin-4(3H)-one an amino-6-methoxyl-2-methyl of 4H-benzo[d] [1,3]-oxazine-4-one
Biljana Ilkovska Bisera Kotevska Trifunova	<i>Public Health Organization Clinical hospital"Dr. TrifunPanovski" – Bitola, North Macedonia. "Tokuda Hospital" – Sofia, Bulgaria</i>	DIFFERENCES BETWEEN LIVER ENZUMES IN HOSPITALIZED PATIENTS WITH DELTA ANDOMICRON VARIANT OF SARS-CoV-2 IN CLINICAL HOSPITAL BITOLA, MACEDONIA
Diah Ayu Istikhomah Isna Cahyani Dr. Ahmad fauzi M.Si	<i>Universitas An Nuur Jl. Gajahmada No. 07 Purwodadi, Indonesia</i>	UTILIZATION OF TRADITIONAL MEDICINE (HERBS) AS ALTERNATIVE MEDICINE
Aishat Sani Abubakar Siddiq Salihu Oumar Al-moubarak Adoum	<i>Bayero University, Kano. State, Nigeria Umaru Musa Yar'adua University, Katsina State, Nigeria</i>	EVALUATION OF LARVICIDAL ACTIVITY, PHYTOCHEMICAL SCREENING AND ISOLATION OF COMPOUND FROM Indigofera nummulariifolia LEAF EXTRACT
Abubakar Siddiq Salihu	<i>Umaru Musa Yar'adua University, Katsina State, Nigeria</i>	A study of the residual interactions of COX and its inhibitors using Molecular Docking and ADMET in silico predictions

(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.



Meeting ID: 878 3074 4465
Passcode: 060606

05.04.2022 | HALL-4



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Assoc. Prof. Hladko A. Maryna

Authors	Affiliation	Presentation title
Haider . Fayyadh . Alamiri	<i>University of kufa, Iraq</i>	Analytical study of some biomechanical variables and achievement of footprint in discus throwing for applicants
Vienny Balakrishnan	<i>Keningau Vocational College, Malaysia</i>	WHAT WE LEARNT FROM STUDENTS' AND TEACHERS' FEEDBACK ON HOME-BASED LEARNING
Dr. Musadhique Kottaparamban Muhammad Reazul Islam	<i>KING KHALID UNIVERSITY, SAUDI ARABIA</i>	From Nature to Culture: Theorizing Cooking as a Cultural Act
Assist. Prof. Negesse Gessese	<i>Bahir Dar University, Ethiopia</i>	MANY CHURCHES, MANY ETHNICITIES, ONE POOR COUNTRY: INSIGHTS FROM RELIGIOUS MEDIA PERSPECTIVE
Assoc. Prof. Hladko A. Maryna	<i>Minsk State Linguistic University, Minsk, Belarus</i>	RECREATION MULTIMODAL MODELS IN NEWS DISCOURSE
Nurgul Mukhanova	<i>The National Pedagogical University named after Abai, Kazakhstan</i>	MARK TWAIN AND HIS INDIVIDUAL STYLE
Iurii Ganushchak	<i>Adam Mickiewicz University in Poznan, Poland</i>	IMPACT OF THE COVID19 PANDEMIC ON THE INTERPERSONAL RELATIONS AND LANGUAGE IN THE POLISH IT INDUSTRY
Moses Adeolu AGOI Oluwakemi Racheal OSHINOWO	<i>Adeniran Ogunsanya College of Education, Lagos Nigeria</i>	THE DYNAMICS OF ARTIFICIAL INTELLIGENCE (AI) ON PRINCIPAL'S INSTRUCTIONAL DELIVERY
Tussupova Zhanara	<i>Institute of Philology and multilingual education, Kazakhstan</i>	CLASSIFICATION OF PUNS AND TRANSLATION TECHNIQUES

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05.04.2022 | HALL-5



New York Local Time: 10:00–12:30



Ankara Local Time: 17:00–19:30

HEAD OF SESSION: Faruk Galyon

Authors	Affiliation	Presentation title
Faruk Galyon Ayla Ünver Alçay	Istanbul Aydin University, Turkey	MICROPLASTICS, NANOPLASTICS IN FISHERY PRODUCTS AND THEIR DETECTION, IDENTIFICATION AND QUANTIFICATION METHODS
Salih TASCI Asina Kübra ASLAN Ash DOKUCU Unal DOKUCU Murat TAVLASOGLU Eren ADIGUZEL	Metropolitan Municipality, Turkey Republic of Turkey Ministry of Energy and Natural Resources, Turkey Nazilli Municipality, Turkey Uludag University, Turkey Bilgi Hospital, Turkey Performance Building Company, Turkey	ASSESSMENT OF CLIMATE CHANGE AWARENESS AT THE LOCAL LEVEL: THE EXAMPLE OF ANKARA
Yasemin Konukçu Pelin Yantur	Istanbul Yeni Yuzyil University, Turkey	GREEN ECONOMY AS A MATTER OF STRATEGIC MEASURE
Işlay Sezen ERMİŞ Engin DEVECİ İlhan ÖZDEMİR	Harran University, Turkey Dicle University, Turkey Atatürk University, Turkey	Evaluation of the effect of Stem Cell Therapy on Infertility
Işlay Sezen ERMİŞ Engin DEVECİ İlhan ÖZDEMİR	Harran University, Turkey Dicle University, Turkey Atatürk University, Turkey	Histopathological and immunohistochemical examination of changes in the bladder in spinal cord injury
Abdullayeva Təranə Qeyis qızı İbrahimova Xoşqədəm Qonaq qızı	Azerbaijan State Pedagogical University	MODEL OF DEVELOPING EDUCATION IN BIOLOGY TEACHING AND ITS COMPONENTS
Esat Doci Enes Altıok Eva Shaipi	Adnan Menderes University, Turkey Adnan Menderes University, Turkey Universiteti Politeknik I Tiranes, Gramsh Elbasan, Albania	MEASURING THE FINANCIAL FAILURE OF COMPANIES IN THE WHOLESALE RETAIL SECTOR TRADED ON BORSA ISTANBUL
Burak KOÇAK	Kahramanmaraş Sutcu Imam University, Turkey	The Effect of Role Defense Industry Turkey on the Economy of the Countries
Kubra Yazici Aysegül Hanımın	Yozgat Bozok University, Turkey Ataturk Horticultural Central Research Institute, Turkey	A LITERATURE REVIEW ON DAHLIA SPP. (KNOWN AS STARFLOWERİN TURKISH NAME); EXAMPLE OF TURKEY
Nursel İŞÇİMEN	Trakya University, Turkey	DATA SECURITY IN ASYMMETRIC ENCRYPTION AND GENERAL NUMBER-FIELD SIEVE (GNFS)
Dr. Begümhan Turgut		MARKET TRENDS OF THE GLOBAL WEARABLE TECHNOLOGIES

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DEVELOPMENT OF OZONE EFFECTING SYSTEM WITHOUT USING HARMFUL
CHEMICALS

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Abstract

Recently, new bleaching methods are developed and presented as an eco-friendly alternative for the traditional bleaching processes. Traditional bleaching chemicals such as sodium hypochlorite, potassium persulfate, potassium permanganate, hydrogen peroxide, sodium perborate, sodium percarbonate and benzoyl peroxide is harmful to human health and the environment. In this study, new eco-friendly and sustainable denim bleaching processes are developed. Given effects in traditional denim bleaching can be given with ozone gas and without any harmful chemicals. Textile washing and giving effect process is provided by using only ozone with different techniques without using any harmful chemicals. Ozone as for that, is a compound consisting of three oxygen atoms and has a higher energy than atmospheric oxygen. Ozone is an oxidative substance and its redox potential is higher than that of hydrogen peroxide. Thanks to this oxidation property of ozone gas indigo molecules of denim fabric are degraded quickly. In terms of both technical and visual aspects, successful results have been obtained according to the traditional method in ozone technology. Technical specifications and visual designs of products between traditional bleaching and ozone bleaching were compared. It has been proven that ozone bleaching application significantly destroys the amount of potassium permanganate compared to the traditional method. Traditional bleaching wastewater have very dark colors while ozone bleaching effluents are light colored. The energy requirement for a product in traditional bleaching is about 1.11 kW, and the energy requirement for ozone bleaching is 0.8 kW. This new method energy consumption is reduced by 27%. The water consumption of a product in traditional bleaching is about 60 liters, and the water consumption in ozone bleaching is 28 liters. Thus, it was observed that water consumption decreased by 53%.

Key words: Denim Bleaching, Ozone, Giving Effect

**DETERMINING THE QUALITY INDEX OF ONLINE SHOPPING WEBSITES BY USING
FUZZY LOGIC**

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Abstract

Online shopping is a platform of e-commerce allowing consumers to purchase goods or services directly from a seller over the Internet using a web browser or a mobile application. Due to Covid-19 pandemic, almost every person has started to spend time at home and preferred e-shopping instead of physical shopping. A practical, applicable, easily updated and effective measurement of the quality of e-shopping sites can make a positive contribution both for customers to make the right choice and for companies to evaluate their positions. In this study, we develop an inference system in fuzzy environment to quantitatively describe the service quality of online shopping websites. The proposed system consists of four sub-fuzzy and one main Mamdani-type inference systems. The inputs for the main fuzzy inference system are considered as cargo and delivery performance, customer support and campaign performance, ease of payment and return, interface quality, and privacy-security. On the other hand, the first sub-fuzzy system, whose inputs are Quality of Shipping the Products, Quality of Order Tracking System, and Delivery Speed of the Products, provides inferences for cargo and delivery performance. The second sub-system is formed for customer support and campaign performance where there are two inputs. The third sub-system gives similarly an output about the ease of payment and return with two inputs. In the fourth system, evaluation of the interface quality of e-shopping sites is carried out, which includes four inputs. Finally, a quality index for online shopping website is determined by entering the values of sub-fuzzy systems and privacy-security to the main fuzzy inference system. In addition, a survey is applied for verifying and supporting the study. In this survey, information about preferred online shopping sites is requested in order to obtain the input values in fuzzy systems.

Keywords: Fuzzy Inference System; Online Shopping; Quality index

**PRODUCTION AND CHARACTERIZATION OF Cu-Cr-B₄C-CNF HYBRID
COMPOSITES BY POWDER METALLURGY METHOD**

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Abstract

In recent years, copper has been widely used in industrial applications due to its high electrical and thermal conductivity and ease of production. However, its relatively low hardness, low strength and low wear resistance limit its extensive applications. These disadvantages can be overcome by integrating ceramic reinforcements such as oxides, carbide borides and carbon fiber into the copper matrix. The inclusion of ceramic particle reinforcement can significantly improve the high temperature mechanical property and wear resistance without severe deterioration in the thermal and electrical conductivity of the matrix. Recently, great attention has been paid to the synergistic reinforcement of metal matrix composites (MMC) with hybrid reinforcement. Hybrid reinforcements consisting of two or more reinforcements have been shown to significantly improve the mechanical properties of MMKs compared to those strengthened with a single reinforcement. Hybrid composites are considered as promising materials that can be used in industry due to their outstanding properties such as conductivity, thermal conductivity, no friction, wear resistance and low thermal expansion. In this study, the microstructure and mechanical properties of Cu-Cr-B₄C-CNF hybrid composites produced by powder metallurgy were investigated. While the microstructural properties of the samples were examined by optical, SEM-EDS and XRD analyses, hardness properties were also investigated. The microstructure results showed that the reinforcement elements were distributed relatively homogeneously in the copper matrix. Cu, CrB₂, Cr₂B₃ and C phases were detected in the microstructure. The hardness of the composite increased with the addition of reinforcement. The maximum value of CNF was reached at 1%, and after this CNF ratio, a very small decrease in the hardness value occurred.

Keywords: Powder metallurgy, copper, hybrid composites

INTRODUCTION

Copper is the first metal used by humans and the second metal to come after iron in terms of use throughout the ages. It was found in the prehistoric period and is thought to have been used earlier than about 5000 BC. The reasons why copper, whose chemical symbol is "Cu", has remained as the most important engineering material until today; their high corrosion resistance, excellent electrical and thermal conductivity, attractive appearance, high ductility and ease of forming. Pure copper is widely used in the transmission of electric current in cables, wires, electrical contacts and other electrical work related places. Copper and some of its alloys are used in automobile radiators, heat exchangers, home heating systems, panels for solar energy absorption, and applications where heat is required to transmit heat quickly from one point of the metal to another (ASM Handbook, 1990).

Despite copper's high electrical and thermal conductivity and good corrosion resistance, its properties such as low hardness, yield strength and creep strength limit the usage area of copper.

Pure copper is a material with a thermal conductivity of 400 W/m.K, a yield strength of 390 MPa and a tensile strength of 490 MPa. Because, even if pure copper is hardened by cold forming, it recrystallizes at temperatures close to 500 °C and thus loses its strength quickly. Copper with good electrical conductivity as well as high strength can be produced by alloying. However, since it is not desired to decrease the electrical conductivity too much, the alloying elements to be added to pure copper are only in the order of 2%. Although these added alloying elements (Cr or Zr) impart a high hardness value to copper with precipitation hardening, they quickly dissolve in copper at high temperatures and lose their properties (Correia et al., 1997). In order to overcome this problem, copper composites are produced by adding carbide, oxide and ceramic particles to copper. The electrical and thermal conductivity of copper and the excellent mechanical wear and erosive wear properties of the reinforcing element at high temperatures constitute the properties of copper composites. Generally, WC (Deshpande and Lin, 2006; Zhao et al., 2004), SiC (Tiong and Lau, 2000; Efe et al., 2011; Efe et al., 2012), TiC (Akhtar et al., 2009; Buytoz et al., 2014) and Al₂O₃ (Upadhyaya and Upadhyaya, 1995; Ritasalo et al., 2011) are used as reinforcement elements. In addition, nanoparticles such as carbon nanotubes (Dong et al., 2001) and graphene (Gao et al., 2016) are added to copper matrices.

Thanks to their improved properties, hybrid composites are second-generation composites that have the potential to replace single-reinforced composites (Singh and Chauhan, 2016). Hybrid composites generally consist of two main components – the base material, the matrix, and the two or more reinforcements, both tailored to the applied load offered by the manufacturing techniques (Seshan et al., 1996). Hybrid reinforced processes containing two or more reinforcing particles are physically and chemically evenly distributed over the basic matrix, providing better rigidity, strength, and premature failure of mechanical parts under tension (Yanming and Zehua., 2000; Gibson, 2010; Alaneme et al., 2013).

In this study, reinforcement materials such as copper matrix and boron carbide, chromium, carbon nanofiber were chosen as composite materials. It is considered that copper-based materials can be widely used in many industrial applications due to their high wear resistance and friction ductility, remarkable corrosion resistance, as well as self-lubricating properties such as plain bearings, sleeves, brushes and other components. The microstructure and hardness properties of the produced hybrid composite materials were experimentally investigated in detail.

MATERIALS AND METHODS

In this study, Cu was used as matrix and B₄C, Cr and CNF were used as reinforcement. Different proportions of Cr, B₄C and CNF were added to Cu. Table 1 shows the powder mixing ratios. The powders were mixed with a Retsch PM 100 model mechanical alloying device at 400 rpm for 2 hours. In the mixing process, 100Cr6 balls with a diameter of 10 mm were used and the powder ball ratio was chosen as 1:5. In order to prevent cold welding and burning of the powders, 2% citrate was added to the powder mixture before mixing. Mechanically alloyed powder mixtures were pressed in a hydraulic press at 400 MPa pressure, and samples with a diameter of 20 mm and a height of 10 mm were produced. Samples in the form of green pellets were sintered at 900 °C for 2 hours in an argon atmosphere in a high temperature tube furnace. The produced samples were sanded on 320-2400 mesh sandpaper and polished using a 1 micron diamond solution for microstructure analysis. The polished samples were etched in 100 ml distilled water + 25 ml hydrochloric acid + 8 g iron (III) chloride solution. Microstructural analysis and phase formation were performed by X-ray diffraction (XRD) and scanning electron microscopy (SEM) and energy dispersive spectrometry (EDS) analyses. The hardness of the samples was measured with Qness Q250 M hardness device under 62.5 kgf load and using 2.5 mm balls as Brinell according to TS EN ISO 6506-1 standard (TS EN ISO 6506-1 standard, 2014).

Table 1. Powder mixture ratios (% by volume)

No	Cu	B ₄ C	Cr	NF
1	100	0	0	
2	92	8	0	
3	90	8	2	
4	88	8	4	
5	86	8	6	
6	85	8	6	
7	84	8	6	
8	83	8	6	

RESULTS AND DISCUSSION

SEM photographs of hybrid composites produced by powder metallurgy are given in Figure 1. The matrix and the reinforcement elements are located in the microstructure of different colours. Cu matrix is light gray, B₄C is black and Cr is dark gray. It can be seen from the SEM photographs that the B₄C grains are homogeneously dispersed in the Cu matrix. Cr is relatively homogeneously distributed. Since CNFs are nano-sized, they could not be detected in the microstructure at small magnifications.

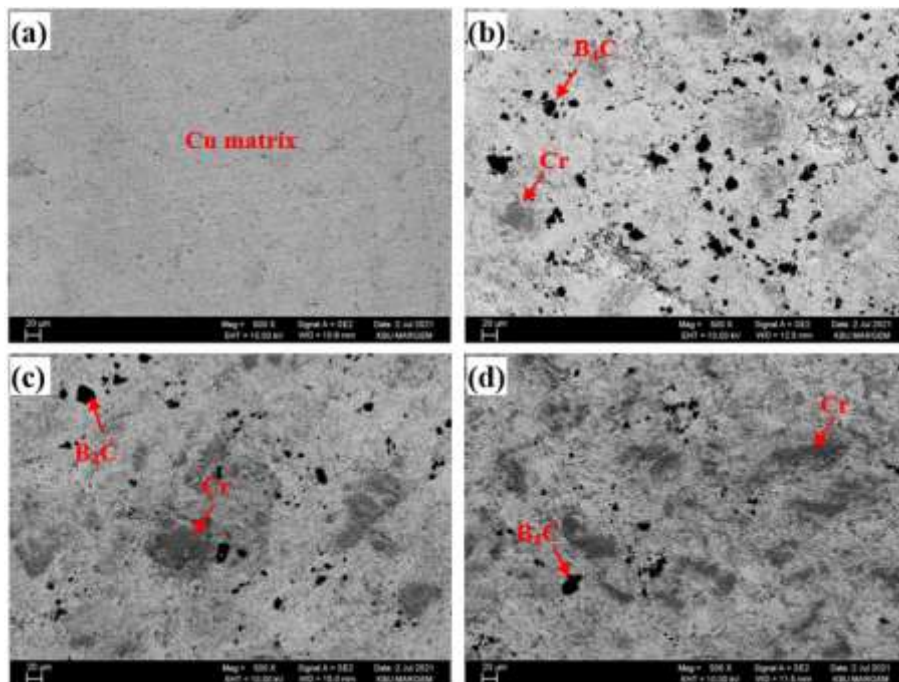


Figure 1. SEM images of samples: (a) Pure Cu, (b) Cu-8B₄C-2Cr, (c) Cu-8B₄C-6Cr and (d) Cu-8B₄C-6Cr-1CNF

XRD analysis graphs of the samples are shown in Figure 2. Cu phase is present in the Cu sample. The Cu phase was formed at 2-theta angles of 43.47°, 50.37°, 74.00° and 89.93°, respectively. When Cr, B₄C and CNF were added to the Cu, CrB₂ and Cr₂B₃ phases were formed in addition to the Cu phase. These phases have (001) and (131) crystal planes, respectively. In addition, the CrB₂ phase was formed at 29.10°, and the Cr₂B₃ phase at 45.42°.

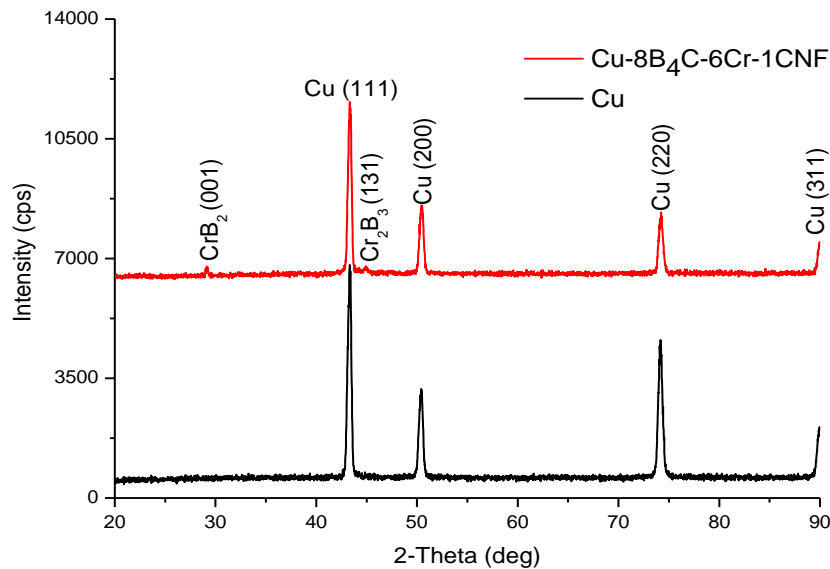


Figure 2. XRD analysis of samples

Figure 3 shows the hardness values of the samples. While the hardness of pure Cu (Sample 1) without additives was 47.1 HB, the hardness of Cu-8B₄C-6Cr-1CNF (Sample 6) was measured as 72.5 HB. For the 2% and 3% values of CNF, there was a decrease in hardness compared to the 6th sample.

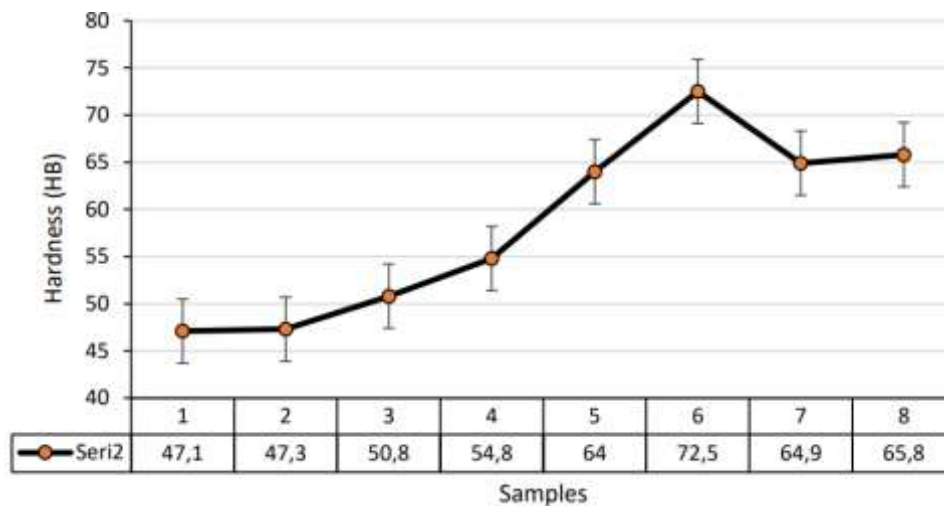


Figure 3. Hardness graph of samples

CONCLUSIONS

1. Cu-matrix hybrid composites have been successfully produced using the PM method.
2. SEM photographs showed that the reinforcing elements except CNF were partially distributed homogenously, and CNF could not be seen at small magnifications. According to XRD analysis, binary intermetallic phases and copper phase were detected in the structure.
3. An increase in the hardness values of the samples up to the 6th sample and then a partial decrease occurred. Sample 6 has the highest hardness, with a hardness value of 72.5 HB.

REFERENCES

- Akhtar, F., Askari, S. J., Shah, K. A., Du, X., & Guo, S. 2009 Microstructure, mechanical properties, electrical conductivity and wear behavior of high volume TiC reinforced Cu-matrix composites. *Materials characterization*, 60(4), 327-336.
- Alaneme, K. K., Akintunde, I. B., Olubambi, P. A., & Adewale, T. M. 2013 Fabrication characteristics and mechanical behaviour of rice husk ash–Alumina reinforced Al-Mg-Si alloy matrix hybrid composites. *Journal of Materials Research and Technology*, 2(1), 60-67.
- ASM Handbook: Properties and Selection: Nonferrous Alloys and Special-Purpose Materials, Vol.2, 10th ed., 1990.
- Buytoz, S., Dagdelen, F., Islak, S., Kok, M., Kir, D., & Ercan, E. 2014 Effect of the TiC content on microstructure and thermal properties of Cu–TiC composites prepared by powder metallurgy. *Journal of Thermal Analysis and Calorimetry*, 117(3), 1277-1283.
- Correia, J. B., Davies, H. A., & Sellars, C. M. 1997 Strengthening in rapidly solidified age hardened Cu-Cr and Cu-Cr-Zr alloys. *Acta Materialia*, 45(1), 177-190.
- Deshpande, P. K., & Lin, R. Y. 2006 Wear resistance of WC particle reinforced copper matrix composites and the effect of porosity. *Materials Science and Engineering: A*, 418(1-2), 137-145.
- Dong, S. R., Tu, J. P., & Zhang, X. B. 2001 An investigation of the sliding wear behavior of Cu-matrix composite reinforced by carbon nanotubes. *Materials Science and Engineering: A*, 313(1-2), 83-87.
- Efe, G. C., Yener, T., Altinsoy, I., İpek, M., Zeytin, S., & Bindal, C. 2011 The effect of sintering temperature on some properties of Cu–SiC composite. *Journal of Alloys and Compounds*, 509(20), 6036-6042.
- Efe, G. C., Zeytin, S., & Bindal, C. 2012 The effect of SiC particle size on the properties of Cu–SiC composites. *Materials & Design (1980-2015)*, 36, 633-639.
- Gao, X., Yue, H., Guo, E., Zhang, H., Lin, X., Yao, L., & Wang, B. 2016 Mechanical properties and thermal conductivity of graphene reinforced copper matrix composites. *Powder Technology*, 301, 601-607.
- Gibson, R. F. 2010 A review of recent research on mechanics of multifunctional composite materials and structures. *Composite structures*, 92(12), 2793-2810.
- Ritasalo, R., Liua, X. W., Söderberg, O., Keski-Honkola, A., Pitkänen, V., & Hannula, S. P. 2011 The microstructural effects on the mechanical and thermal properties of pulsed electric current sintered Cu–Al₂O₃ composites. *Procedia Engineering*, 10, 124-129.
- Seshan, S., Guruprasad, A., Prabha, M., & Sudhakar, A. 1996 Fibre-reinforced metal matrix composites--a review. *Journal of the Indian Institute of Science*, 76(1), 1.
- Singh, J., & Chauhan, A. 2016 Characterization of hybrid aluminum matrix composites for advanced applications–A review. *Journal of Materials Research and Technology*, 5(2), 159-169.
- Tjong, S. C., & Lau, K. C. 2000 Tribological behaviour of SiC particle-reinforced copper matrix composites. *Materials Letters*, 43(5-6), 274-280.
- TS EN ISO 6506-1:2014. “Metallic materials - Brinell hardness test - Part 1: Test method”, TSE, Ankara, Türkiye.
- Upadhyaya, A., & Upadhyaya, G. S. 1995 Sintering of copper-alumina composites through blending and mechanical alloying powder metallurgy routes. *Materials & Design*, 16(1), 41-45.
- Yanming, Q., & Zehua, Z. 2000 Tool wear and its mechanism for cutting SiC particle-reinforced aluminium matrix composites. *Journal of materials processing technology*, 100(1-3), 194-199.
- Zhao, N., Li, J., & Yang, X. 2004 Influence of the P/M process on the microstructure and properties of WC reinforced copper matrix composite. *Journal of materials science*, 39(15), 4829-4834.

CHARACTERIZATION OF Mo_5SiB_2 BASED SiC REINFORCED COMPOSITES

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Abstract

In fields such as power generation and aerospace, Ni-based superalloys have reached their physical limits in terms of maximum operating conditions temperature (~ 1200 °C) approaching 90% of the melting point. Today, Mo-Si-B alloys are extremely popular materials for high temperature applications. Since molybdenum-based materials have some characteristic properties such as high melting point, high strength, creep strength and oxidation resistance, these alloys are widely used in the above-mentioned applications. Mo_xSi_y is a binary alloy refractory compound and therefore has excellent strength at elevated temperatures. To the best of our knowledge, Mo-Si-B alloys are leading candidates for next-generation high-temperature structural materials due to their potential to increase the current temperature. Mo_5SiB_2 -based new generation materials have a high potential to replace Ni-based superalloys. In this study, Mo_5SiB_2 based composite materials were produced using powder metallurgy (PM) process. First of all, Mo_5SiB_2 matrix was obtained by mechanical alloying procedure. SiC was used as a reinforcement element to increase the strength of the matrix. In this study, 2, 4, 6 and 8 vol% SiC ratios were chosen. It is aimed to investigate the microstructure and hardness properties of these composites. X-ray diffraction (XRD) and scanning electron microscopy (SEM-EDS) were used to characterize the microstructures of the composites. Hardness measurements were made with a microhardness measuring device. SEM photographs showed that a porous structure was formed as a microstructure. Studies in the literature confirm this. According to XRD results, α -Mo, Mo_5SiB_2 and Mo_3Si phases were formed in the microstructure. The highest hardness was determined at 6% SiC.

Keywords: Mo_5SiB_2 , SiC, powder metallurgy

INTRODUCTION

High temperature resistant materials are widely used for critical elements in many industries such as power generation and chemical based processes. Higher efficiency is achieved by increasing the temperature and pressure. Continuous innovations are made in compositions, coating procedures and manufacturing in the gas turbine industry to reduce the permanent damage of corrosion (Rapp, 2011). Super alloys, which are high temperature alloys, contain elements such as niobium, titanium, chromium, aluminium, vanadium, tantalum, zirconium, hafnium for oxidation resistance. It also contains other elements added as gamma prime formers. These precipitate gammas prime intermetallic compounds, strengthening the matrix of materials. Hydrogen will form hydrides in the case of zirconium, titanium, tantalum, niobium and hafnium and will cause hydrogen embrittlement in super alloys. Carbides reduce the amount of gamma primary precipitates. Therefore, carbon is not desired in these materials. Zirconium, aluminium, hafnium, titanium and their oxides cannot be reduced with either hydrogen or carbon. In most cases, argon or vacuum is preferred (Banerjee and

Joes, 2019). Figure 1 shows the conversion of gas turbine materials for maximum operating temperatures.

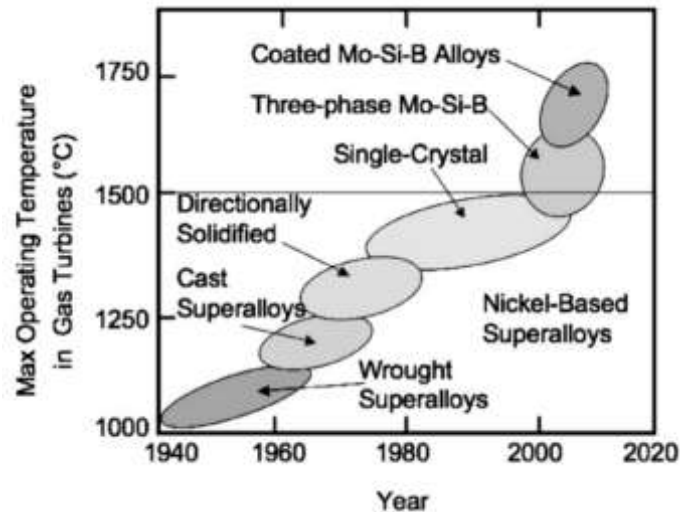


Figure 1. The conversion of gas turbine materials for maximum operating temperatures (Jackson et al., 2007).

Nickel-based super alloys are used in gas turbine engines. These materials must withstand oxidation and hot corrosion under corrosive conditions (Patarini et al., 1979; Ma et al., 2013; Eliaz et al., 2002). Ni-based superalloys can function up to a maximum operating temperature of 1200°C. This operating temperature corresponds to approximately 90% of the melting point of these alloys (Meyer et al., 1996; Perepezko, 2009; Lemberg and Ritchie, 2012; Alur et al., 2004).

Mo-Si-B based alloys are extremely popular materials for high temperature applications. Thanks to these alloys, the operating temperature of the turbine will increase and thus fuel efficiency will increase (Makineni et al., 2018). In this study, Mo-based composite materials were produced using the powder metallurgy (PM) process. SiC was used as a reinforcing element to increase the strength of the matrix. As the matrix, the basic element is Mo, the others are Si and B elements. It is aimed to investigate the microstructure and hardness properties of this material.

MATERIALS AND METHODS

Mo, Si and B powders were weighed on precision scales at the ratios of 92%, 5% and 3% by weight, respectively, and zinc citrate was added at a rate of 1.5% by weight and mechanically alloyed at 10:1 ball-to-powder ratio. There are different times in the literature as mechanical alloying time, 5 hours was chosen here and 350 rpm was chosen as the mixing speed. In mixing, straight mixing for 1 hour, then reverse mixing was performed for 1 hour. The mixing process was carried out using a Retsch PM 100 brand and model mechanical alloying device. In the mixing process, 10 mm diameter 100Cr6 steel balls were used as balls. 2, 4, 6 and 8 wt% SiC was added to the prepared Mo-Si-B matrix and mixed for 45 minutes in the turbule. 0, 2, 4, 6 and 8 % SiC doped samples were named as M0S, M2S, M4S, M6S and M8S, respectively. The mixed powders were pressed as samples with a diameter of 13 mm in a Specac brand cold pressing press. A pressure of 400 MPa was applied as the pressing pressure. Then, the green pellet samples were sintered for 2 hours at 1675 °C in argon atmosphere in a high temperature tube furnace.

Microstructural analysis and phase formation were performed by X-ray diffraction (XRD) and scanning electron microscopy (SEM) and energy dispersive spectrometry (EDS) analyses. Hardness testing is a fundamental mechanical test for material properties used in engineering designs, structural analysis, and material development. In this study, Vickers microhardness measurements

(Hv) were made on SHIMADZU HMV-G21 model microhardness device using 2 kg load and the time was determined as 16 seconds.

RESULTS AND DISCUSSION

XRD analysis chart is given in Figure 2. In the mechanical alloying process, some of the large impact kinetic energy was converted to the surface energy of the mixed powders. The surface energy of the mixed powder increased after MA. In the microstructure, α -Mo, Mo_5SiB_2 (T2) and Mo_3Si (A15) phases were formed. With the sintering temperature exceeding 1400 °C, diffusion between Mo-Si-B systems leads to complete conversion of elemental molybdenum. By increasing the temperature to 1600 °C, the peak density of Mo_5Si_3 decreases, while the peak density of Mo_3Si and Mo_5SiB_2 increases. Moreover, the diffusion distance of Si has increased due to the porous microstructure, making it difficult to achieve composition homogenization in such a short time.

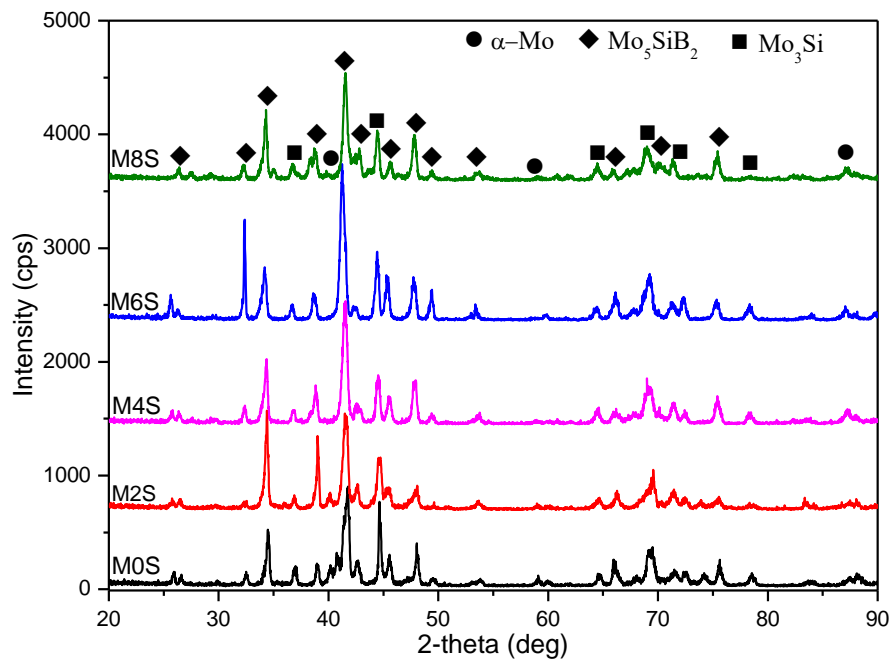


Figure 2. XRD analysis

Representative micrographs of the samples are given in Figure 3. Depending on the increasing amount of SiC, SEM photographs are shown in Figure 3a-e. The porosity is remarkable in the samples. The light-colored phase is the α -Mo phase. Mo_3Si and Mo_5SiB_2 phases are dissolved in the α -Mo main phase. With the increase in the amount of SiC carbide, the amount of Si in the alloy increased and the structure of the continuous mesh Mo phase became discontinuous. Li et al. investigated the microstructure and tribological properties of Mo-Si-B alloy depending on the amount of Si and B. They reported that the α -Mo continuous phase became discontinuous with the increasing Si and B ratios in the microstructure they obtained (Li et al., 2019).

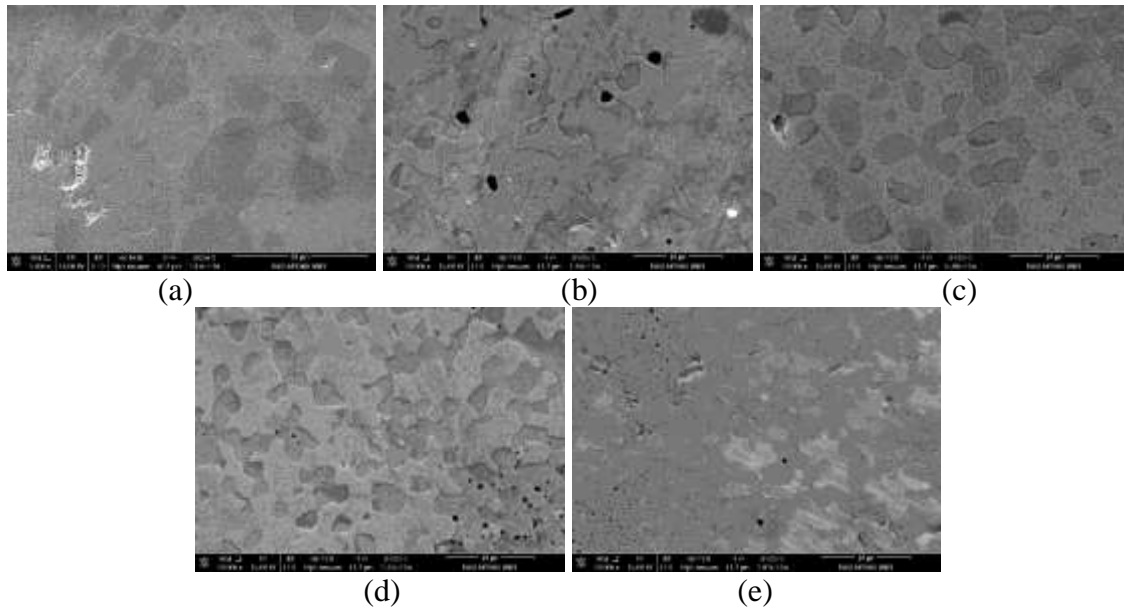


Figure 3. SEM images: (a) M0S, (b) M2S, (c) M4S, (d) M6S and (e) M8S

The microhardness variation of 5 samples depending on the amount of SiC is given in Figure 4. As SiC decomposed and the formed Si element reacted with Mo and B to form intermetallic phases, there were significant increases in hardness. The highest hardness was achieved with 1639 HV₂ value at 6% SiC additive. The hardness of the sample without additives was measured as 1446 HV₂. There was an increase of approximately 13% compared to the unadulterated sample. A significant decrease in hardness occurred with 8% SiC additive. This can be explained by the fact that the presence of high SiC negatively affects sintering.

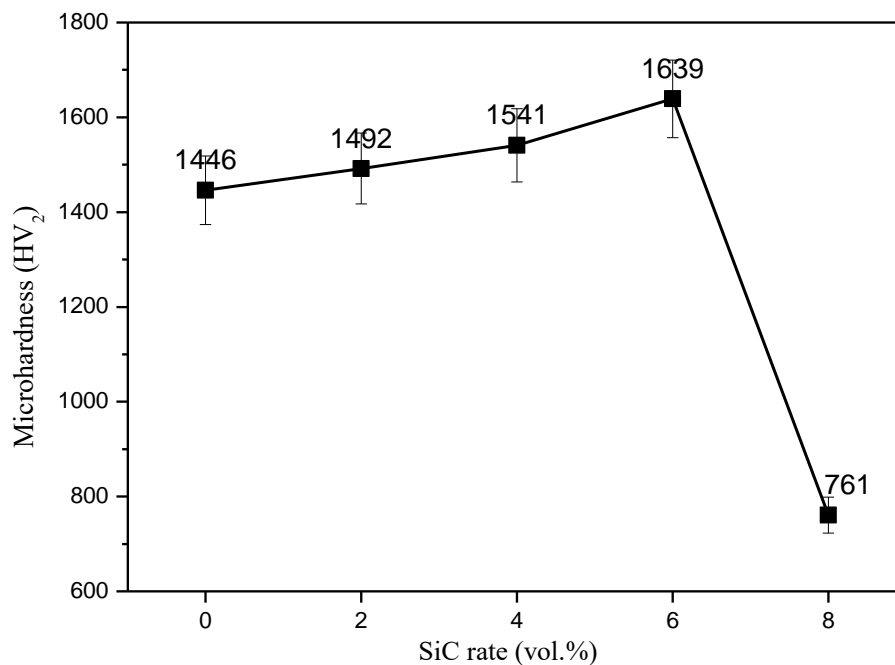


Figure 4. Hardness graph of samples

CONCLUSIONS

1. XRD analysis results showed that α -Mo, Mo₃Si and Mo₅SiB₂ phases were formed in the microstructure and as the SiC ratio increased, the intensities of Mo₃Si and Mo₅SiB₂ phases increased.
2. From the SEM photographs, Mo₃Si and Mo₅SiB₂ phases dissolved in the α -Mo phase can be seen in the microstructure. In addition, there is the formation of pores.
3. The hardness of the alloy increased significantly thanks to the double and triple intermetallic phases formed with the increase of the SiC amount.

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REFERENCES

- Alur, A. P., Chollacoop, N., & Kumar, K. S. (2004). High-temperature compression behavior of Mo–Si–B alloys. *Acta Materialia*, 52(19), 5571-5587.
- Banerjee, S., & Joens, C. J. (2019). Debinding and sintering of metal injection molding (MIM) components. In *Handbook of metal injection molding* (pp. 129-171). Woodhead Publishing.
- Eliaz, N., Shemesh, G., & Latanision, R. M. (2002). Hot corrosion in gas turbine components. *Engineering failure analysis*, 9(1), 31-43.
- Jackson, J. E., Olson, D. L., Mishra, B., & Lasseigne-Jackson, A. N. (2007). Deposition and characterization of Al–Si metallic TBC precursor on Mo–Si–B turbine materials. *International journal of hydrogen energy*, 32(16), 3789-3796.
- Ma, J., Jiang, S. M., Gong, J., & Sun, C. (2013). Hot corrosion properties of composite coatings in the presence of NaCl at 700 and 900° C. *Corrosion science*, 70, 29-36.
- Makineni, S. K., Kini, A. R., Jäggle, E. A., Springer, H., Raabe, D., & Gault, B. (2018). Synthesis and stabilization of a new phase regime in a Mo-Si-B based alloy by laser-based additive manufacturing. *Acta Materialia*, 151, 31-40.
- Meyer, M., Kramer, M., & Akinc, M. (1996). Boron-doped molybdenum silicides. *Advanced Materials*, 8(1), 85-88.
- Lemberg, J. A., & Ritchie, R. O. (2012). Mo-Si-B Alloys for Ultrahigh-Temperature Structural Applications. *Advanced Materials*, 24(26), 3445-3480.
- Li, W., Ai, T., Dong, H., & Zhang, G. (2019). Tribological properties of Mo-Si-B alloys doped with La₂O₃ and tested at 293–1173 K. *Materials*, 12(12), 2011.
- Patarini, V., Bornstein, N. S., & DeCrescente, M. A. (1979). Hot corrosion of gas turbine components. *J. Eng. Power*. 101(1): 177-185
- Perepezko, J. H. (2009). The hotter the engine, the better. *Science*, 326(5956), 1068-1069.
- Rapp, R. A. (2011). Hot corrosion by fused salts. *Encyclopedia of Materials: Science and Technology*, 3834-3835.

ANALYTICAL DELAY MODEL OF BLOCKCHAIN SYSTEM

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Abstract

Recently; security has been an urgent requirement of 5G. There are many challenges resulted from a centralized authority. The central server can be bottleneck under an increase in the arrival requests. Point of failure is another challenge for the central authorization. These directly affect the delay in a response from a central server. To overcome these, blockchain handles secure systems in a decentralized manner by trusting computational work. It has three main parts as transaction, validation and adding blockchain. Firstly; there are producers and consumers that have a signed smart contract (transaction) by using an encryption algorithm. There can be more than one transaction in a block including a unique block id, hash value of the previous block, nonce value, timestamp, transactions signed by the pairs, and hash value of the whole block. Secondly; validation process is performed by using either Proof of Work (PoW), or Proof of Stake (PoS) algorithms as in Bitcoin and Ethereum respectively. In PoW, everyone can be a miner and it can change computational power to coin; whereas, in PoS, the validator is selected randomly according to offerings. Thirdly, the winner builds a block and broadcasts it to the system for adding into blockchains. According to the complexities of three parts, the delay of blockchain can be an unacceptable delay. Because the blocks may be built faster than the processing of them for validation in a blockchain. To estimate the delay of blockchain under different arrivals, the analytical model is proposed by using Queuing Theory. The analytical delay has been modeled into three parts considering processing, transmission, queuing, propagation delay. It is also differentiated according to using either PoW or PoS validation procedures to add a block in blockchain. In performance evaluation, the unacceptable level of delay in blockchain is also simulated by using MATLAB Simulink environment.

Keywords: Blockchain, Queuing Theory, Markov Model.

INTRODUCTION

Recently, the global mobile data traffic has been increased. According to Cisco's annual internet report, the global mobile data traffic is expected to grow 74% by 2021 (Cisco 2020). According to Ericsson mobility report, 5G is expected to account for the half of all mobile subscribers by 2027 (Ericsson 2021). Moreover, the cyberattacks have been increased on the next-generation applications led by economic growth. Therefore; under this tremendous increase on mobile data traffic, the security has been urgent requirement of 5G.

Most cloud applications in 5G such as Youtube, Netflix, Amazon, Office 365, etc. have been required the centralized authority for authentication and authorization procedures (Erel-Özçevik M and Canberk B, 2021). However, the central server can be bottlenecked under an increase in the arrival request or cyber-attack, which causes the point of failure. To overcome this challenge, blockchain has been handling for the distributed security requirement of 5G. It is an emerging technology for data security and privacy in such next-generation applications. It is implementable such several areas as Unmanned Aerial Vehicles (Wu et. al. 2021), Content Delivery Networks (Vu

et. al. 2019), Wireless Sensor Networks (Cui et al. 2020), Energy Trading (Wongthongtham et. al. 2021), Software Defined Networks (Pourvahab and Ekbatanifard 2019), etc.

Blockchain trusts computational work instead of centralized authority. It has three main parts named as transaction, validation and adding blockchain. According to the computational processes and the possible communicational overhead under increases arrival requests, the delay of blockchain cannot be under acceptable level for the 5G end-user. Because the blocks may be built faster than the processing of them for validation in a blockchain. The delay requirement of emerging applications in 5G should be under a few milliseconds. Therefore; to estimate the delay of blockchain under different arrivals, the analytical model of blockchain is proposed by using Queuing Theory where the whole contributions are given below:

- Transaction part is modeled by using the M/M/1 Markov model which shows the communication overhead between producers and consumers in a blockchain.
- Validation part is modeled by using the M/M/CK Markov model which shows the total arrival of transactions in a system with a serving rate of miner/validators changing according to validation types such as Proof of Work or Proof of Stake.
- Adding blockchain is modeled by using the M/M/1 Markov model which shows the processing of a winner/validator to add a validated block into blockchain and broadcasting it to the channel.

The rest of the paper is organized as follows. In section II, the background information about blockchain systems is given with network architecture. In section III, the proposed system model for the analytical delay of blockchain is detailed. In section IV, the performance evaluation of analytical delay is simulated on MATLAB. Finally, in section V, the paper is summarized and concluded with a future work.

BACKGROUND INFORMATION OF BLOCKCHAIN SYSTEM

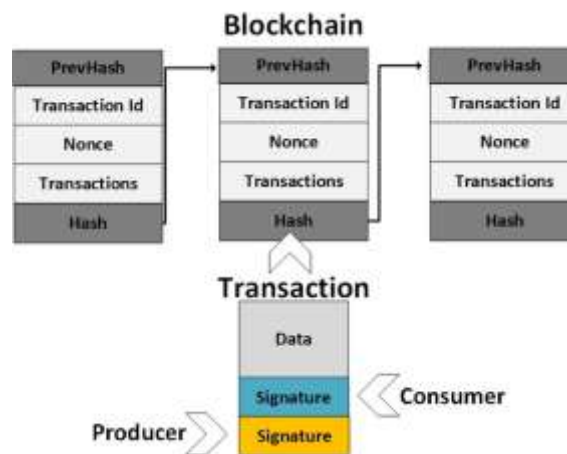


Figure 1. General Blockchain Architecture.

In Figure 1, the general architecture of blockchain based systems is given. The blockchain procedures includes three main parts named as transaction, validation and adding blockchain. In the first part; producers and consumers sign a smart contract which is newly called as a transaction. It includes the data and the signatures of the pairs. Therefore, the data cannot be changed in a transaction without the permission of the pairs. The privacy of data is handled by using smart contracts. In the second part, the transactions which builds blocks have unique id, temporary nonce value, the signed data, and hash of previous block. By running SHA-2 algorithm, the miners/validators try to validate transaction to add blockchain. There are two different validation method named as Proof of Work (PoW) and Proof of Stake (PoS). For example, Bitcoin uses PoW to validate the transaction blocks. Here, everyone can be a miner and it can change computational

power to coin. There are different degrees in validation procedure. The miner tries to find the unique combination that makes either four or two digits as 0 in the hash value of block. In this paper, the degree of PoW is considered as under degree 2 or 4. It is clear that the processing time for PoW where the degree is 4 takes higher than the other validation methods that considered in this paper. The first miner that finds the hash value making the first 4 digits is 0, is newly called winner. The winner adds this validated block into blockchain and it can alter its computational power with coin. The main contribution of this paper is trying the delay of blockchain system under acceptable level. Therefore, PoS is alternate validation method that is believed to keep delay under acceptable level. Because, there is validator instead of miner. Here, the validator is selected randomly according to their offerings. There is no need to change computational power to coin. Ethereum is one of the popular examples that uses PoS. According to different validations, the proposed analytical model is performed in performance evaluation. In the third part, the winner in PoW or randomly selected validator in PoS adds block into blockchain by broadcasting it to the network. The integrity of the data is handled thanks to these processes.

SYSTEM MODEL

The proposed analytical delay of blockchain is given as follows:

$$W_{Block}(t) = W_T(t) + W_V(t) + W_B(t) \quad (1)$$

It includes three parts named as Transaction, Validation and Adding Blockchain. Each part has processing, propagation, queuing and transmission delays for own procedures. They are detailed in the following subsections:

Transaction Delay

The Transaction Delay, $W_T(t)$ analytically models the procedure for smart contract signed between producers and consumers in a blockchain. Each block in a blockchain can include more than one transaction. Each transaction in a block stores a data which is signed by these pairs. A block has a unique block id, hash value of the previous block, nonce value, timestamp, data signed by the pairs, and hash value of the whole block. In the transaction part, the asymmetric encryption algorithm is run to sign the data. The malicious users in a network cannot decode the data without having the private keys of these pairs. Here, the processing delay is caused by running asymmetric encryption algorithm; whereas the propagation, transmission delays are caused by the communication between producer and consumer. Queuing delay is caused the arrival of transmission to the blockchain system. Under tremendous increase on the number of transactions, the Transaction Delay become worse for the end-users' QoS. Therefore, the processing time in transaction part is extremely important. To keep Transaction Delay in an acceptable level, there are many studies that try to accelerate the running of Secure Hash Algorithm (SHA-2) in the delay sensitive systems (Martino and Cilaro 2020).

The Transaction Delay is modeled by using M/M/1 where the queue size is infinite. The reason to use this Markov model for the assumption of infinite buffer sizes in producer and consumer during peer to peer communication. Therefore, it is calculated as follows:

$$W_T^j(t) = \frac{1}{\mu_T - \lambda_T} \quad , \quad \forall j \in \{\mathbf{producer} \rightarrow \mathbf{consumer}\} \quad (2)$$

where $\lambda_T(t)$ is the arrival rate of the transactions and $\mu_T(t)$ is the processing time in a producer/consumer to run asymmetric encryption algorithm. The load of the system is calculated as $\rho_T = \lambda_T / \mu_T$.

Accordingly, the total generated transactions for blockchain system is calculated as follows:

$$W_T(t) = \sum_j W_T^j(t) \quad (3)$$

By combining equations 2 and 3, the full formula of Transmission Delay can be shown as in equation 4 as follows:

$$W_T(t) = \sum_j \frac{1}{\mu_{Tj} - \lambda_{Tj}}, \quad \forall j \in \{\text{producer} \rightarrow \text{consumer}\} \quad (4)$$

Validation Delay

After the transactions are signed by the producers and consumers in their peer to peer communications, the transactions are stored in a block. These temporary blocks should be validated while adding to the blockchain based system. There are two different validation procedures named as Proof of Work (PoW) and Proof of Stake (PoS). In PoW, everyone can be a miner and it can change computational power to coin; whereas, in PoS, the validator is selected randomly according to offerings. For both cases, there are more than one miners to validate the block. Therefore, the Validation Delay is modeled by using M/M/C/K where the queue size (K-C) is large. The reason to use this model is that the system can be responsive also for the overloaded cases $\rho_v > 1$. In M/M/C/K queuing model, the arrival rate of the transactions is in Poisson and Geometric distributions for different cases such as $0 \leq n < C$ and $C \leq n < K$, respectively. By using L'Hospital rule on distribution function, the Validation Delay, $W_v(t)$ is modeled as follows (Shortle et.al. 2008):

$$W_v(t) = \frac{\rho_v \mu_m \left(1 - \frac{(\rho_v \mu_m)^K}{\mu_v^{K-\mu_m} \mu_m!} P_0 \right) + \frac{P_0 (\rho_v \mu_m)^{\mu_m} \rho_v}{\mu_m! (1 - \rho_v)^2} \cdot [1 - \rho_v^{K-\mu_m+1} - (1 - \rho_v)(K - \mu_m + 1)(\rho_v^{K-\mu_m})]}{\lambda_v \left(1 - \frac{(\rho_v \mu_m)^K}{\mu_v^{K-\mu_m} \mu_m!} P_0 \right)} \quad (5)$$

where $\lambda_v(t)$ is arrival rate of blocks for the validation, and $\mu_m(t)$ is the processing time of miners to validate the blocks. The load of the system is calculated as $\rho_v = \lambda_v / m \mu_m$ where the m is the number of miners. P_0 is also calculated as follows:

$$P_0 = \begin{cases} \frac{1}{\frac{r^{\{\mu_m\}}}{\mu_m!} \left(\frac{1 - \rho_v^{K-\mu_m+1}}{1 - \rho_v} \right) + \sum_{\{n=0\}}^{\{\mu_m-1\}} \frac{r^n}{n!}}, & \rho_T \neq 1 \\ \frac{1}{\frac{r^{\{\mu_m\}}}{\mu_m!} (K - \mu_m + 1) + \sum_{\{n=0\}}^{\{\mu_m-1\}} \frac{r^n}{n!}}, & \rho_T = 1 \end{cases} \quad \forall m \in \text{Miner} \quad (6)$$

where $r = \lambda_v / \mu_m$. The whole formula of $W_v(t)$ can be found by combining equations 5 and 6.

Adding Blockchain Delay

After the blocks are validated by a miner, the validated block is added to blockchain. It mainly outputs propagation delay for adding validated block in a chain and broadcasting blockchain to the whole system. Therefore, it is modeled by using M/M/1 Markov model where the queue size is infinite. The reason to use this Markov model for adding a block to blockchain is that the delay is

directly affected by the communication between the pairs in the blockchain system. Here, there is an assumption as infinite buffer sizes in the producers and consumers during peer to peer communication. The analytical formula is shown below:

$$W_B(t) = \frac{1}{\mu_j - \lambda_j}, \quad \forall j \in \{\text{producer } V \text{ consumer}\} \quad (7)$$

The whole analytical formula of blockchain system can be calculated by using equations 1,4,5,7 as follows:

$$\begin{aligned}
 &W_{Block}(t) \\
 &= \sum_j \frac{1}{\mu_{Tj} - \lambda_{Tj}} \\
 &+ \frac{\rho_v \mu_m \left(1 - \frac{(\rho_v \mu_m)^K}{\mu_v^{K-\mu_m} \mu_m!} P_0 \right) + \frac{P_0 (\rho_v \mu_m)^{\mu_m} \rho_v}{\mu_m! (1 - \rho_v)^2} \cdot [1 - \rho_v^{K-\mu_m+1} - (1 - \rho_v)(K - \mu_m + 1)(\rho_v^{K-\mu_m})]}{\lambda_v \left(1 - \frac{(\rho_v \mu_m)^K}{\mu_m^{K-\mu_m} \mu_m!} P_0 \right)} \\
 &+ \frac{1}{\mu_j - \lambda_j}, \quad \forall j, m \\
 &\in \{\text{producer } V \text{ consumer}\} \quad (8)
 \end{aligned}$$

Performance Evaluation:

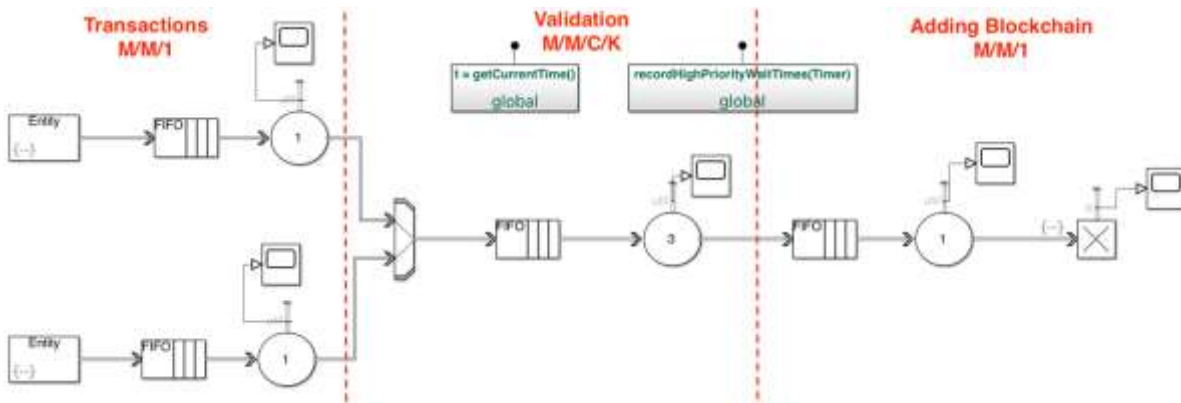


Figure 2. Performance Evaluation Environment in MATLAB.

As shown in Figure 2, the performance evaluation is run on MATLAB 2021 environment by using Simulink. The Jackson’s network is built by using M/M/1, M/M/C/K and M/M/1 based queuing systems. Here, two Simulink functions named as `getCurrentTime()` and `recordHighPriorityWaitngTimes()` are used to calculate timer of entity. The arrival rate of transactions and the serving rates of validators vary according to different transaction load in a system. The experimental setup details are shown in Table 1.

Table 1. Performance Evaluation Parameters.

Parameters		Values
Arrival Rate (λ_j)		1-1000
Number of Producer, Consumer (M)		4
Processing Time ($1/\mu_j$)	Producer/Consumer	0.005 second
	Miner/Validator for PoS	0.001 second
	Miner/Validator for PoW	1 second (degree=4) 0.1 second (degree=2)
Queue size (K-C)		100000

As shown in Figure 3, the Delay results are shown according to experimental analysis in MATLAB environment by using Simulink entities. By considering the proposed Markov model, the arrival transactions are served by transaction, validation and adding blockchain parts; respectively. As the arrival rate of transactions increases, the validation of blockchain is decisive part of the proposed analytical delay model. Here, three types of validation are used for the experimental analyzes such as PoS, PoW (degree=2) and PoW (degree=4). They are ordered according to the required processing for the validation. The processing times for the validations are given in Table 1. According to results, the experimental delay is acceptable under the arrival rate is 110 for the first two types of validation. The observed delay is not under a few millisecond levels for PoW (degree=4). Therefore, the model suggests that the blockchain should use either PoS or PoW (degree=2) instead of PoW (degree=4) when the arrival rate reaches the 100 transactions per second. In other words, the processing delay for PoW of miners/validators can be lower than 0.1 seconds by handling higher serving capability.

As shown in Figure 4, the utilization results for each parts of proposed Markov model in a blockchain are given according to different validation types. In Figure 4a, the blockchain is validated by using PoS. Accordingly, the utilization of transaction and adding blockchain parts are higher than validation part. The reason of that is the processing time in validation part is lower than the others. Under the arrival rate of transactions is 125, the system can add all transactions in a blockchain. However, when the arrival rate of transaction exceeds 125 level, the utilization of first part reaches to 1 which shows the load of server is higher than 1. Here, the transactions in a block is built faster than the processing of them for the validation in a blockchain. As seen in Figures 4b and 4c, there is no effect on the utilization rate in the transaction part while the validation method is changing. The types of validation directly affects the utilization in validation and adding blockchain parts in proposed Markov model. According to results, the validation part can serve the transactions under the arrival is 125, while the utilization of server in adding blockchain part is 1 for PoW (degree=2). As the degree of PoW is increased to 4 (namely, the security level of validating is increased to 4 digit in SHA-2 algorithm), the validation part is utilized full when the arrival rate is under 100. Here, there is too low utilization for adding blockchain because of the huge waiting times in validation parts.

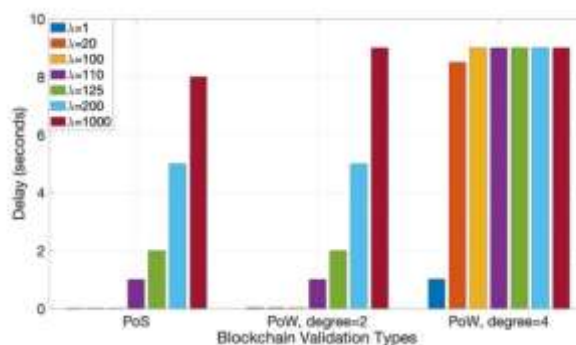
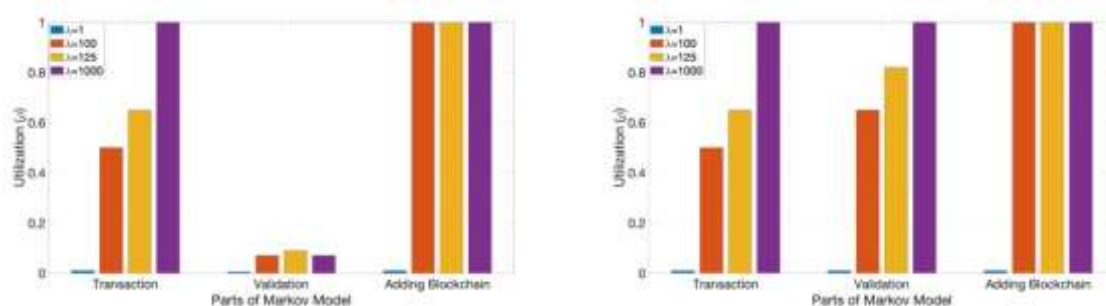
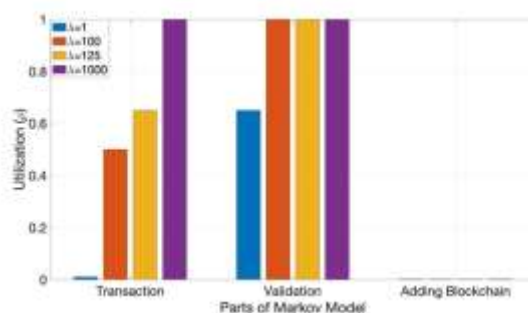


Figure 3. Delay results for different validation types of blockchain with experimental analysis in MATLAB.



(a) PoS is used for the validation.

(b) PoW (degree=2) is used for the validation.



(c) PoW (degree=4) is used for the validation.

Figure 4. Utilization results for each parts of proposed Markov model.

Conclusion

In this paper, the delay model of blockchain systems is analytically defined by using Queuing Theory. It has three main parts named as transaction, validation and adding blockchain. They are modeled by M/M/1, M/M/C/K and M/M/1 Markov models respectively. There are also various types of validation as PoS and PoW which directly affects the processing time in validation part. The markov model of whole system is build and analyzed by using Jackson's network. In performance evaluation, the proposed delay model is analyzed experimentally in MATLAB environment for the different arrival rates of transactions in a blockchain. According to results, the validation part is decisive in a blockchain delay model. The newly defined analytical model outputs that the blockchain should use either PoS or PoW (degree=2) instead of PoW (degree=4) when the arrival rate reaches the 100 transactions per second. As a future work, the proposed delay model of blockchain is considered for the different scenarios such as UAV networks etc.

References

- Cisco 2020. Cisco annual internet report (2018-2023). White paper, c11-741490, Cisco public, Tech. Rep..
- Ericsson 2021. Ericsson mobility report, tech. rep. eab-21:010887. Ericsson, Stockholm, Sweden, Tech. Rep.
- Erel-Özçevik M, Canberk B 2021. OFaaS: OpenFlow Switch as a Service for Multi Tenant Slicing in SD-CDN. IEEE Transactions on Network and Service Management, vol. 18, no. 1, pp. 362-373. doi: 10.1109/TNSM.2020.3045044.
- Wu Y, Dai H.N, Wang H. and Choo K.K.R 2021. Blockchain-Based Privacy Preservation for 5G-Enabled Drone Communications. IEEE Network, vol. 35, no. 1, pp. 50-56. doi: 10.1109/MNET.011.2000166.
- Vu T.X, Chatzinotas S. and Ottersten B 2019. Blockchain-based Content Delivery Networks: Content Transparency Meets User Privacy. IEEE Wireless Communications and Networking

Conference (WCNC), pp. 1-6, doi: 10.1109/WCNC.2019.8885904.

Pourvahab M. and Ekbatanifard G 2019. Digital Forensics Architecture for Evidence Collection and Provenance Preservation in IaaS Cloud Environment Using SDN and Blockchain Technology. IEEE Access, vol. 7, pp. 153349-153364. doi: 10.1109/ACCESS.2019.2946978.

Wongthongtham P, Marrable D, Abu-Salih B, Liu X, Morrison G 2021. Blockchain-enabled Peer-to-Peer energy trading. Computers & Electrical Engineering, vol. 94, ISSN 0045-7906, doi:10.1016/j.compeleceng.2021.107299.

Cui Z. et al. 2020. A Hybrid BlockChain-Based Identity Authentication Scheme for Multi-WSN. IEEE Transactions on Services Computing, vol. 13, no. 2, pp. 241-251, doi: 10.1109/TSC.2020.2964537.

Martino R. and Cilaro A 2020. SHA-2 Acceleration Meeting the Needs of Emerging Applications: A Comparative Survey. IEEE Access, vol. 8, pp. 28415-28436, doi: 10.1109/ACCESS.2020.2972265.

Shortle J.F., Thompson J.M., Gross D., Harris C.M. 2008. Fundamentals of Queueing Theory. John Wiley & Sons, doi:10.1002/9781119453765.

A GAME-BASED SOFTWARE ECOSYSTEM FOR VIRTUAL LABORATORY CONSTRUCTION

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Abstract

Game-based learning is an approach used to develop and reinforce a user's ability to apply any subject to the real world by using a computer game itself. In this approach, a computer game is a tool that aims to create an interaction between the physical environment and the digital world.

Educational computer games are versatile ecosystem that arouse people's interest and makes them actively participate in the learning process. Thus, a game-based learning approach can be seen as having the ability to teach permanently by stimulating different senses. For this reason, in this study, an application development ecosystem is proposed to provide educational packages by creating a virtual laboratory via software and graphics-based game model. The first step is to simulate a workshop and environments with some basic equipment for those studying in engineering. In this context, Unity game engine was utilized to create an interactive flow and support it with various effects. Moreover, 3D Blender software and the Unity Asset Store are used for the modeling of the digital environment and the objects contained in it.

As a conclusion, a digital workshop environment is developed that display and introduce the equipment included in the scenario. It was ensured that the user could freely navigate in the virtual workshops within the computer simulation game developed. It can be stated that, in such an environment, a user is able to learn new information or consolidate existing knowledge by accessing the informative content in the digital. Thus, one can easily adapt to the real-world assets by virtue of the visual and auditory components included in the simulation game flow. Moreover, it can also be argued that entertaining has the ability of increasing the permanence of the information gathered by an individual from such a digital environment.

Keywords: Unity, game-based learning, virtual laboratory.

INTRODUCTION

Game-based learning is one teaching strategies that are becoming increasingly popular to help people achieve their learning skills. In particular, people are developing their thinking skills more efficient and people are more motivated to learn with such an approach. There are many ways of game-based learning. One of them is constructed with video games. However, the implementation of this approach experiences a quite slow progress until the video game become popular. On the other hand, advancement of gaming technologies has let game-based approaches to be used in education instead of the traditional way. The illustration in Figure 1 shows the components of game-based learning in a computer-aided environment. Associating the concepts of learning, simulation and game have created new ways for education and every one of them have been the subject of research separately.



Figure 1. Game-based learning model in a computer-aided environment

There are many studies that reflect the opportunities of gamed-based education. According to Barab et al., computer simulation games can draw the attention of the students, allowing them to develop their cognition and experience along with the evolution of the games (2005). Similarly, Raessens and Goldstein assert that game-based multimedia learning elements are combined to enhance the attention of the students and foster their concentration, interest, creativity, and community relationships (2003). Kincaid et al., also advocate that the use of simulation in education definitely does make a difference (2003). McGonigal states that while students are less motivated by traditional classes, they are more often so in game-based settings (2011). The situation is also encountered in different level of engineering education at universities. Bodnar et al. (2016), Mesquida and Mas (2018) and Rondon et al. (2013) all argue that the use of game-based education in engineering can increase the participation, attitudes and motivation of the students. Moreover, they also state that such an approach is able to provide more interactive learning processes with immediate feedback to enhance the understanding of basic concepts and complex components through visual senses. In another study, García and Cano (2018) designed a 2D computer game in order to teach mathematical topics to engineering students. In their experimental study, they found that computer game increased the motivation, achievement and the degree of satisfaction of participants.

It is obvious that laboratory facilities are limited today, especially in engineering education. There are many experiments that are difficult to perform in real laboratories; there are hard-to-reach elements, tools and equipment, and laboratory materials are very expensive. Thus, the interaction of students with materials is limited in real-world laboratory settings. Moreover, the deterioration of any device or instrument poses a problem in the laboratory. As a consequence, participation rates in laboratory classes become low because there is not enough equipment for every student. Furthermore, It is also not possible for educators to follow everyone in the laboratory. For all these reasons, laboratory training cannot be provided in the desired ways. When we consider virtual laboratories, it is possible to mention many advantages such as degradation of equipment purchase or repair costs, performing complex and risky experiments, and active participation of people in hands-on learning. Moreover, in such a virtual laboratory environment, even abstract concepts can be embodied using visualization and software technologies, supporting learning with visual and auditory senses.

Considering the aforementioned motivations, in this study, a unified ecosystem is created in which students can interact virtual laboratory components based on software and graphics. Hence, a computer-aided environment is constructed for students to interact with an experimental apparatus or other activities via a computer interface.

THE PROPOSED MODEL

The proposed model consists of a virtual workshop targeting the education in engineering. For this purpose, a simulation game is constructed in which a gamer can learn about the materials by interacting them and then testing the information they have gained. It has been trying to ensure that the gamer can examine the materials and get detailed information about them by navigating the map with the virtual character.

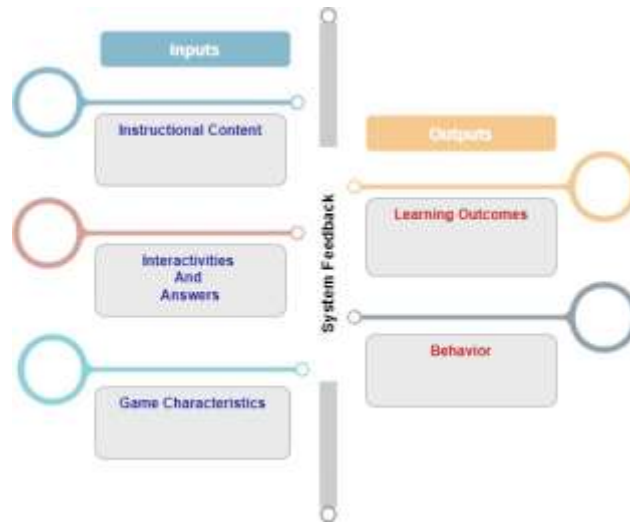


Figure 2. A model of simulation game elements in the computer-aided system

A model of simulation game elements is shown in Figure 2. The computer-aided system provides a link between the game and the real world. It supports learning through virtual experiences by establishing a relationship between game inputs and the real world. In such a model, system feedback corresponds to the learning process and forms an interactive model of learning.

The study focuses on the promotion of today's engineering tools in a game-based workshop environment. In the proposed simulation game, common engineering terms, materials, tools and hardware are introduced differently from the traditional teaching models. For this purpose, firstly, an orientation on the topics covered is provided, and then gamers are encouraged to evaluate their knowledge by taking small quizzes about the materials. In case of failure, it has been ensured that the educational process can be repeated by retry mechanism. In the proposed model, gamers can study at any time by virtue of the computer-aided environment, which can be played independently from the location.

The game-based learning infrastructure is designed and developed primarily for engineering students, more specifically, in undergraduate education where laboratory courses are important. Thus, it is aimed to take actions that many students cannot experience enough in the real-world.

MATERIALS AND METHODS

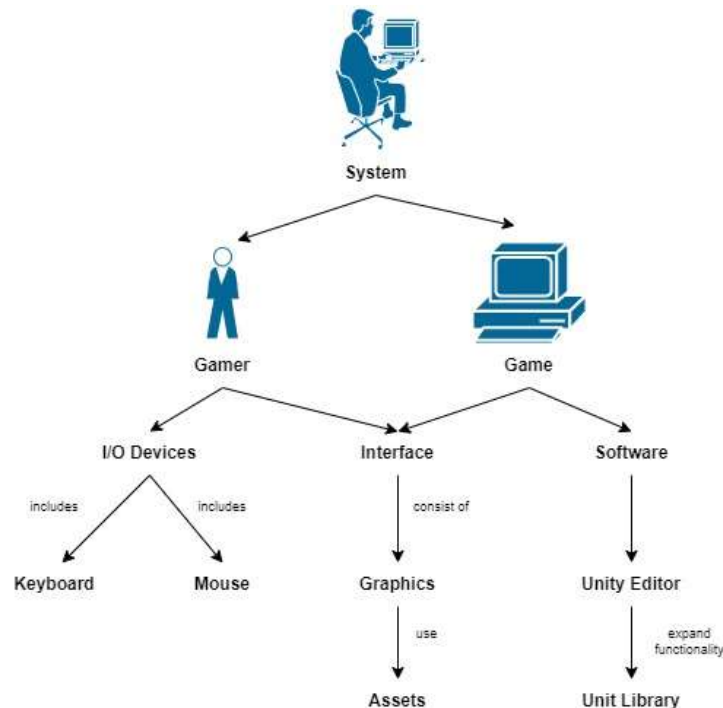


Figure 3. System architecture for the proposed game-based education model

The system architecture created for the proposed model includes game software, game interface and computer input/output devices as shown in Figure 3. The game-gamer relationship starts as soon as the user plays the game. There are no strictly defined goals in the game, instead, the gamer is allowed to freely control the environment with computer mechanics (keyboard and mouse). At this point, the game graphics come into play. Objects modeled in 2D or 3D should be presented to the gamer as close as possible to reflect the sense of reality.

Unity Game Engine is utilized to construct the simulation game software. Unity is a cross-platform game engine developed by Unity Technologies. It is announced and released in 2005 at the Worldwide Developers Conference. The engine supports a variety of desktop, mobile, console and virtual reality platforms. The engine can be used to create 3D and 2D games, as well as interactive simulations and other experiences (Axon and Samuel, 2016). The assets for the game environment is prepared by Blender software which is a free and open-source 3D computer graphics software tool set used for creating animation films, visual effects, art, 3D printed models, motion graphics, interactive 3D applications, virtual reality, and computer games graphics. Blender's features include 3D modelling, UV unwrapping, texturing, raster graphics editing, rigging and skinning, fluid and smoke simulation, particle simulation, soft body simulation, sculpting, animating, match moving, rendering, motion graphics, video editing, and compositing. Hence, it can be stated as a proper candidate for preparing extensive graphical features for game-based education systems.

THE FINAL PRODUCT

A computer simulation game has been developed according to the proposed system architecture as seen in Figure 4. The environment includes a set of tools and equipment in a virtual workshop. The gamer can navigate on the screen using the input/output devices over the tools and equipment interested in.



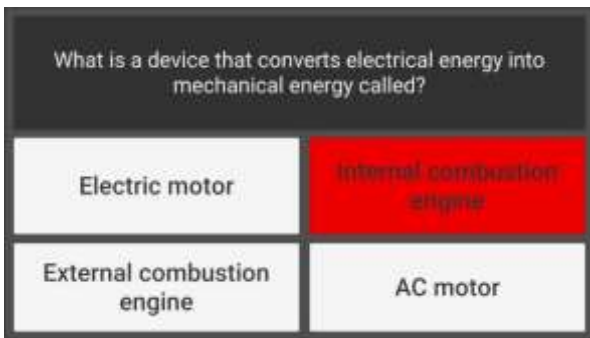
a. A sample wide angle view



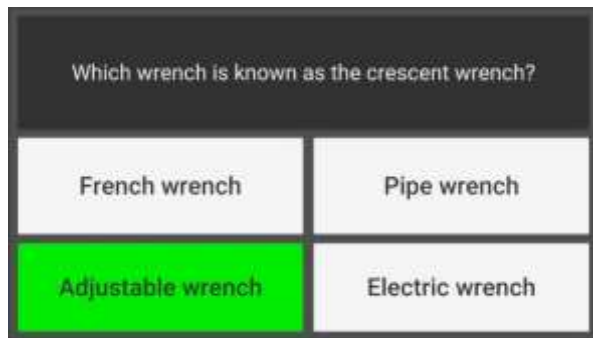
b. A sample narrow angle view

Figure 4. Screenshots from the game-based workshop environment including a set of equipment

When the computer object located on the screen is selected at the end of the tutorial, the gamer will encounter with questions on the screen as shown in Figure 5. In this way, it is aimed for a user to reinforce the information gathered from the scenario by showing whether the answers given are correct or incorrect.



a. Sample correct answer view



b. Sample wrong answer view

Figure 5. Quiz view of the proposed game-based education system

CONCLUSION

In this study, a game-based learning environment is proposed with a computer-aided infrastructure. For this purpose, a set of tools and a virtual workshop scenario are introduced. It is shown that real-world costs are avoided with the simulation game software development, and it is also ensured that a user can easily interact with the equipment and has a chance to gather or reinforce information. Moreover, the implementation of such virtual environments is a way of preventing possible dangerous effect that may arise during a risky experiment. As a conclusion, it is believed that computer-based simulation games are remarkable candidates that contribute an effective learning process and may replace with the traditional education system in the near future.

This study is open for improvement. It can be used in educational institutions if improvements are made to increase interaction with objects using sound and image effects to get closer to the real-world perception. Moreover, the proposed ecosystem can be enhanced with virtual reality or augmented reality equipment.

REFERENCES

- Axon S 2016, Unity at 10: For better or worse game development has never been easier, *Ars Technica*.
- Barab S, Thomas M, Dodge T, Carteaux R, Tuzun H 2005, Making learning fun: Quest Atlantis, a game without guns, *Educational Technology Research and Development*, vol. 53, pp. 86–107.
- Bodnar AC, Anastasio D, Enszer JA, and Burkey DD 2016, Engineers at Play: Games as Teaching Tools for Undergraduate Engineering Students, *Journal of Engineering Education*, 105(1): 147–200.
- García I, Cano E 2018, A Computer Game for Teaching and Learning Algebra Topics at Undergraduate Level, *Computer Applications in Engineering Education*, 26 (2): 326–340.
- Garris R, Ahlers R, Driskell JE 2002, Games, Motivation, and Learning: A Research and Practice Model, *Simulation & Gaming*, 33 (4): 441–467.
- Kincaid PJ, Hamilton R, Tarr WR, Sangani H 2003, Simulation in education and training, *In Applied system simulation*, pp. 437-456, Springer, Boston, MA.
- McGonigal J 2011, *Reality is broken*, New York, NY: The Penguin Press.
- Mesquida LA, Mas A 2018, Experiences on the Use of a Game for Improving Learning and Assessing Knowledge, *Computer Applications in Engineering Education*, 26 (6): 2058–2070.
- Raessens J, Goldstein J 2003, *Handbook of Computer Game Studies*, Cambridge, MIT Press.
- Rondon S, Sassi FC, Furquim de Andrade CR 2013, Computer Game-Based and Traditional Learning Method: a Comparison Regarding Students' Knowledge Retention, *BMC Medical Education*, 13 (1): 30.

THE EFFECT OF DATASET BALANCING FOR SOFTWARE BUG PREDICTION

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Abstract

Machine Learning (ML) approaches are among different methods used to measure quality in a software. Such approaches utilize software metrics to measure the quality or error prone parts of a software. BugHunter is a recent dataset including thousands of classes and hundreds of metrics. However, the dataset provides an unbalanced multi-labeling for different software units. For this purpose, the success of ML approaches applied to the dataset cannot exceed a certain level. Therefore, we performed a balancing on method related metrics set that is cleaned according to the subtraction method. To this end, firstly, binary labeling is achieved considering the total number of bugs in a method. The methods having no error are labeled with 0 (healthy) and the ones with one or more errors are labeled with 1 (faulty). Afterwards, the outliers are determined and removed from the data set. Consequently, data balancing is applied according to two different ratios between healthy and faulty methods and performance evaluation is conducted considering different ML approaches.

The different balancing approaches are at a 1-to-1 ratio and 1-to-2 ratio with respect to the healthy and faulty class labels, respectively. There are six different machine learning algorithms that have been applied for the balanced datasets: Karar Ağacı (Decision Tree), K-En Yakın Komşu (K-NN), Hafif Gradyan Artırma Makinesi (LightGBM), Kategorik Artırma (CatBoost), Aşırı Gradyan Artırma (XGBoost) ve Rastgele Orman (Random Forest). The effect of balancing on different machine learning algorithms was investigated according to the parameters of accuracy, precision, recall and F1-score. According to the evaluation results, it is concluded that balancing the data and removing the outliers from the original data set affect the performance of all machine learning approaches applied in the study. In the experiments repeated on the 1-to-1 and the 1-to-2 balanced datasets, it is observed that while the accuracy decreases; prediction, recall and F1-score values increase compared to the original dataset.

Keywords: Machine learning, error prediction, software metrics

YAZILIM HATA TAHMİNİ İÇİN VERİ SETİ DENGELEMENİN ETKİSİ

Özet

Makine öğrenmesi yaklaşımları, bir yazılımda kaliteyi ölçmek için kullanılan farklı yöntemler arasında yer almaktadır. Bu tür yaklaşımlar, bir yazılımın kalitesini veya hataya açık kısımlarını ölçmek için yazılım metriklerini kullanır. BugHunter, binlerce sınıf ve yüzlerce ölçüm içeren yeni bir veri setidir. Ancak bu veri seti, farklı yazılım birimleri için dengesiz bir çoklu etiketleme sağlamaktadır. Bu durumda veri setine uygulanan makine öğrenmesi yaklaşımlarının başarısı belirli bir seviyeyi geçmemektedir. Bu nedenle, bu çalışmada, çıkarma yöntemine göre temizlenen metotlarla ilişkili metrik kümesi üzerinde bir dengeleme gerçekleştirilmesi önerilmektedir. Bunun için öncelikle bir metottaki toplam hata sayısı dikkate alınarak ikili etiketleme yapılmaktadır. Hata vermeyen yöntemler 0 (hatasız), bir veya daha fazla hata içeren yöntemler 1 (hatalı) ile etiketlenir. Daha sonra uç değerler belirlenir ve veri setinden çıkarılır. Sonuçta, hatalı ve hatasız yöntemler arasında iki farklı orana göre veri seti dengelemesi yapılarak farklı makine öğrenmesi yaklaşımları ile performans değerlendirmesi yapılmaktadır.

Farklı dengeleme yaklaşımları, sırasıyla hatalı ve hatasız sınıf etiketlerine göre 1/1 oranında ve 1/2 oranındadır. Dengeli veri kümeleri için uygulanan altı farklı makine öğrenme algoritması vardır: Karar Ağacı, K-En Yakın Komşu, Hafif Gradyan Artırma Makinesi, Kategorik Artırma, Aşırı Gradyan Artırma ve Rastgele Orman. Dengelemenin farklı makine öğrenme algoritmaları üzerindeki etkisi doğruluk, kesinlik, duyarlılık ve F1-Skor parametrelerine göre araştırılmaktadır. Değerlendirme sonuçlarına göre, verilerin dengelenmesi ve orijinal veri setinden aykırı değerlerin çıkarılmasının çalışmada uygulanan tüm makine öğrenmesi yaklaşımlarının performansını etkilediği sonucuna varılmıştır. 1'e 1 ve 1'e 2 dengeli veri setleri üzerinde tekrarlanan deneylerde doğruluk azalırken; kesinlik, duyarlılık ve F1-Skor değerleri orijinal veri kümesine göre artmaktadır.

Anahtar kelimeler: Makine öğrenmesi, hata öngörüsü, yazılım metrikleri

Giriş

Yazılım kalite ölçme ve değerlendirme faaliyetleri, geliştirici ekibe potansiyel yazılım kusurlarını tespit ve takip imkânı tanımakla birlikte daha kaliteli bir yazılım geliştirmeye yardımcı olmaktadır (Aydilek, 2018). Yazılımda kalite ölçümü ve standartları için kullanılan birçok yöntem vardır. Bunlardan biri olan makine öğrenmesi yaklaşımları ile hızlı ve doğru sonuçlar elde edilebilir. Makine öğrenmesi yaklaşımları kullanılırken yazılım metriklerinden yararlanır. Yazılım metrikleri, yazılım yaşam döngüsü boyunca birçok türde tahmin ve değerlendirme yapmayı sağlayan bir araçtır (Fenton ve ark., 2000). Bu sebeple, bu çalışmada, içerisinde çok sayıda yazılım metriği bulunduran BugHunter veri seti üzerinde analizler yürütülmektedir. Buna göre, çıkarma yöntemine göre temizlenen BugHunter veri setinde dengeleme ve etiketleme işlemleri yapılmaktadır.

Yazılım kalitesini izlemenin bir yolu, yazılım hatalarını veya kusurlarını bulmak ve ardından bu hataları düzeltmektir (Meiliana ve ark., 2017). Hata tahmininin temel amacı ise kalite güvence çabasının etkin tahsisi veya önceliklendirilmesi olarak belirtilmektedir. (Lessmann ve ark., 2008). Bir diğer amaç ise hata tahmininin kaynak tahsisi sorunu ile ilişkilendirilmesi olarak gösterilmektedir (D'Ambros ve ark., 2010). Sonuçta, hedef ne olursa olsun, yazılım birimlerinin hatalı ya da hatasız bir şekilde etiketlenmesi gerekli ve yeterlidir. BugHunter veri setinde yer alan etiketler ise birimlere ilişkin tespit edilen toplam hata sayılarını içermektedir. Bu sebeple, bu çalışmada ilk olarak, yazılım metotları için ikili sınıflandırmaya sahip etiketleme yapılarak hata sayısından bağımsız bir veri seti oluşturulmaktadır. Hatasız olarak kabul gören metotlar için 0

(hatasız) etiketi; bir veya daha fazla hata içeren metotlar içinse 1 (hatalı) etiketi kullanılmaktadır.

Literatürde yazılım hata tahmini ile ilgili birçok çalışma yer almaktadır. Bu çalışmaların birçoğunda, uygulanan makine öğrenmesi yönteminin başarımı için veri setinde bazı ön işlemler uygulanmaktadır. Bennin ve ark. (2016) yeniden dengeleme için fazla örnekleme ve az örnekleme yaklaşımları uygulayarak hataya açık olabilecek modül analizi yapmaktadır. Buna göre, eğitim veri setlerinde %20 ile %30 oranları arasında örnekleme teknikleri uygulandığında tüm tahmin modellerinin performansında iyileşme gösterdiği görülmektedir. Öğrenmeye dayalı yaklaşımlarda başarımlar için uygun bir makine öğrenmesi yönteminin, uygun bir veri seti ile kullanılması önem arz etmektedir. Bu bağlamda, makine öğrenmesi yöntemlerinin başarımını olumsuz etkileyen uç değerlerin tespit edilmesi gerekir. Bu sebeple tespit edilen uç değerler veri setinden aykırı değerler yöntemi ile ayıklanmalıdır. Bu kapsamda, Yohannese ve ark (2017) yazılım birimlerinin sınıflandırırken ölçüm sayısını da uygun seviyede tutmaya özen göstermektedir.

Sonuç olarak, tüm bu etkenler göz önüne alındığında, veri setindeki hatalı ve hatasız birimlerin dengelemesi, hata tahmini için dikkate alınması gereken bir unsur olarak karşımıza çıkmaktadır. Belirtilen motivasyonlar göz önüne alındığında; bu çalışmada i) Bug Hunter veri seti üzerinde uç değerlerin silinmesi ve dengeleme işlemleriyle orijinal veri seti dışında iki farklı veri seti oluşturulmaktadır. ii) Hazırlanan bu veri setleriyle birlikte altı farklı makine öğrenmesi yöntemi kullanılarak önerilen dengeleme yaklaşımının başarımlar analizi ortaya konmaktadır.

Çalışmanın geri kalanında ilk olarak kullanılan veri setinin özellikleri ve bu veri setine uygulanan ön işlemler tanıtılmaktadır. Daha sonra, sınama ortamına ilişkin detaylar verilerken, sonrasında elde edilen değerlendirme bulguları tartışılmaktadır. Son olarak, çalışma, gelecek yönleri belirtilerek sonuçlandırılmaktadır.

Kullanılan Veri Setinin Özellikleri ve Ön İşlemler

Bu çalışmada BugHunter veri seti analiz edilerek veri dengelemenin yazılım hatalarını tespit etmedeki etkisi araştırılmaktadır. Bu bağlamda, BugHunter veri seti içerisindeki 15 farklı yazılım projesinden metot düzeyinde metrikler kullanılmaktadır. Veri setleri içerisindeki her bir satır bir yazılım metoduna karşılık düşerken, her bir sütun ise ilgili metottan ölçülen farklı metrik değerlerini ifade etmektedir. En sağda yer alan sütunda ise, bir metotta tespit edilen toplam hata sayısı yer almaktadır. Buna göre, veri setinin kalitesini artırmak üzere bir dizi ön işlem uygulanmaktadır. İlk olarak, hata sayısına ilişkin veri setinde bulunan aykırı değerler tespit edilerek veri setinden çıkarılmaktadır. Daha sonra, bir metodun hatalı ya da hatasız olarak etiketlenmesine yönelik ikili etiketleme yapılmaktadır.

Yazılımlardan elde edilen veri setlerinde hatalı birimlerin oranı hatasız birimlere göre çok daha düşük olmaktadır. Bu durum, uygulanan ML yaklaşımlarının başarımını olumsuz etkilemektedir. BugHunter veri setinde yer alan içerikler doğrultusunda, yazılım metotlarının hatalı ve hatasız etiketlenmesi sonucu elde edilen ikili etiket dağılımları Tablo 1 ile verilmektedir. Buna göre, her bir projeden elde edilen veri setlerindeki hatalı metot sayısı, veri setinin ikili etikete göre dengelenmesine aykırı bir durum oluşturmaktadır. Bu bağlamda, veri setinde yer alan hatalı metotların, hatasız metotlara göre 1/1 oranında ve 1/2 oranının dengelenmesi için, hatasız olduğu bilinen bazı metot verileri veri setinden çıkarılmaktadır. Sonuçta elde edilen üç farklı veri setindeki hatasız metot sayısı ve makine öğrenmesi yöntemlerinin uygulandığı toplam veri kümesi boyutu tabloda gösterilmektedir.

Tablo 1. Çalışmada ele alınan veri seti bilgileri

	Orijinal Veri Seti				1/1 Oranında Dengelenen Veri Seti		1/2 Oranında Dengelenen Veri Seti	
	Metot Sayısı	Aykırı Değerler Olmadan Metot Sayısı	Hatalı Metot Sayısı	Hatasız Metot Sayısı	Hatasız Metot Sayısı	Toplam Metot Sayısı	Hatasız Metot Sayısı	Toplam Metot Sayısı
Tümü	108106	97868	28929	68939	28929	57858	57858	86787
Android Uni. İma. Load.	325	295	89	206	89	178	178	267
ANTLR v4	840	723	72	651	72	144	144	216
Elasticsearch	4709	4284	846	3438	846	1692	1692	2538
jUnit	2087	1919	460	1459	460	920	920	1380
MapDB	35862	32736	10531	22205	10531	21062	21062	31593
mcMMO	32973	30696	11000	19696	11000	22000	19696	30696
Mission Control T.	462	432	77	355	77	154	154	231
Neo4j	1456	1322	421	901	421	842	842	1263
Netty	1184	1090	375	715	375	750	715	1090
OrientDB	105	93	20	73	20	40	40	60
Oryx	7030	6444	1599	4845	1599	3198	3198	4797
Titan	11171	10133	2061	8072	2061	4122	4122	6183
Eclipse Plug. for Ceylon	9445	8577	2223	6354	2223	4446	4446	6669
Hazelcast	810	752	65	687	65	130	130	195
Broadleaf Commerce	785	702	136	566	136	272	57858	408

Sınama Ortamı

Veri setinin sınanması için kullanılan sınama ortamının teknik detayları Tablo 2 ile belirtilmektedir. Buna göre, Intel Core i5 işlemciye sahip 4 çekirdekli bir sınama ortamı üzerinde 2 GHz işlemci hızı ile 6 MB ön bellek yer almaktadır. Ayrıca, 1,5 GB belleğe sahip bir Intel Iris Plus Graphics ekran kartı ve 16 GB bellek donanımı mevcuttur. Bu konfigürasyona sahip bir bilgisayar ortamında farklı algoritmalarla tekrarlanan makine öğrenmesi deneyleri Anaconda Navigator platformu üzerinden Spyder IDE geliştirme ortamında gerçekleştirilmektedir.

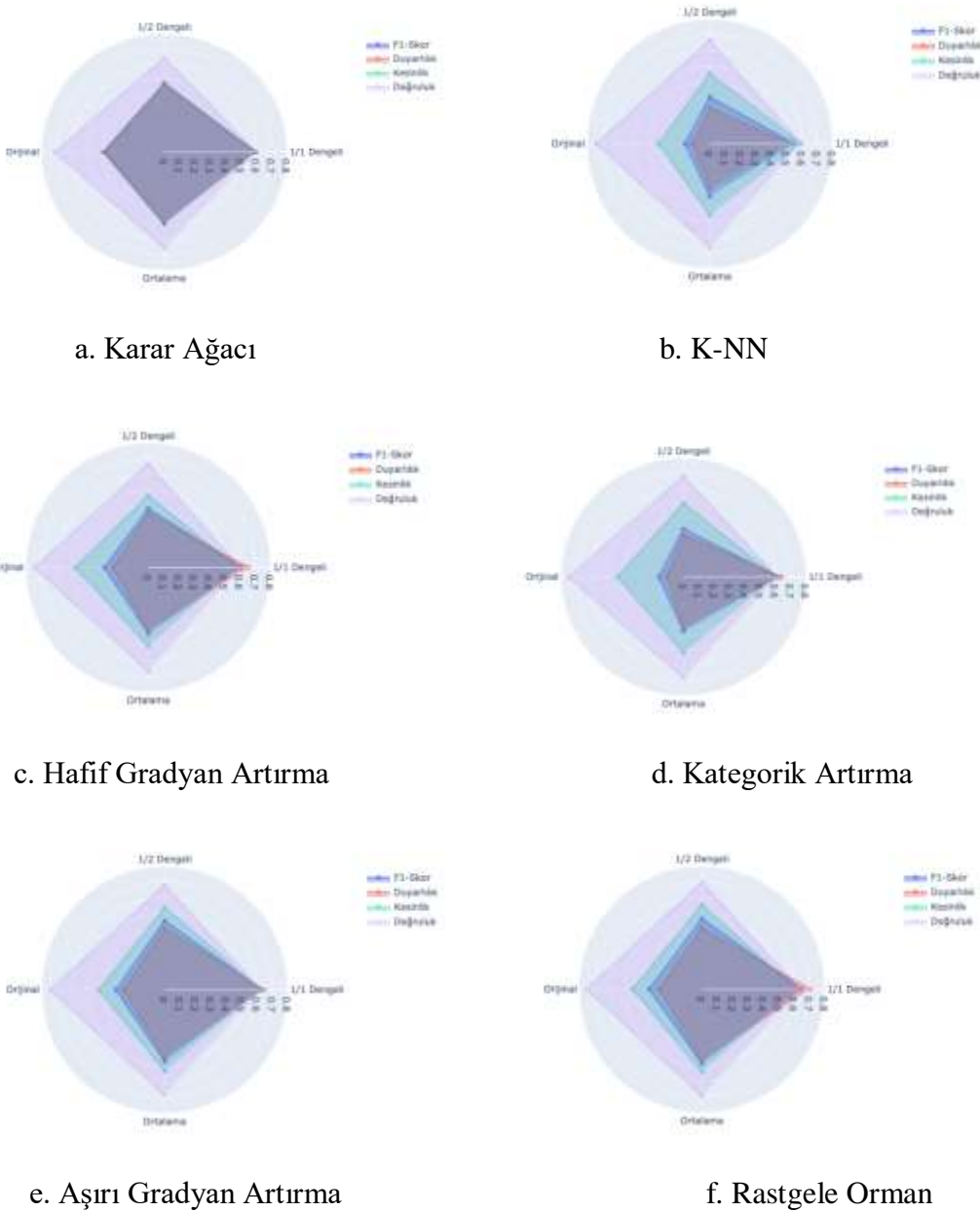
Tablo 2. Sınama ortamına ilişkin teknik nitelikler

Teknik Nitelik/Donanım	Açıklama
İşlemci	4 Çekirdekli Intel Core i5
İşlemci hızı	2 GHz
Ön Bellek	6 MB
Ekran kartı	Intel Iris Plus Graphics
Ekran kartı belleği	1,5 GB
Bellek	16 GB

Elde Edilen Değerlendirme Bulguları

Çalışma kapsamında, dengeli veri kümeleri ve orijinal veri kümesi için altı farklı makine öğrenmesi yöntemi uygulanmaktadır: Karar Ağacı (Decision Tree), K-En Yakın Komşu (K-NN),

Hafif Gradyan Artırma Makinesi (LightGBM), Kategorik Artırma (CatBoost), Aşırı Gradyan Artırma (XGBoost) ve Rastgele Orman (Random Forest). Veri seti dengelemenin, ilgili makine öğrenme algoritmaları üzerindeki etkisi doğruluk, kesinlik, duyarlılık ve F1-Skor parametrelerine göre incelenmektedir. Her veri kümesi için elde edilen sonuçlar Şekil 1 ile gösterilmektedir.



Şekil 1. Makine öğrenmesi yöntemlerinin farklı veri setleri üzerinde performans değerlendirilmesi

Şekil 1’de, her bir makine öğrenmesi yöntemi ile farklı dengelemeye sahip veri setleri için elde edilen doğruluk, kesinlik, duyarlılık ve F1-Skor parametrelerinin değerleri ile birlikte ortalama değer bilgisi yer almaktadır. Buna göre, doğruluk değerinin, orijinal veri seti için en yüksek ve 1/1 oranında dengeli veri seti için en düşük olduğu tespit edilmektedir. Kesinlik, duyarlılık ve F1-Skor değerleri ise, 1/1 oranında dengeli veri seti için en yüksek ve orijinal veri seti için en düşüktür.

Çalışma kapsamında elde edilen bulgulara göre; 1/1 oranında dengeli veri seti için en yüksek doğruluk değeri 0,636 ile Rastgele Orman, en yüksek kesinlik değeri 0,621 ile Aşırı Gradyan Artırma, en yüksek duyarlılık değeri 0,705 ile Rastgele Orman ve en yüksek F1-Skor değeri 0,458 ile Rastgele Orman yöntemi ile elde edilmektedir. 1/2 oranında dengeli veri seti için ise en

yüksek doğruluk değeri 0,694 ile Rastgele Orman, en yüksek kesinlik değeri 0,548 ile Rastgele Orman, en yüksek duyarlılık değeri 0,467 ile Karar Ağacı ve en yüksek F1-Skor değeri 0,462 ile Rastgele Orman yöntemi ile elde edilmektedir. Benzer şekilde, orijinal veri seti üzerinde koşan yöntemlerden en yüksek doğruluk değeri 0,752 ile Rastgele Orman, en yüksek kesinlik değeri 0,476 ile Hafif Gradyan Artırma, en yüksek duyarlılık değeri 0,397 ile Karar Ağacı ve en yüksek F1-Skor değeri 0,386 ile Karar Ağacı yöntemi ile elde edilmektedir. Hatalı ve hatasız sınıflar arasında 3 farklı dengelemeye sahip veri setleri üzerinde yürütülen makine öğrenmesi performans değerlendirmesine ilişkin ortalama sonuçlar alındığında ise en yüksek doğruluk değeri 0,694 ile Rastgele Orman, en yüksek kesinlik değeri 0,536 ile Rastgele Orman, en yüksek duyarlılık değeri 0,488 ile Karar Ağacı ve en yüksek F1- Skor değeri 0,483 ile Rastgele Orman olarak tespit edilmektedir.

Değerlendirme sonuçlarına göre, veri seti dengelenmesi tüm makine öğrenmesi yaklaşımlarının performansını doğrudan etkilemektedir. 1/1 oranında ve 1/2 oranında dengelenen veri setleri üzerinde tekrarlanan deneylerde doğruluk değeri azalırken; kesinlik, duyarlılık ve F1-Skor değerlerinin orijinal veri seti üzerinde elde edilen değerlere göre artış gösterdiği tespit edilmektedir.

Sonuç

Bu çalışmada, yazılım hata tahmini için kullanılan bir veri setinde hatalı ve hatasız sınıf oranının dengelenmesi ve uygulanan makine öğrenmesi yöntemlerinin başarımı arasındaki ilişki araştırılmaktadır. Bu amaçla, ilk olarak, BugHunter veri seti üzerinde ön işlemler yürütülerek farklı dengeleme oranlarına sahip veri setleri elde edilmektedir. Daha sonra, farklı makine öğrenmesi algoritmalarının bu veri setlerine uygulanması sonucu elde edilen doğruluk, kesinlik, duyarlılık ve F1-Skor parametrelerine ilişkin bulgulara yer verilmektedir. Elde edilen bulgulara göre, veri seti dengelemenin başarımı etkilediği; ayrıca, Rastgele Orman ve Karar Ağacı yöntemlerinin diğer yöntemlere göre daha başarılı sonuçlar ürettiği görülmektedir. Gelecekte ise, yapılan araştırmanın kapsamı genişletilerek daha büyük bir veri seti ve farklı makine öğrenmesi algoritmalarıyla yeni bulgular elde edilmesi hedeflenmektedir.

Kaynaklar

- Aydilek İB 2018, Karar ağaçlarında yazılım hata tahmininde kullanılan metriklerin bilgi kazanımını analiz etmek ve iyileştirmek, *Pamukkale Üniversitesi Mühendislik Bilimleri Dergisi*, 24 (5), 906-914.
- Bennin KE, Keung J, Monden A, Kamei Y, Ubayashi N 2016, Investigating the effects of balanced training and testing datasets on effort-aware fault prediction models, *In IEEE 40th annual Computer software and applications conference (COMPSAC)*, vol. 1, pp. 154-163.
- D'Ambros M, Lanza M, Robbes R 2010, An extensive comparison of bug prediction approaches, *In 7th IEEE working conference on mining software repositories (MSR 2010)*, pp. 31-41.
- Fenton NE, Neil M 2000, Software metrics: roadmap, *In Proceedings of the Conference on the Future of Software Engineering*, pp. 357-370.
- Lessmann S, Baesens B, Mues C, Pietsch S 2008, Benchmarking classification models for software defect prediction: A proposed framework and novel findings, *IEEE Transactions on Software Engineering*, vol.34, no. 4, pp. 485-496.
- Meiliana SK, Warnars HLHS, Gaol FL, Abdurachman E, Soewito B 2017, Software Metrics for Fault Prediction Using Machine Learning Approaches, *IEEE International Conference on Cybernetics and Computational Intelligence (CyberneticsCom)*, pp. 19-23.
- Yohannese CW, Li T 2017, A combined-learning based framework for improved software fault prediction, *International Journal of Computational Intelligence Systems*, 10(1), 647.

INVESTIGATION OF THE CORROSION BEHAVIOR OF SiC AND B₄C PARTICLES
REINFORCED AZ91 AND ZK60 COMPOSITES

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Abstract

Magnesium alloys come to the fore in automotive and aerospace applications with their many helpful properties such as low density, high specific strength, and high thermal conductivity. In this study, AZ91 and ZK60 alloys, which are the most preferred magnesium alloys were improved. Two new composite materials were produced by adding 15% SiC (composite 1) to AZ91 alloy and 10% B₄C (composite 2) to ZK60 alloy. The production of composites was conducted by melt-based induction mixing, alloying, and casting methods. After the casting process, to refine the grain structure and reduce the porosity, an extrusion process was applied using a 30-ton capacity hydraulic press at an extrusion ratio of 9:1. The microstructure, hardness, and corrosion properties of the produced extrusion samples were investigated. The microstructure images of the composites show that the reinforcements present a homogeneous distribution in general, but there are agglomerations in some regions. The microstructural studies show that α -Mg, MgAl eutectic, and Mg₁₇Al₁₂ intermetallics are present in AZ91 alloy while primary α -Mg particles, spherical Mg-Zn, and Zn-Zr binary intermetallics are detected in ZK60 alloy. The Brinell hardness values of the unreinforced alloys were measured as 86 HB for AZ91 and 75.01 HB for ZK60. After the alloying and adding the reinforcements, the hardness of the composite 1 increased to 87.38 HB and that of the composite 2 increased to 141.97 HB. The corrosion current density of AZ91 without reinforcement was 156.00 $\mu\text{A}/\text{cm}^2$, while this value decreased to 57.90 $\mu\text{A}/\text{cm}^2$ with the addition of 15% SiC. The corrosion current densities of the ZK60 unreinforced and reinforced with 10% B₄C were 214 $\mu\text{A}/\text{cm}^2$ and 291.00 $\mu\text{A}/\text{cm}^2$, respectively. This means that, the corrosion resistance improves by reinforcing SiC particles, but B₄C reinforcement decreases the corrosion resistance.

Keywords: Magnesium; AZ91; ZK60; SiC and B₄C Particles; Corrosion.

INTRODUCTION

Magnesium, one of the traditional materials, has a very important place in the application areas where lightness is prioritized (Avedesian ve Baker, 1999; Friedrich ve Mordike, 2006). In addition, it is used in many fields due to its high thermal conductivity, high dimensional stability, good electromagnetic shielding, high damping, good workability and easy recycling, and high specific strength (Benedyk 2004; Froes, Eliezer, ve Aghion 1998; Furuya vd. 2000). However, it has low strength and toughness values as unalloyed thus, it is generally used by alloying. With the technological developments, traditional materials have become unable to fully meet the needs. Therefore, the progress in material technology in parallel with technology has made it necessary to research new materials or develop existing materials. The most key features expected from materials according to their usage areas are strength, toughness, lightness, and low cost. However, traditional materials cannot show the desired performance due to their weak corrosion resistance (Kelen vd. 2019). The high electronegative potential of these materials and the unstable protective oxide layers formed on the material surfaces cause low corrosion resistance (Esmaily vd. 2017; Song ve StJohn 2005). For this reason, it is of great importance to improve the corrosion resistance of composite materials formed by combining two or more materials (Ersoy 2001). Metal matrix composites (MMK) have a prominent place among the types of composite materials, and the properties of these composite materials are further improved thanks to different ceramic-based reinforcement elements such as B_4C , SiC , Al_2O_3 , SiO_2 , MgO , TiC and TiB_2 . These added reinforcement elements increase the properties such as high tensile strength, high wear resistance, high corrosion resistance, melting temperature, thermal stability, and easy manufacturability (Ayhan, Uğur, ve Ali Kaya 2007). However, thermomechanical processes have a major place in magnesium alloys and one of these thermomechanical processes is extrusion. The extrusion process improves the mechanical behaviors (Bauser, Sauer, ve Siegert 2006; Kalpakjian, Schmid, ve Sekar 2013). The processes (heat treatment, forming, chemical processes, etc.) to which the material is exposed before and after the extrusion process improve the properties of the product (Sönmez 1989).

Although there are few studies in the literature to improve the mechanical properties of the reinforced magnesium matrix materials by SiC and/ or B_4C . Moreover, data on the effect of the reinforced magnesium matrix materials by SiC and/ or B_4C on corrosion properties is limited. In this study, the corrosion properties of the reinforced magnesium matrix materials: 15% SiC to AZ91 (Composite 1) alloy and 10% B_4C to ZK60 (Composite 2) alloy and the unreinforced magnesium materials AZ91 and ZK60 were investigated. The production of these composites is conducted by using semi- powder metallurgy and melting alloying together.

MATERIAL AND METHOD

The first stage of the production of samples; is the melting process in an induction casting unit under a shielding gas consisting of a mixture of $CO_2+0.8 SF_6$ and argon (Ar) gas. After the alloy materials melted, reinforcement powders were added to the crucible. In the melting process of the alloys, while the melt was semi-solid at 450 °C, it was mixed with a graphite-based mechanical mixer at 200 rpm for half an hour. Then, casting samples were obtained by pouring the molten metal into the metal mold at 750°C. The homogenization process was conducted at 420 °C for 24 hours to prevent micro-segregation that may occur in the structure of the cast samples produced and to supply a homogeneous distribution. After homogenization, the extrusion process is conducted at 400°C at an extrusion speed of 9:1 and an extrusion speed of 0.3 mm/sec. For the microstructure investigations of the produced composites, surface cleaning was applied with sandpaper coated with SiC particles as 240, 400, 600, 800, 1000, 1200, and 2500 grit, respectively. After sanding, polishing was done on the polishing felt with 1µm alumina paste. After the polishing process, microstructure examinations of the samples are made using the Carl Zeiss microscope device. In addition, SEM and EDS analyses are performed for detailed microstructure investigations. Hardness

measurements were conducted with a 2.5 mm diameter ball and a Brinell hardness device under a load of 187.5 N. Hardness values were measured and averaged by creating three traces for each sample. The corrosion properties of the extruded samples were verified using the electrochemical potentiodynamic polarization test in the brine solution. After each sample is cabled with copper wire and embedded in epoxy resin the surface to be evaluated is sanded and cleaned. The surface of the samples is covered with a circular perforated tape film with an area of 0.25 cm². Potentiodynamic polarization tests are performed with computer controlled DC105 corrosion analysis Gamry model PC4/300 mA potentiostat/galvanostat at room temperature, in the 3.5% NaCl solution. A graphite rod is used as the counter electrode, a saturated calomel electrode (SCE) as the reference electrode, and a conventional three-electrode cell with the sample surface as the working electrode.

EXPERIMENTAL RESULTS

Figure 1 shows images of the unreinforced AZ91, ZK60 alloys, Composite 1 (SiC reinforced AZ91) and Composite 2 (B₄C reinforced ZK60) at 50x magnification. As seen from the surface images, a significant reduction in grain size achieved in all alloys due to dynamic recrystallization (DRX) during hot extrusion. As can be seen from the microstructure image (Figure 1), SiC and B₄C reinforcement materials are homogeneously dispersed in the matrix.

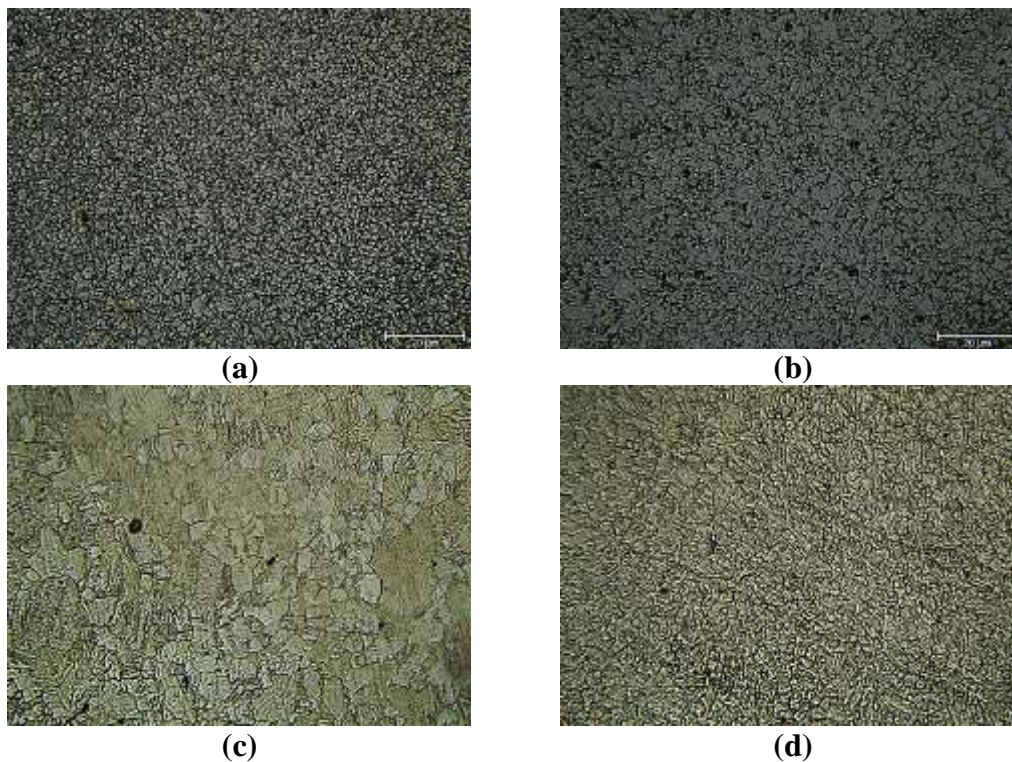


Figure 1. 50x zoom images of a) AZ91 b) Composite 1 c) ZK60 d) Composite 2.

SEM and EDX images of the composites are given in Figures 2 and 3. The SiC is seen in the grains visualized at 1K zoom during SEM analyses, and particles that have Si and C are visible in Figure 2. And the B₄C is detected in the grains visualized at 1K zoom during SEM analyses in Figure 3. Also Figure 3 shows the EDX analysis results of grains having B and C.

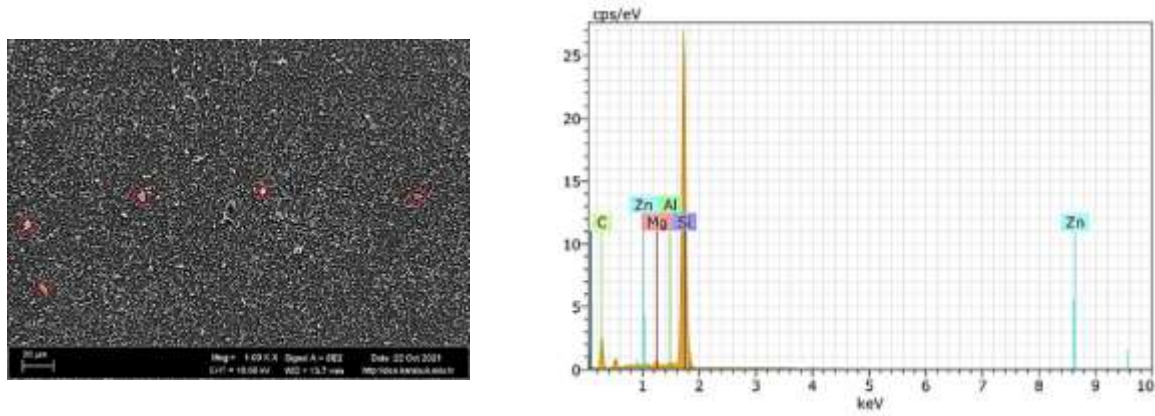


Figure 2. Silicon carbide SEM and EDX images.

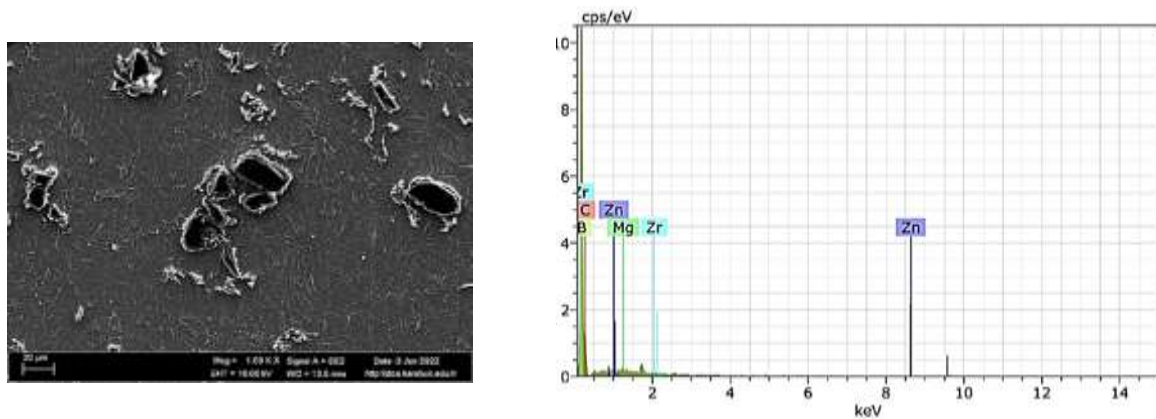


Figure 3. Boron carbide SEM and EDX images.

The average Brinell hardness test results of the samples are presented in Figure 4. It is observed that the hardnesses have increased with the added reinforcements. The hardness of the AZ91 alloy was measured as 86 HB, and the ZK60 alloy as 75.01 HB. The results show that aluminum rich alloy (AZ91) exhibit higher strength than zinc rich alloy (ZK60) (Silva vd. 2019). And the hardness of the Composite 1 was calculated as 87.38 HB, and the Composite 2 was calculated as 141.97 HB. When the values are compared, SiC increased the hardness 1.01 times, while B₄C increased 1.89 times. Although the B₄C (10%) reinforcement ratio is lower compared to SiC (15%), the higher hardness value was obtained in Composite 2. The fact that the added B₄C is the hardest material after diamond and cubic boron nitride it causes the highest strength increase in the composite (Çelik ve Kilickap 2019).

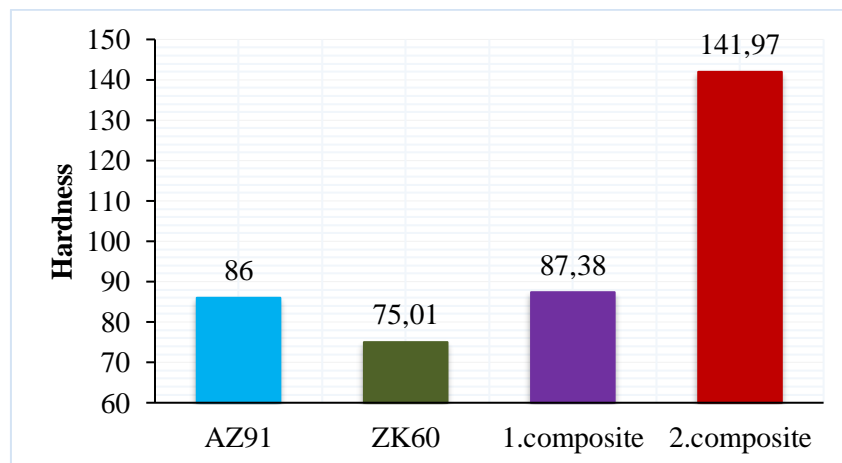


Figure 4. Hardness of Brinell results.

The corrosion current density (i_{corr}) and corrosion potential (E_{corr}) values of the unreinforced AZ91, ZK60 and the reinforced composite materials composites 1 and 2 are presented in the Figure 5 and 6. The i_{corr} value of the unreinforced AZ91 was $156 \mu\text{A}/\text{cm}^2$ and the E_{corr} value was $-1,410 \text{ V}$. The ones of the unreinforced ZK60 alloy are $214 \mu\text{A}/\text{cm}^2$ and $-1,430 \text{ V}$, respectively. It observed that the unreinforced AZ91 shows better corrosion resistance than the unreinforced ZK60 alloy. The i_{corr} and E_{corr} values of the composite 1 are measured as $57.90 \mu\text{A}/\text{cm}^2$ and $-1,210 \text{ V}$, respectively. The i_{corr} and E_{corr} values the Composite 2 are measured as $291 \mu\text{A}/\text{cm}^2$ and $-1,490 \text{ V}$, respectively. 15% SiC reinforcement (Composite 1) increased the corrosion resistance of unreinforced AZ91 by 62.8%. And 10% B_4C reinforcement (Composite 2) reduced the corrosion resistance of unreinforced ZK60 by 36%.

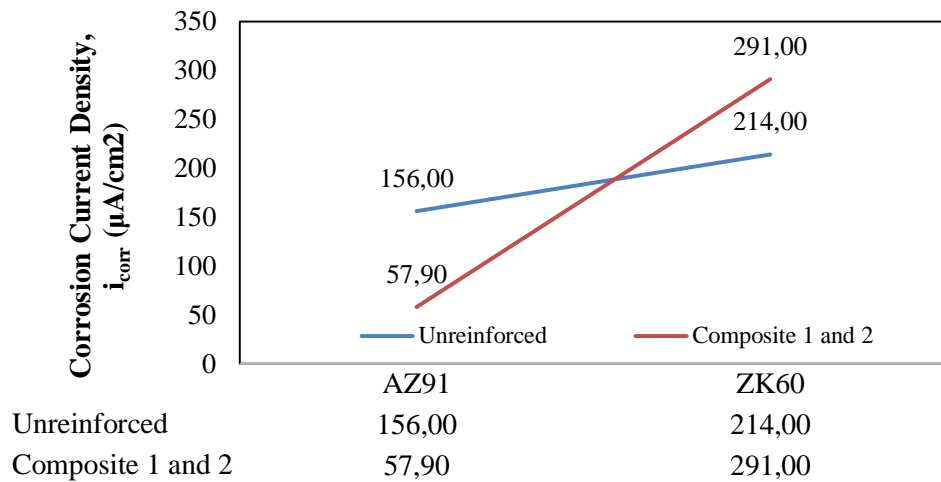


Figure 5. Corrosion current density results of all samples.

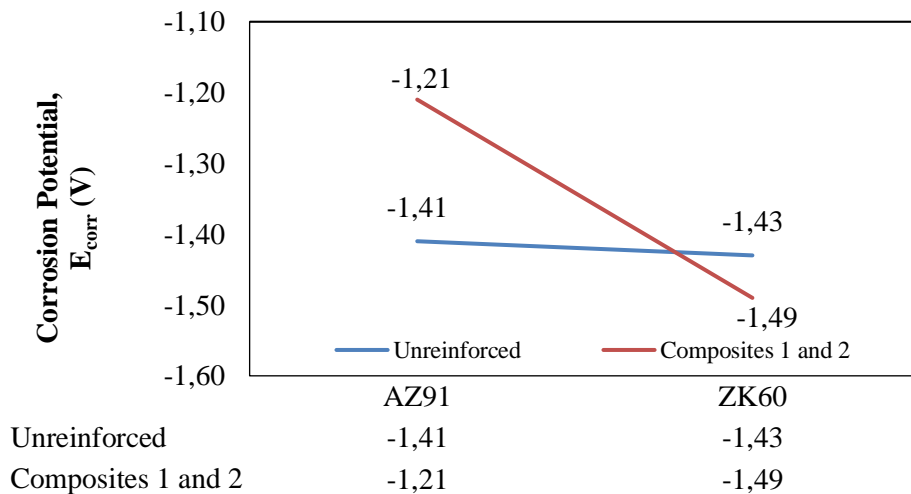


Figure 6. Corrosion potential results of all samples.

The composite sample 2 with B_4C is thought to have high dislocation agglomeration and finer grain size due to B_4C in the dynamic recrystallization during the extrusion. The reason that B_4C decreased the corrosion resistance it weakens the resistance to corrosion between the grains. The reasons why SiC reinforcement increases corrosion resistance are thought to be the grain refinement effect of SiC on AZ91 and the nearly equal SiC-Mg grain sizes. Therefore, corrosion reduces current density and increases corrosion resistance.

After the corrosion test, it is observed from the surface image of Composite 1 (Figure 7 (a)) that corrosion damage occurs in the form of small pits. However, looking at the surface image of Composite 2 (Fig. 7(b)), the entire surface was rapidly damaged by corrosion with large pits compared to Composite 1.

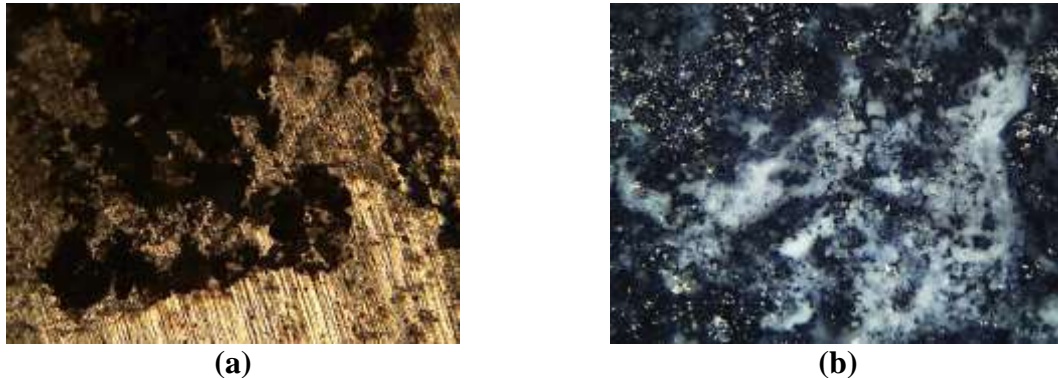


Figure 7. Corrosion surface of a) Composite 1 b) Composite 2.

CONCLUSION

In this study, the production and characterization (the metallographic, hardness and corrosion test) of the unreinforced AZ91 and ZK60 alloys, AZ91 reinforced with 15% SiC (Composite 1) and ZK60 reinforced with 10% B₄C (Composite 2) composite materials were conducted. The results obtained in this study are summarized as items below:

- The hardness values of the unreinforced AZ91 and ZK60 are measured as 86 HB and 75.01 HB respectively. Al-rich Mg alloys (AZ91) exhibit higher strength than Zn-rich Mg alloys (ZK60).
- The hardness of the Composite 1 was calculated as 87.38 HB, and the Composite 2 was calculated as 141.97 HB. It is observed that B₄C reinforcement exhibits higher strength than SiC reinforced.
- The icorr value of the unreinforced AZ91 and ZK60 are 156 $\mu\text{A}/\text{cm}^2$ and 214 $\mu\text{A}/\text{cm}^2$, respectively. Thus, the AZ91 exhibited better corrosion resistance than the ZK60 alloy.
- The icorr value of the SiC reinforced composite 1 is 57.90 $\mu\text{A}/\text{cm}^2$ and the icorr value of the B₄C reinforced composite 2 is 291 $\mu\text{A}/\text{cm}^2$. It has been clearly seen that B₄C reinforcement decreases the corrosion resistance compared to SiC reinforcement.
- Corrosion pits were formed in addition to the corrosion surface in the Composite 1, while deep corrosion surface mechanisms were formed in the Composite 2.

ACKNOWLEDGEMENTS

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REFERENCES

- Avedesian, M. M., ve Hugh Baker. 1999. *ASM Specialty Handbook: Magnesium and Magnesium Alloys*. ASM International.
- Ayhan, O., Ç. Uğur, ve G. Ali Kaya. 2007. "Al Matrisli B₄C Takviyeli Kompozitlerin Sıcak Presleme Yöntemiyle Üretimi". *Makine Teknolojileri Elektronik Dergisi* 4:8-13.
- Bausier, M., G. Sauer, ve Klaus Siegert, ed. 2006. *Extrusion*. 2nd ed. Materials Park, OH: ASM International.
- Benedyk, Joseph. 2004. "Magnesium challenges aluminum dominance as the light metal of choice in automotive markets". 62:22-27.
- Çelik, Yahya, ve Erol Kilickap. 2019. "Hardness and Wear Behaviours of Al Matrix Composites and Hybrid Composites Reinforced with B₄C and SiC". *Powder Metallurgy and Metal Ceramics* 57. doi: 10.1007/s11106-019-00023-w.
- Ersoy, Halit Yaşa. 2001. *Kompozit Malzeme*. İstanbul: Literatür Yayınları.
- Esmaily, M., J. E. Svensson, S. Fajardo, N. Birbilis, G. S. Frankel, S. Virtanen, R. Arrabal, S. Thomas, ve L. G. Johansson. 2017. "Fundamentals and Advances in Magnesium Alloy Corrosion". *Progress in Materials Science* 89:92-193. doi: 10.1016/j.pmatsci.2017.04.011.
- Friedrich, Horst E., ve Barry L. Mordike, ed. 2006. "Technology of Magnesium and Magnesium Alloys". Ss. 219-430 içinde *Magnesium Technology: Metallurgy, Design Data, Applications*. Berlin, Heidelberg: Springer.
- Froes, Francis, Dan Eliezer, ve Eli Aghion. 1998. "The science, technology, and applications of magnesium". *JOM* 50:30-34. doi: 10.1007/s11837-998-0411-6.
- Furuya, Hiroshi, Nozomu Kogiso, Saburo Matunaga, ve Kei Senda. 2000. "Applications of Magnesium Alloys for Aerospace Structure Systems". *Materials Science Forum - MATER SCI FORUM* 350:341-48. doi: 10.4028/www.scientific.net/MSF.350-351.341.
- Kalpakistan, Serope, Steven Schmid, ve Vijay Sekar. 2013. *Manufacturing Engineering and Technology*.
- Kelen, Fevzi, Tarık Aydoğmuş, Mehmet Gavgali, ve Burak Dikici. 2019. "Toz Metalürjisi Yöntemi İle Üretilmiş Magnezyum Matrisli Kompozitlerin Korozyon Duyarlılıkları". *Bitlis Eren Üniversitesi Fen Bilimleri Dergisi* 8:914-20. doi: 10.17798/bitlisfen.502290.
- Silva, Claudio, Renata Soares, Pedro Henrique Pereira, Roberto Figueiredo, V. Lins, ve Terence Langdon. 2019. "The Effect of High-Pressure Torsion on Microstructure, Hardness and Corrosion Behavior for Pure Magnesium and Different Magnesium Alloys". *Advanced Engineering Materials* 21:1801081. doi: 10.1002/adem.201801081.
- Song, Guang-Ling, ve D. StJohn. 2005. "Corrosion of magnesium alloys in commercial engine coolants". *Materials and Corrosion* 56:15-23. doi: 10.1002/maco.200403803.
- Sönmez, Hüseyin. 1989. *Metal Ekstrüzyonu*. İstanbul.

AN INVESTIGATION OF MATERIAL THICKNESS BEHAVIOR IN ROLL FORM
PROCESS USING FINITE ELEMENT METHOD

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Abstract

It can be called a gradual bending process of the roll form roll sheet material, by opening it in the uncoiler and passing it through the roller groups called the forming mold, until it reaches the desired cross-section dimensions. Among the biggest advantages offered by the rollform process are high production volume and low labor use. High surface quality and low dimensional tolerances can be achieved in the final product. In addition to the advantages brought by the roll form process, there are also disadvantages. One of these disadvantages is that it is difficult to determine the amount of stress and elongation that occurs on the material while forming with the rotational movement of the forming dies. Therefore, it is necessary to engineer studies for ensure final section of product which has complicated section. Also elongation and distrubition of stress should be determined for catch to narrow tolerances on final section. As the sheet material passes through the forming dies, the material does not show a linear deformation and follows a characteristic non-linear curve. Firstly, tensile test is performed to examine the deformation of the material, but the true curve is determined with the help of engineering formulas. Also engineer experince must be for determined to true curve. Engineer optimization was done during determined to true curve. In the scope of the article, the thinning and transverse elongation of the sheet material in the final product in the roll form process is determined, so the determination of the plastic region is very important. Marc Mentat program, one of the finite element programs, was used in the examination of the plastic region. Copra RF program was used for roll form mold design and flower pattern.

Keywords: Roll Forming, Finite Elements, Stress, Strain, Plastic Forming

1. INTRODUCTION

It can be called a gradual bending process of the roll form roll sheet material, by opening it in the un-coiler and passing it through the roller groups called the forming mold, until it reaches the desired cross-section dimensions. [1] Among the biggest advantages offered by the roll form process are high production volume and low labor use. Profile produced by roll form are used to in electric and electronic, structure, green house, automotive and a lot of sector. [2] Plastic deformation process is permanent shaping of material. Shaping of raw material is in plastic region and raw material is follow to nonlinear curve during to shaping. Mostly, while raw material shaping, passing region is not sharp. Therefore, estimating of yield point is pretty difficult. [3] Tensile test is commonly used for determining to yield point. Non-linear characteristic could be determined by using to tensile test result with engineering calculations. However, it necessary to be experienced for determine to nearest curve of material characteristic.

There are advantage and disadvantage in roll process. While design of tool, should be considered to angle of bending, number of stations, position of tools, determining to curve of material characteristic. Strain of bending region on material is examined according to K-factor in classic bending methods. [4] However, this method is not enough for roll form process. One of the main reasons while the sheet material is exposed to shear stresses in classical sheet bending methods, it is also exposed to normal stresses in addition to shear stresses in the roll form process. [5] Wrinkled, and flare, reducing of material thickness, desiring elongation might be occurred on material during to forming because of normal and shear stress. These deformations may cause the desired section not to be provide or out of tolerance. Within the scope of this article, thinning of sheet material thickness and transverse elongation of strip material are examined.

Finite element method is numerical analyses which is commonly used. Simulation piece is divided to meshes in finite element method and provide to model of material forming steps by using engineer formulas. [6] Within the scope of this article, the plastic deformations of the material were investigated using the Marc Mentat finite element analysis program. The designs of the molds used in the analysis were prepared with Copra RF.

2. MATERIAL AND METHOD

In Finite Element Analyze, material properties that is identified to software is significantly important to receive more accurate analyze and observe realistic non-linearity. Tensile test is common method to determined mechanical properties of material such as yield Strength (YS), ultimate Tensile Strength (UTS) and elongation percentage. [7]

The results of tensile test is not enough for realistic analyzes. It assumes that cross-section of the material is constant However, material area becomes narrow as forces applied correspondingly stress is increased. For this reason, the curve that is determined from tensile test called engineering curve need to transform to real curve via constant value assumed calculations as known Hooke's Law and Hollomon equations. [8]

Hooke's Law;

$$\sigma = E \cdot \varepsilon \quad (1)$$

σ : Stress, MPa

E: Elastic Modulus, MPa

ε : Strain

$$d\varepsilon = \frac{d\varepsilon}{L_i} \quad (2)$$

$$\sigma_R = \frac{P_i}{A_i} \quad (3)$$

According the constant value assumption,

$$V_i = V_0 \quad (4)$$

$$A_i \cdot L_i = A_0 \cdot L_0 \quad (5)$$

$$\frac{L_i}{L_0} = \frac{A_0}{A_i} \quad (6)$$

$$\varepsilon = \frac{L_i - L_0}{L_0} = \frac{L_i}{L_0} - 1 \quad (7)$$

$$1 + \varepsilon = \frac{L_i}{L_0} = \frac{A_0}{A_i} \quad (8)$$

$$A_i = \frac{L_0 \cdot A_0}{L_i} \quad (9)$$

If A_i from equation (3) use on equation (9), the real stress value σ_R calculate as below,

$$\sigma_R = \frac{P_i \cdot L_i}{A_0 \cdot L_0} \quad (10)$$

$$\sigma_E = \frac{P_i}{A_0} \quad (11)$$

$$\frac{L_i}{L_0} = 1 + \varepsilon \quad (12)$$

Relation between σ_g and σ_m is calculated by using equations 11 and 12,

$$\sigma_g = \sigma_m(1 + \varepsilon) \quad (13)$$

Integration calculation of strain for constant value assumption,

$$\varepsilon = \int_{L_0}^{L_i} \frac{dL}{L} = \ln \frac{L_i}{L_0} \quad (14)$$

Relation between engineering strain and real strain is,

$$\varepsilon_R = \ln(1 + \varepsilon) \quad (15)$$

Hollomon equations;

$$\sigma_g = K \cdot \varepsilon^n \quad (16)$$

σ_R : Real Stress

K: Constant Strength Factor

ε : Real Strain

n: Exponent

$$\log \sigma_g = \log K + n \log \varepsilon \quad (20)$$

Customer	2	TestDate	05-Mar-21
Coil No/Package No		Type	Flat
Size(mm)	2.8*20.8	So(mm ²)	58.24
A(%)	34.0	Su(mm ²)	/
Z(%)	/	Fm(kN)	27.14
Rm(MPa)	466	FeH(kN)	22.08
ReH(MPa)	379	Customer	2
TestDate	05-Mar-21	Coil No/Package No	
Type	Flat	Size(mm)	2.8*20.8
So(mm ²)	58.24	Lo(mm)	50
Lu(mm)	66.924	A(%)	34.0
Su(mm ²)	/	Z(%)	/
Fm(kN)	27.14	Rm(MPa)	466
FeH(kN)	22.08	ReH(MPa)	379
FeL(kN)	22.04	ReL(MPa)	378
Fp(kN)	20.58	Rp(MPa)	353
Ft(kN)	21.62	Rt(MPa)	371
E(GPa)	86		

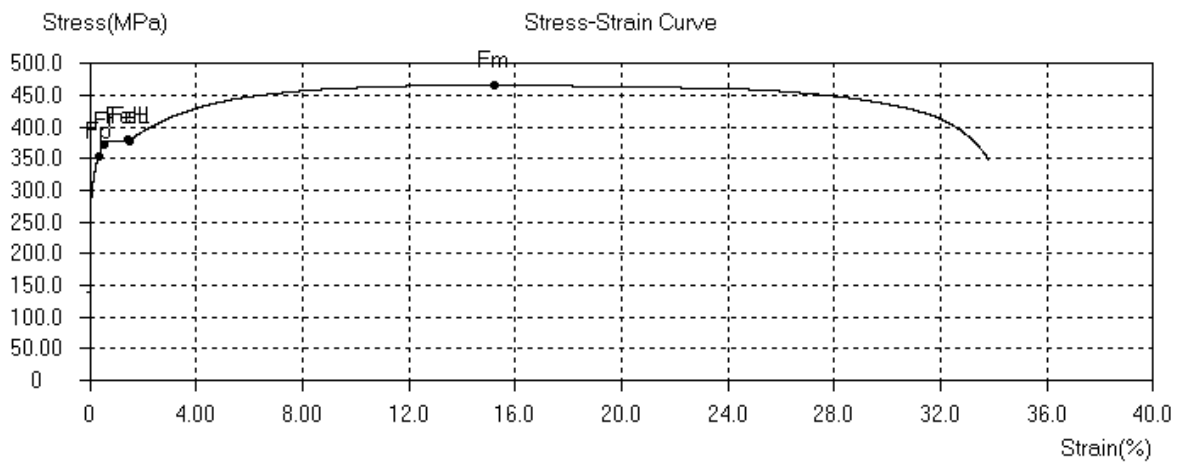


Table 1. Strain-Stress curve of material from tensile test

<i>Time</i>	<i>Load</i>	<i>Strain</i>	<i>Displacement</i>
0	0,020	-0,0006	0,000
0,08	0,020	-0,0005	0,000
0,18	0,040	-0,0010	0,000
0,28	0,040	-0,0010	0,010
0,381	0,060	-0,0020	0,010
0,48	0,100	-0,0030	0,020
0,58	0,140	-0,0045	0,020
0,68	0,180	-0,0060	0,030
0,78	0,240	-0,0070	0,040
0,879	0,300	-0,0085	0,050
0,979	0,380	-0,0095	0,060
1,079	0,460	-0,0110	0,071
1,179	0,540	-0,0125	0,081
1,279	0,640	-0,0135	0,091
1,379	0,720	-0,0150	0,101
1,479	0,800	-0,0160	0,111
1,579	0,880	-0,0175	0,121
1,679	0,940	-0,0185	0,131
1,779	1,020	-0,0200	0,141

Table 2. Some of tensile test outputs

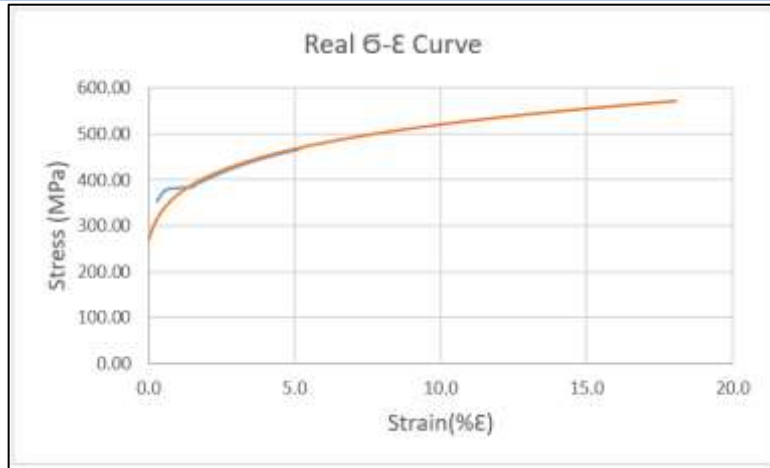


Figure 2. Real Stress-Strain Curve

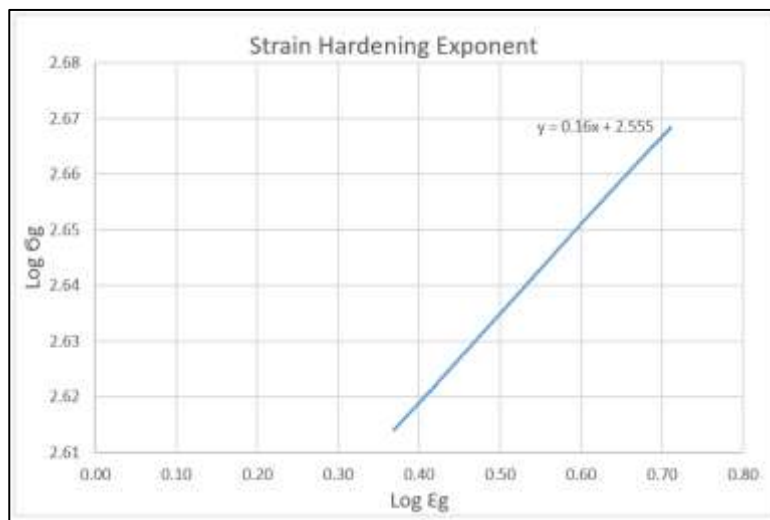


Figure 2. Strain Hardening Exponent Curve

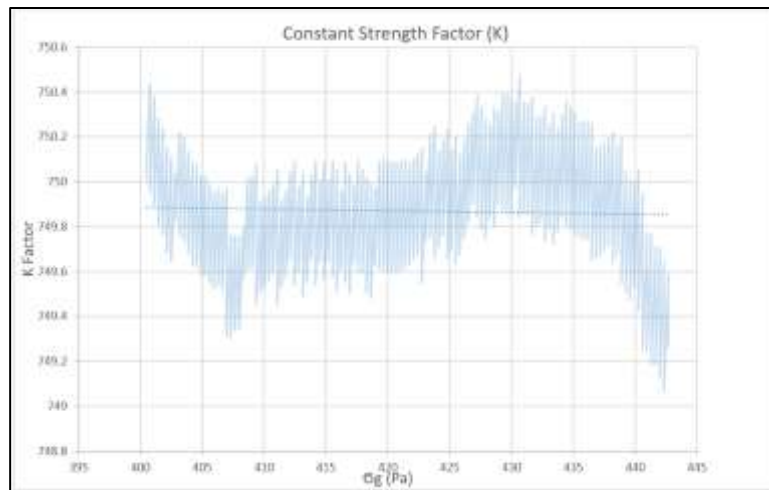


Figure 3. Constant Strength Graphic

The values that is required to achieve the real curve identify by these graphics.

$K = 750 \text{ MPa}$

$n = 0.16$

Accordingly, real curve identifies to FEA software as below,

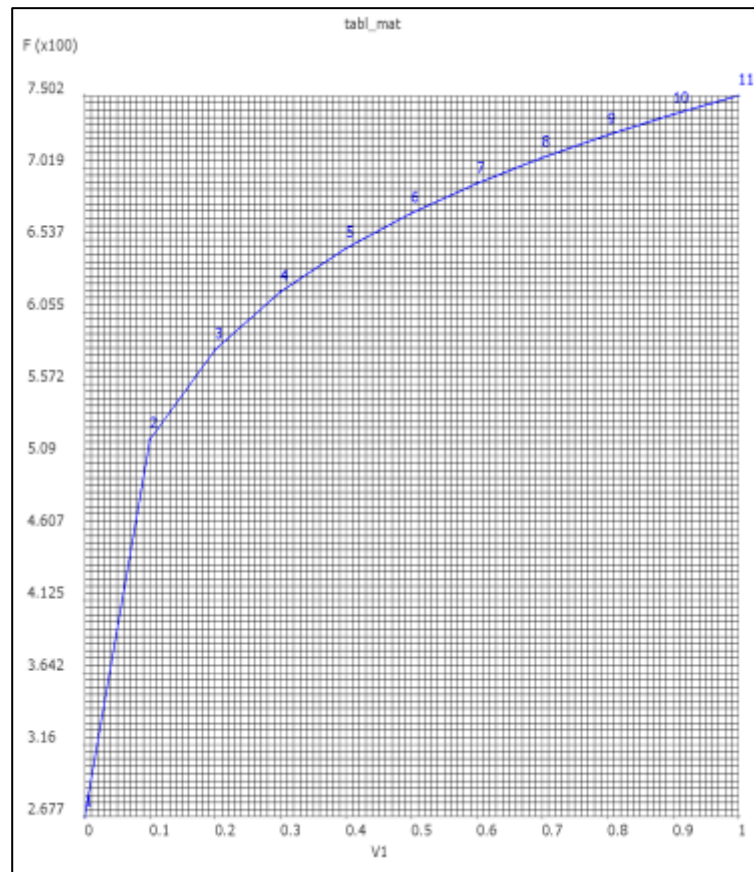


Figure 4. Real curve identifies to FEA software

3. DESIGN

Roll forming process is to shape the material progressively by the rollers step by step and sum of all shapes from each station be named roll form flower-pattern [9]. Flower-pattern is important to avoid extreme strains and residual stresses. The designer examines the flower-pattern according to machine parameters such as engine power, gear ratio, number of passes, distance between each pass, rolls diameter, dimensions of the shaft and shafts axis. Besides the mechanical parameters, material properties are used for determine the number of stations and shaping angles.

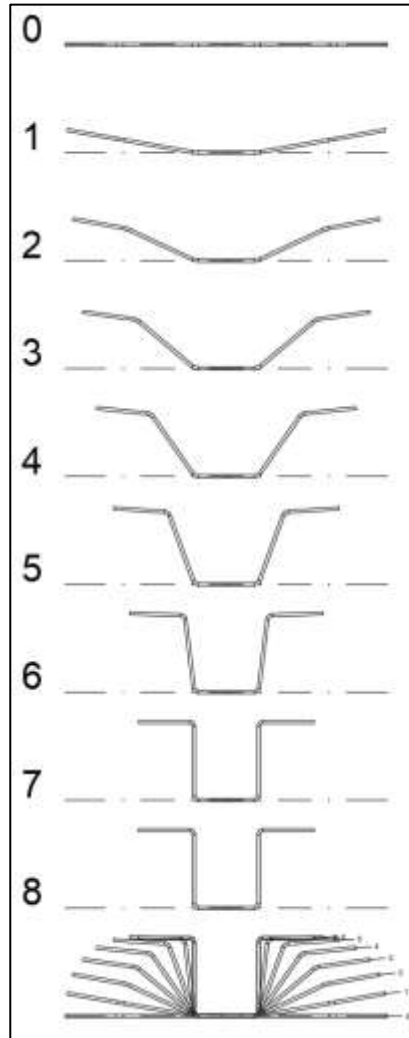


Figure 5. Flower-pattern

4. FINITE ELEMENT ANALYZE

The boundary conditions are defined to FEA software according to below assumptions;

- All gaps between bottom and top rollers at all stations are same and not change during forming
- An abrasion of rollers is ignored
- Frictions are ignored in environment
- The shafts that resist to forming forces has infinite rigidity.
- Sheet material has constant thickness
- Material is isotropic and homogeneous

Sheet material is defined deformable material and rollers are defined as infinitely rigid geometry to the FEA software. Mesh construction of the deformable material is 8 nodes hex element. [10]

5. DISCUSSION

While material formed step by step, undesired deformation might be occurred on material during to roll form process. Mainly deformations are;

- 1) Spring back
- 2) Traverse elongation
- 3) Longitudinal elongation
- 4) Crack

These undesired deformations could be affected to material alone or together. [11] Result of these effecting, wrinkled of flat corner which is not bending, spring back after cutting, thinning of thickness might be occurred that effect to final section on material. A few deformation is showed in figure of 6 which might have occurred on material.

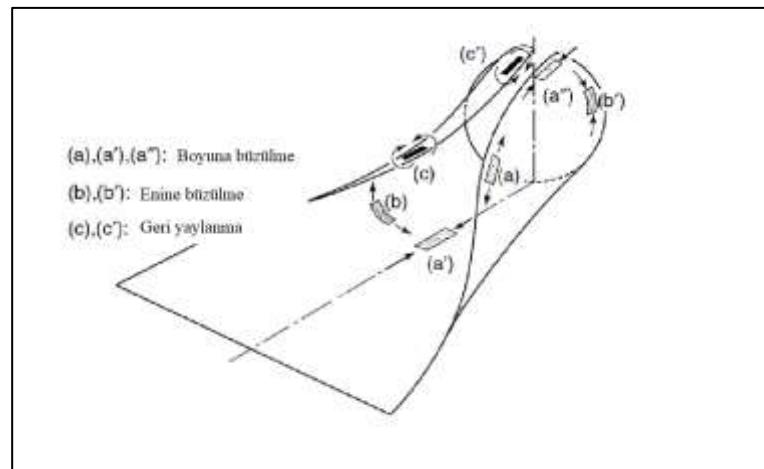


Figure 6. Undesired deformation on material

As seen in Figure 7, the deformation in bend edge mostly effect on the outside. [12]

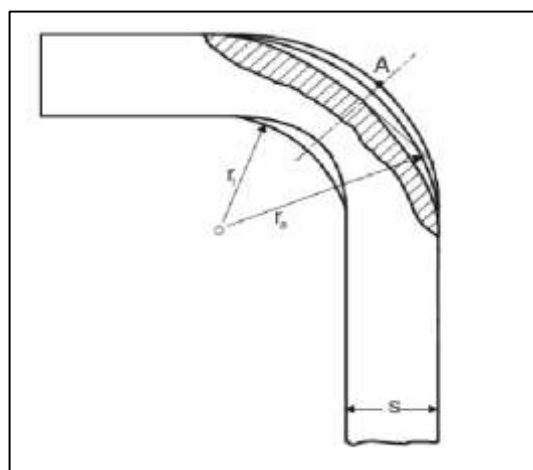


Figure 7. Deformation of bending region [12]

The material characteristics, which the mold design was made in accordance with the flow pattern shown in Figure 5 and calculated in section 2. Material and method, were defined to the finite element

software program with the boundary conditions which is explained in section 4. Finite element analyzes, and the cross-section comparison as a result of the analysis is shown in Figure 8.

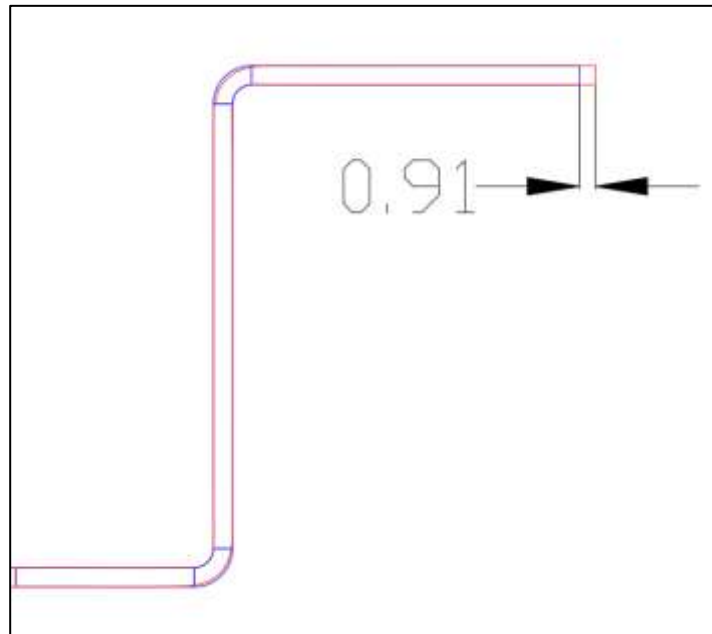


Figure 8. Comparison of analysis result to real section

Comparison of the cross sections result of the analysis which shown in Figure 8, close to the expected deformation that was determined in the bend edge as shown in Figure 7. While material forming step by step, it is exposed to normal and shear stress. Therefore, towards to out of elongation is occurred because of thinning of bend corner. The behavior of the elongation of the sheet material during cold forming is examined as seen below figure 9 – 10 – 11 - 12.

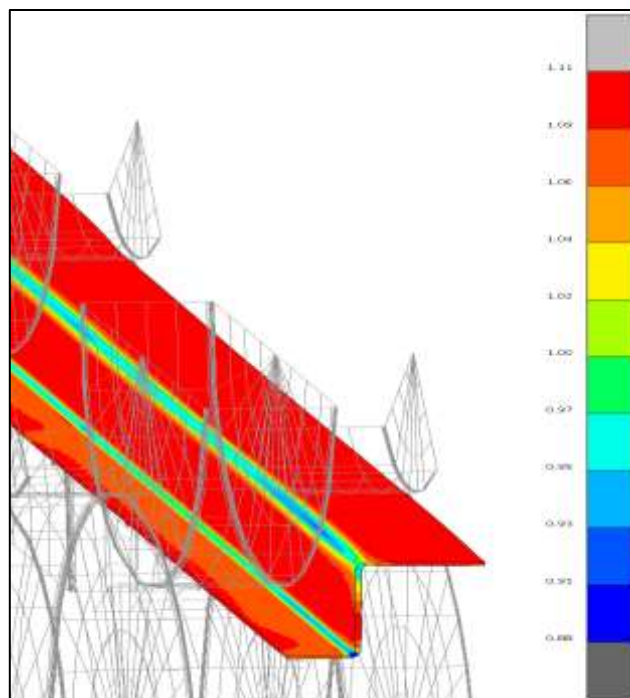


Figure 9. Distribution of sheet thickness in profile

Input material thickness is 1.10 mm. Min material thickness 1.11, max material thickness 0.88mm is observed according to simulation result. As an expected, most thinning of material thickness is observed in bending corner which is radius region. Consequently, transverse elongation is observed 1.82mm.

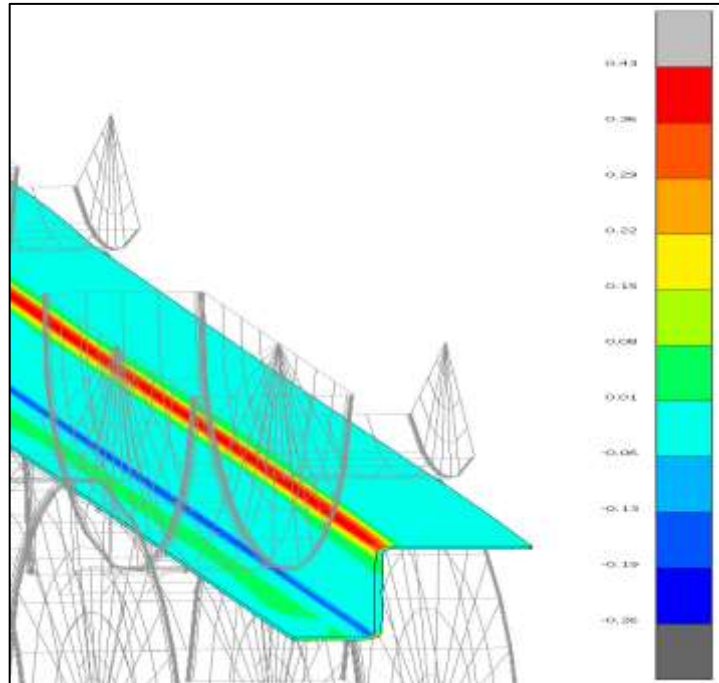


Figure 10. Distribution of strain in the width direction

As seen figure 10, one of the reasons of thinning radius region is difference to strain in upper surface to lower surface. Therefore, neutral axis is not to middle of bending region. In Figure 13, their elongation at the upper and lower surfaces are in the opposite direction.

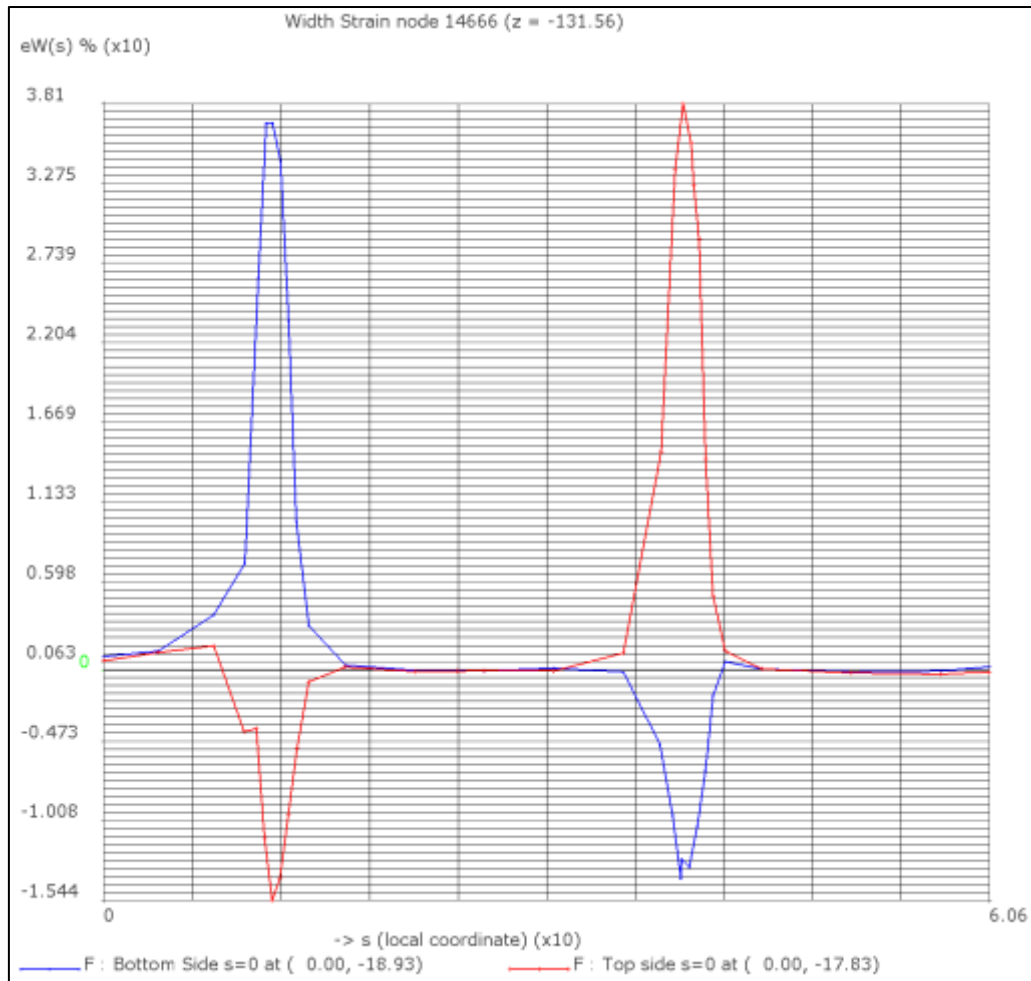


Figure 11. Elongation of final section in the width direction

In figure 11, picked node of last section is examined that node displacement toward to width direction. Red line is shown to upper surface and blue line is shown lower surface. Consequently, to strain which showed to figure 11, decrease to material thickness is predicted in this strain values. Amount to thinning of material thickness is shown in figure 12.

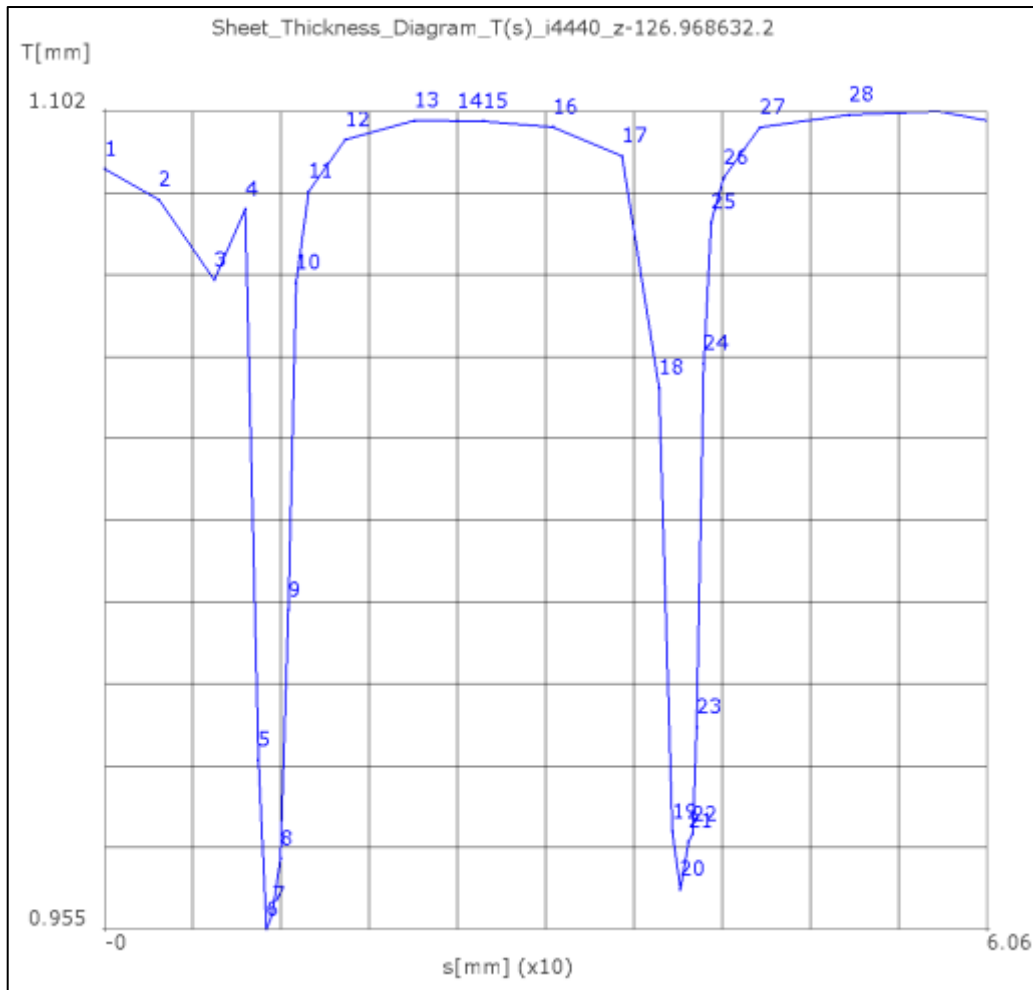


Figure 12. Thinning of final section

6.CONCULATION

The transverse elongation of the sheet material caused by the thinning in the radius regions may cause the section tolerances is not ensured Real strip width of material is determined by trial production because of elongations during to forming. This trial production cause increased to amount of scrap and labor price. If these elongations could be determined before to serial production, trial production is not necessary for real strip width calculation. In order to eliminate this trial production, the design should be revised to minimize the transverse elongation of the sheet material caused by the thinning of the bend radius or this elongation amount should be determined. In dependent to determining of elongation, real strip width could be determined. Within the scope of this article, the thinning of the radius region of the material and the transverse elongation of the sheet were calculated by using finite element analysis program.

REFERENCES

- [1] **Todd, R. H., Allen, D. K., Alting, L.** 1994. "Manufacturing Processes Reference Guide", Industrial Press Inc.
- [2] **Wei-Wen Yu, Roger A. LaBoube** 2010. "Cold Formed Steel Design 4th Edition" ISBN: 978-0-470-46245-4
- [3] **Z. Marciniak, J. L. Duncan, S. J. Hu** 2002. "Mechanics of Sheet Metal Forming" ISBN: 0-7506-5300-0
- [4] **Karachalios, E., Achilles, V.** 2006 "The study of design of constants in sheet metal forming." Proceedings of the 2nd International Conference of "From Scientific Computing to Computational Engineering", Athens.
- [5] **Kiuchi, M., Kodabashi, T.** 1984 "Proc. of the 3rd International Conf. on Rotary Metalworking Processes", IFS Ltd and North Holland.
- [6] **O. C. Zienkiewicz, R. L. Taylor, J. Z. Zhu** "The Finite Method Its basic and fundamental 7th edition" ISBN: 9781856176330
- [7] **Davis, J. R.**, 2004. "Tensile testing", ASM international.
- [8] **Robert M. Jones** 2009 "Deformation Theory of Plasticity" ISBN 978-0-9787223-1-9
- [9] **Abeyrathna B., Rolfe B., Hodgson P., Weiss M.**, 2015 "An extension of the flower pattern diagram for roll forming. The International Journal of Advanced Manufacturing Technology." 83. 10.1007/s00170-015-7667-0.
- [10] **Marc volum b: element library** 2021
- [11] **G.T. Halmos** 2005 "Roll forming handbook" ISBN: 0-8247-9563-6
- [12] **Fritz Klocke** 2006 "Manufacturing processes 4" ISBN: 978-3-540-23650-4

**THE EFFECT OF COMPANY DEMOGRAPHY ON COMPANY PERFORMANCE;
AN APPLICATION IN MERSIN FREE ZONE AND ORGANIZED INDUSTRIAL
ZONE**

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Özet

Firma performans ölçümü günümüze kadar sürekli gelişen ve değişen bir yaklaşımdır. Rekabetin yüksek olduğu yerlerde performans açısından finansal olmayan önlemleri vurgulamak mantıklı olabilir. Firmalar hedeflerinin gerçekleşip gerçekleşmediğini, firmanın finansal yapısının değerlendirilmesinin yanında karlılık ve etkinlik analizleri ve firmanın rekabetçi yapısını ortaya koymasını ve firmanın büyüme gücünün tespiti gibi konular performans ölçümüyle belirlenebilmektedir (Şenol,2019:279). Finansal göstergelerin kullanımı işletmelerin çalışma şeklini belirlemiştir, ancak özellikle süreç, yapı ve değişime odaklanan finansal olmayan veya niteliksel göstergelerin ortaya çıkması, işletmelerin performansı algılama biçimini değiştirmiştir (Tucker ve Pitt; 2008: 407).Bu çalışmada şirketlerin çalışan sayısının ve faaliyet yılının firma performansı değişkenlerinden müşteri ve finansal performans üzerine etkileri teorik ve ampirik olarak ele alınmıştır. Araştırma Mersin Serbest Bölgesi ve Mersin Organize Sanayi Bölgesinde firmaların performansı üzerine firma demografik bilgileri bakımından incelenmiş ve analiz bulgularına Doğrulayıcı Faktör Analizi (DFA) yöntemi ile ulaşılmıştır. Araştırmanın uygulama aşamasında 238 firmaya anket uygulanmıştır. Analiz sonucunda performans ölçeği çalışan sayısı bakımından değerlendirildiğinde hem müşteri hem finans boyutları ve hem de ölçeğin tamamı için çalışan sayısı arttıkça performans algısının da arttığı görülmektedir. Ayrıca performans ölçeği çalışan sayısı bakımından değerlendirildiğinde, çalışan sayısı bakımından ortaya çıkan algıdan farklı olarak, hem müşteri hem finans boyutları ve hem de ölçeğin tamamı için yaşı daha genç olan firmalarda performans algısının daha yüksek olduğu görülmektedir.

Anahtar Kelimeler: Finansal Performans, Müşteri Performans, Doğrulayıcı Faktör Analizi

Abstract

Firm performance measurement is an approach that is constantly evolving and changing until today. Where competition is high, it may make sense to emphasize non-financial measures for performance. Subjects such as whether companies have achieved their goals, evaluation of the financial structure of the company, profitability and efficiency analyzes, revealing the competitive structure of the company and determining the growth power of the company can be determined by performance measurement (Şenol, 2019:279). The use of financial indicators has determined the way businesses operate, but the emergence of non-financial or qualitative indicators that focus specifically on process, structure and change has changed the way businesses perceive performance (Tucker ve Pitt; 2008: 407). In this study, the effects of

the number of employees and the operating year of the companies on customer and financial performance, which are among the firm performance variables, are discussed theoretically and empirically. The research was examined in terms of company demographic information on the performance of the companies in Mersin Free Zone and Mersin Organized Industrial Zone, and the analysis findings were reached with the Confirmatory Factor Analysis (CFA) method. During the implementation phase of the research, a questionnaire was applied to 238 companies. As a result of the analysis, when the performance scale is evaluated in terms of the number of employees, it is seen that the perception of performance increases as the number of employees

increases for both customer and financial dimensions and the whole scale. In addition, when the performance scale is evaluated in terms of the number of employees, it is seen that the performance perception is higher in companies that are younger for both customer and financial dimensions and the whole scale, unlike the perception in terms of the number of employees.

Keywords: Financial Performance, Customer Performance, Confirmatory Factor Analysis

1. GİRİŞ

Performans ölçümü çeşitli birçok konuyu bünyesinde barındırır. Dolayısıyla gerek muhasebe, pazarlama finans, ekonomi, operasyon yönetimi gerekse de psikoloji ve sosyoloji gibi alanlarda çeşitli araştırmacılar aktif olarak performans ölçümü konusunda çalışmaktadır. Firma performansının bütününe değerlemeye yönelik geçmişten günümüze kadar gelişen ve değişen birçok performans ölçme yaklaşımı söz konusudur (Elitaş ve Ağca, 2006: 343).

Performans ölçümlerinde finansal olmayan ölçüler ile finansal performans arasındaki gerçek ilişkiyi anlamak gerekir. Rekabetin yüksek olduğu yerlerde finansal olmayan önlemleri vurgulamak mantıklı olabilir. Firmalar hedeflerinin gerçekleşip gerçekleşmediğini, firmanın finansal yapısının değerlendirilmesinin yanında karlılık ve etkinlik analizleri ve firmanın rekabetçi yapısını ortaya koyması ve firmanın büyüme gücünün tespiti gibi konular performans ölçümüyle belirlenebilmektedir. Firma performansı işletmeye konulan ya da konulması düşünen sermayeye ve faaliyet sonuçlarının ekonomik sonucuna göre belirlenmektedir (Şenol,2019: 279).

Elitaş ve Ağca (2006), bugüne kadar kullanılan ve halen de kullanılmakta olan sadece finansal göstergelere dayalı değerlemenin firma performansını ölçmede yetersiz kaldığına vurgu yapmıştır (Elitaş ve Ağca, 2006: 343). Dolayısıyla çok boyutlu performans değerlemesi, firma faaliyetlerinin tüm boyutlarıyla değerlendirilmesinin yanında firma demografisinin firma performansına etkisini de incelenmesi gerekliliğini göz ardı etmemek gerekir.

2. KAVRAMSAL ÇERÇEVE

2.1. Firma Performansı

Performans, genellikle harcama verimliliği, yönetim sorumluluğu veya hesap verilebilirlik ile bağlantılı olarak, bir zaman dilimindeki bir eylemin performansının bir kısmına veya tamamına uygulanan bir faaliyettir (Khan, Nouman ve Imran:2015:3). Diğer bir ifadeyle performans ölçümü, firmaların planlama ve kontrol sağlamada firma yöneticilerini yönlendiren ve yöneticilerin bu doğrultuda kararlar almasına yardımcı araçlardır, bu doğrultuda organizasyonel amaçların ne derecede gerçekleştiğinden ziyade, organizasyonun

güçlü ve zayıf yönlerinin ve gelecekle ilgili hedeflerinin neler olabileceği durumunu belirler (Öncü vd.,2012: 150).

Yeni üretim yöntemleri, geleneksel muhasebe sistemlerinin bilgi ve motivasyon eksikliklerini ortaya çıkarmıştır (McNair vd.;1990: 28). Yiğiter (2011), finansal olmayan performans ölçümlerini “mali tablolarda yansıtılmayan ya da sonuçları raporlanmayan ölçümlere olduğuna vurgu yapmıştır (Yiğiter,2011:2). Dolayısıyla performans değerlendirmede; üretim ve operasyon teknolojileri, müşteri zevk ve tercihleri, pazar talebi, müşteri ve tedarikçilerle ilişkiler, dağıtım kanalları, rakiplerin sayısı ve eylemleri, paydaşlarla ilişkiler gibi faktörlere ilgi önemli ölçüde yoğunlaşmıştır (Khan vd.;2011:6).

Tüm bu anlatımlarla birlikte firmalar finansal performans ölçüm sistemlerinin kalite, müşteri memnuniyeti, çalışanların memnuniyeti, esneklik ve yenilik gibi finansal olmayan konular üzerine odaklanmışlardır (Debusk, Brown vd.; 2003: 217).

2.1.1. Müşteri Performansı

Geleneksel olarak, finansal göstergelerin kullanımı işletmelerin çalışma şeklini belirlemiştir, ancak özellikle süreç, yapı ve değişime odaklanan finansal olmayan veya niteliksel göstergelerin ortaya çıkması, işletmelerin performansı algılama biçimini değiştirmiştir (Tucker ve Pitt; 2008: 407). Bu doğrultuda, firmaların yönetim kontrol sistemlerinde finansal olmayan ölçütlerin kullanımı, araştırmacılar kadar uygulayıcılar arasında da büyük ilgi uyandırmış ve müşteri memnuniyeti ile finansal performans arasındaki bağlantılar incelenmiştir. Bu literatürden elde edilen bulgular, daha yüksek müşteri memnuniyetinin daha düşük pazarlama maliyetleri, daha az fiyat esnekliği ve daha yüksek müşteri sadakati anlamına geldiğini ve bunun da finansal performansta iyileşmelere yol açtığını göstermektedir (Reichheld ve Sasser 1990). Tüm bu anlatımlarla birlikte müşteri memnuniyetini artırmak, müşteri memnuniyetindeki artışların genel ekonomik sonuçlarına odaklanmayı gerektiren belirli maliyetler gerektirebilir. Müşteri memnuniyetinin bu tür ekonomik sonuçlarını anlamaya odaklanan çalışmalar müşteri memnuniyetinin satış geliri, pazar payı ve müşterilerin satın alma davranışı üzerinde bir etkisi olduğunu savunur ((Anderson, Fornell ve Lehmann 1994:131; Anderson, Fornell ve Rust 1997:55).

Ayrıca, Avrupa Kalite Yönetimi Vakfı (EFQM) tarafından geliştirilen Avrupa İş Mükemmelliği Modeli Avrupa ve birçok ulusal kalite ödülünün temelini oluşturur ve şirketlerin değerlendirildiği dokuz kriterlerden müşteri memnuniyeti kriteri en önemli kriterdir ve şirketler kendi mükemmelliklerini değerlendirip ölçtüğünde puanlama sistemindeki toplam puanların yüzde 20'sini oluşturur. Bu, müşterileri anlamının ve müşteri memnuniyetini ölçmenin, şirketlerin sürekli kalite iyileştirmesinde önemli bir unsur olduğu anlamına gelir, bu da ekonomik performans da dahil olmak üzere iş performansının iyileşmesine yol açtığına vurgu yapar (Kristensen vd.2004:279).

2.1.2.Finansal Performans

Finansal performans, aynı faaliyet kolundaki firmaları karşılaştırmak veya nasıl iyileştirebileceklerine dair bir iş planı sağlamak için toplam endüstrileri veya sektörleri karşılaştırmak için kullanılabilir (Ruri ve Oamwa: 2018:2). Diğer bir ifadeyle finansal performans, normal iş faaliyetleri sırasında firmanın cari varlıklarının en uygun nasıl kullanılabileceği ve işletme için geliri nasıl artırabileceğidir (Ruri and Omagwa; 2018 :2). Firmanın finansal performansı; karlılık performansı, büyüme performansı ve piyasa değeri performansı olmak üzere üç değişkenden oluşmaktadır. Finansal performans gelir tablosundaki ciro, stok seviyeleri, satışların maliyeti, faaliyet gelirleri ve giderleri ile nakit akışları gibi kalemler kullanılabilir (Ruri ve Omagwa, 2018:2).

3. İLGİLİ LİTERATÜR

Brito ve Vasconcelos (2013), performansın ölçülmesi ve analiz edilmesi, performansın firmadan firmaya, endüstriden sektöre ve yıldan yıla aynı anda değiştiği çok karmaşık bir konu olduğu ve bu sorunun arkasındaki teorik tartışmanın, endüstriyel organizasyondan türetilmiş strateji yaklaşımının kaynak temelli bakış açısına göre değiştiği hususuna vurgu yapmıştır (Brito ve Vasconcelos, 2013 : 1). Ayrıca Brito ve Vasconcelos 1998-2001 yılları arasındaki Brezilya firmaları üzerine performans değişkenliğinin bileşimini analiz etmiştir. Ampirik bir çalışma sonucu yıl ve endüstri etkilerinin bu tür bir ortamda beklenenden çok daha küçük olmasıyla birlikte firma etkilerinin performansla baskın olduğu görülmüştür ve bununla birlikte firma büyüklükleri firma etkilerinden ikinci sıradadır. Bu etkinin belli bir kısmı belirli bir yılda çeşitli endüstrileri farklı şekilde etkileyen faktörlerin etkisini temsil eden yıl ile etkileşimden kaynaklanmaktadır (Brito ve Vasconcelos, 2013 : 13).

Salim ve Yadav (2012), firmaların performansı çeşitli faktörlerden önemli ölçüde etkilenir ve sermaye yapısı bunlar arasında önemli faktörlerden biridir. Firma performansı ile sermaye yapısı arasında herhangi bir (olumlu, olumsuz ya da ilişki yok) ilişki olup olmadığını araştırmak için birçok ampirik

çalışma yapılmıştır ve bu çalışmalar karışık sonuçlar vermiştir (Salim ve Yadav; 2012:157). Rajan (2005)'a göre bir firmanın performansını etkileyen faktörler göz önüne alındığında sermaye yapısı kararları büyük önem taşımaktadır (Rajan, 2005:22). Dolayısıyla şirket değerini ve yatırım kararlarını etkiler (Mustafa; 2019: 2). Bu anlatımlara ek olarak, Bonoma ve Clark (1988), endüstri düzeyinde üretkenlik çalışmaları incelemelerinde, kullanılan en yaygın girdi ölçütleri adam saat, sermaye ve istihdam edilen kişi sayısıdır. Ayrıca, demografik, ekonomik ve sektöre özel değişkenler de dahil olmak üzere pazarlama perspektifi girdi-çıkı ilişkisi üzerinde yaklaşık 17 düzenleyici faktör kaydettiler (Bonoma ve Clark;1988:2).

Ayrıca Ağdelen ve Erkut (2008) çalışmasında firmanın kurumsal ve yönetsel özelliklerinin insan kaynakları yönetimi üzerindeki performansı incelediklerinde “firmanın öz sermayesi, firmada çalışan sayısı, firma yaşı, firmada çalışanların ortalama yaşı, çalışanların ortalama kıdem yaşı, insan kaynakları kadro oranı (firmada çalışan toplam personel sayısının insan kaynakları bölümünde çalışan kişi sayısına oranı) ve sahiplik (firmanın şirket yapısı ile üst düzey yönetimde kimlerin yer aldığı belirlenmeye çalışıldığı özellik) kurumsal özellikler açısından analiz edildiğinde çalışanların yaşının büyük olmasının, yönetici sayısının fazla olmasının” gibi etmenler insan kaynakları performansını olumsuz etkilediğini, “formalizasyon, standardizasyon, öz sermaye, firma yaşı ve çalışan sayısının büyük olması” gibi etmenlerde insan kaynakları performansını olumlu etkilediğini göstermektedir (Ağdelen ve Erkut; 2008:50). Kaplan ve Norton (1996), firmalara finansal açıdan değerlendirildiğinde, gerek yöneticilerin şirketlerin uzun zamanda başarısının hangi ölçülere göre yorumlayacağını belirlemelerine, gerekse uzun zamanlı amaçlara ulaşmada en önemli unsurların neler olduğunu belirlemelerine vurgu yapmıştır. (Kaplan, Norton 1996: 78)

Çopuroğlu ve Korkmaz (2008), çalışmasında kontrol değişkenleri olarak; “firma hacmi, firma yaşı, sorumluluğu ya da varlık yapısı, satış büyümesi, likiditesi ve reklam oranı, dağıtım pazarlama giderlerinin toplam giderlere oranı” kullanmıştır. Firma yaşı ölçülürken, “başlangıç yılından gözlem yılına kadar devam eden yıl sayısı” ölçülen bir kontrol değişkeni ve diğer kontrol değişkeni “varlık yapısı”dır. Varlık yapısının hesaplanmasında “net duran varlıkların toplam varlıklara oranı” kullanılmıştır. Aynı zamanda satışlardaki değişimin firma

performansının üzerindeki etkisini incelenmiştir. Ayrıca likidite oranı hesaplanmış ve son olarak “reklam, dağıtım ve pazarlama giderlerinin”, “toplam giderlere” oranları incelenerek, firma üzerinde bir etkisinin olup olmadığı incelenmiştir. İnceleme sonucu firmanın yaşı ile firma performansı ve sermaye yapısı arasında herhangi bir ilişki bulunamamıştır (Çopuroğlu ve Korkmaz,2008: 30). Asimakopoulos vd. (2009), Atina Borsasına kayıtlı 119 finansal olmayan firmanın 1995-2003 dönemine ait verilerle karlılığın belirleyicilerini araştırmışlardır. Çalışmada, firma karlılığının büyüklük, satış büyümesi ve yatırımla pozitif, kaldıraç ve likit varlıklarla negatif yönde ilişkili olduğu belirlenmiştir.

Ayrıca bu anlatımlarla birlikte müşteri performansı açısından bakıldığında Yiğiter (2011: 2), “yüksek müşteri memnuniyetinin düşük pazarlama maliyetlerine, düşük fiyat esnekliğine ve yüksek müşteri sadakatine yol açtığını”, bunun da finansal performansına pozitif etkisi olduğunu vurgulamış , tüm bu ifadelerle birlikte müşteri memnuniyetinin ekonomik sonuçlarını inceleyen çalışmalarda artan müşteri memnuniyetinin işletmelerin satışlarını, pazar payını, işletmenin piyasa değerini, hisse senedi fiyatını ve müşterinin satın alma davranışını olumlu etkilediği hususuna vurgu yapmıştır. Kaplan ve Norton, firmanın çalışanlar, sistemler ve kurumsal uyum için yapmış oldukları yatırımların sonuçlarının ölçülmesinde, çalışanların memnuniyeti, verimlilik ve devamlılık gibi üç temel faktöre vurgu yapmıştır. (Kaplan Norton 1996: 161). Anderson ve arkadaşları (1997), müşteri memnuniyetinin imalat firmaları için verimliliğin artmasına yol açarken, hizmet firmaları için memnuniyet ve verimlilik arasında bir değiş tokuş olduğunu bulmuştur (Anderson vd.;1997: 134). Ittner ve Larcker (1998) birçok durumda müşteri memnuniyeti ile finansal performans arasında önemsiz hatta negatif bir ilişki bulmaktadır (Ittner ve Larcker,1998:30). Müşteri memnuniyeti gibi finansal olmayan ölçüleri karar destek veya yönetim

kontrol sistemlerine dahil etmeden önce, bu ilişkiyi etkileyen düzenleyici etkileri belirlemek önemlidir. (Banker and Mashruwala, 2007: 766)

4. YÖNTEM

Bu bölümde Mersin Serbest Bölgesi ve Mersin Organize Sanayi Bölgesinde firmaların performansı üzerine yapılan bir araştırmanın firma demografik bilgileri bakımından incelenmesi analiz bulguları verilmiştir.

Bu ölçek için yapılan araştırmalar sonucu Yıldız ve Çetindaş (2018)'in “Stratejik kaynak kullanımının firma performansı üzerindeki etkisinde tedarik zinciri çevikliğinin aracılık rolü” çalışmasındaki firma performansı ölçeğinin, bu çalışma için de uygun olacağı düşünülmüştür. Orijinal dili İngilizce olan ölçekler, daha önce Yıldız ve Çetindaş (2018)'in çalışmasında Türkçeye çevrilmiş ve soruların anlaşılabilirliği uzmanlar tarafından geçerliliği yapılmıştır. Bu ölçek de 5'li Likert Ölçeğidir ve toplam 9 ifadeli ölçekte müşteri performansı boyutunda 5, finansal performans boyutunda 4 ifade bulunmaktadır.

Evren ve Örneklem

Duyarlılık, güven düzeyi ve seçilecek örnekteki birim sayısı birbiri ile ilişkili değerlerdir. İstenilen düzeyde duyarlılık ve güvenilirliği sağlayan örnek çapı yığındaki birim sayısına bağlı olarak aşağıdaki formülde verilmiştir.

$$n = \frac{N(zs)^2}{Nd^2 + (zs)^2} \quad (1)$$

Burada N yığındaki birim sayısını, z istenilen güvenilirlik düzeyi için standart normal dağılımdaki kritik değeri, d duyarlılığı, s ise standart sapmayı göstermektedir. Eğer örnekleme çalışması yığındaki oran üzerine ise; orana ilişkin varyans

$$s^2 = p.q \quad (q = 1 - p)$$

olduğundan yukarıdaki formül

$$n = \frac{Nz^2 pq}{Nd^2 + z^2 pq} \quad (2)$$

şeklinde ifade edilir (Yamane, 2001:116).

Yığından seçilecek örneklem sayısı yukarıda (2) ile verilen formül uygulanarak elde edilir. Araştırmanın evreni organize sanayi bölgesinde 217 firma (kurumsal web sayfasından alınan bilgiye göre: <https://www.mesbas.com.tr/firmalar.html>, Erişim tarihi: Şubat 2020), Serbest Bölge'de 70 firma (kurumsal web sayfasından alınan bilgiye göre: <http://www.mtosb.org.tr/firmalar/>, Erişim tarihi: Şubat 2020) olmak üzere toplam 287 firmadan oluşturmaktadır. Çalışmanın çerçevesi ve kısıtlarına göre örneklem çapı %95 güvenilirlik %5 duyarlılık düzeyinde olması uygun görülmüştür. Buna göre örnek çapı en az 168 firma olarak tespit edilmiştir. Araştırma deseninin dengeli olması göz önünde bulundurularak, organize sanayi bölgesinden 127 firma, serbest bölgeden 41 firma seçilmesi uygun görülmüştür. Araştırmanın uygulama aşamasında 238 firmaya anket uygulanmıştır. Örnekleme yöntemi olarak basit rastgele örnekleme yöntemi kullanılmıştır.

Araştırma hipotezleri

İlgili literatürde bir işletmenin büyüklüğünü belirlemek için genel olarak çalışan sayısı, faaliyet süresi ve ciro büyüklüğü (veya sermaye büyüklüğü) olmak üzere üç değişken yaygın olarak kullanılmaktadır. Araştırma kapsamında firma büyüklüğünü ifade eden ve anket uygulaması ile elde edilmesi mümkün olan firma demografik değişkenleri; firmanın faaliyet süresi ve çalışan sayısı olarak belirlenmiştir. Araştırma hipotezleri de firma performansının bu iki değişken bakımından farklılaşıp farklılaşmadığı üzerine kurulmuştur .

Verilen bilgiler ışığında oluşturulan hipotezler şunlardır:

H1: Şirketin firma performansı faaliyet yılına göre farklılaşmaktadır.

H1_A: Şirketin müşteri performansı faaliyet yılına göre farklılaşmaktadır.

H1_B: Şirketin finansal performansı faaliyet yılına göre farklılaşmaktadır.

H2: Şirketin firma performansı çalışan sayısına göre farklılaşmaktadır.

H2_A: Şirketin müşteri performansı çalışan sayısına göre farklılaşmaktadır.

H2_B: Şirketin finansal performansı çalışan sayısına göre farklılaşmaktadır.

Araştırmada kullanılan ölçreklere için güvenilirlik ve geçerlik analizleri; Cronbach'ın Alpha katsayısı ve Doğrulayıcı Faktör Analizi (DFA) yöntemleri ile gerçekleştirilmiştir. Elde edilen bulgular Tablo1 ve Tablo 2 de özetlenmiştir.

Cronbach alfa katsayısı, ölçek içinde bulunan maddelerin iç tutarlığının (homojenliğinin) maddeler arası korelasyon katsayılarına bağlı bir ölçüsüdür. Diğer bir ifadeyle, alfa katsayısı ile ölçekte yer alan k tane maddenin (sorunun) türdeş bir yapıyı açıklamak ya da sorgulamak üzere bir bütün oluşturup oluşturmadıklarının sorgulanması konusunda bilgi elde edilir.

Cronbach alfa katsayısı, 0 ile 1 arasında değer alır, ölçeğin alfa katsayısı ne kadar yüksek olursa “bu ölçekte bulunan maddelerin o ölçüde birbiriyle tutarlı ve aynı özelliğin öğelerini yoklayan maddelerden oluştuğu ya da tüm maddelerin o ölçüde birlikte çalıştığı” yorumu yapılır.

Alfa katsayısının yorumu aşağıdaki gibi yapılır. (Alpar, 2013: 876).

Tablo 1. Cronbach’s Alpha katsayısının değer aralığı ve yorumları

Alfa katsayısı	Yorumu
0,80 – 1,00	Geliştirilen ölçek/test yüksek güvenilirliğe sahiptir.
0,60 – 0,79	Geliştirilen test oldukça güvenilirdir.
0,40 – 0,59	Geliştirilen güvenilirliği düşüktür.
0,00 – 0,39	Geliştirilen test güvenilir değildir.

DFA, ölçeklerin geliştirilmesinde, ölçek modelinin de geçerliliğinin analiz edilerek analiz ve yorumunun yapılmasını sağlamasından dolayı sık kullanılan bir yöntemdir. Yöntem ölçeğin teorik alt yapısına göre önceden belirlenen model aracılığıyla verilerin ve ölçeğin güvenilirlik ve geçerliliğini ölçmeyi sağlayan kolay uygulanabilir bir işlemdir. Çok sayıda gözlenen ve ölçülen değişkenleri ait olduğu gizil (örtük) değişkenin yapısal olarak analiz edilmesinde doğrulayıcı faktör analizi kullanılır.

Her istatistiksel sonuç çıkarım yönteminde olduğu gibi, doğrulayıcı faktör analizinde de modelin uyum iyiliğinin testi yapılır. Uyum iyiliği için geliştirilen çok sayıda test istatistikleri vardır. Modelin uyum iyiliğinin en önemli ölçütü ki-kare istatistiğidir. Ancak ki-kare istatistiği modeldeki veri ve parametre sayısına bağlı olarak yüksek değerler alabilmektedir. Bu zayıf yönünden dolayı ki-kare istatistiğinin serbestlik derecesine oranı kritik değer olarak kullanılır. Doğrulayıcı faktör analizinde, χ^2/sd 'nin kriter olarak kullanılmasında genel anlamda görüş birliği vardır. Aşağıdaki Tablo 2’de çalışmada kullanılan DFA uyum iyiliği ölçütleri verilmiştir (İlhan ve Çetin, 2004: 38).

Tablo 2. Modelin geçerliliği için uyum istatistiği değerleri

İndeks	Mükemmel uyum değerleri	Kabul edilebilir uyum değerleri
χ^2/df	<2	<5
GFI	>0,95	>0,90
CFI	>0,95	>0,90
TLI	>0,95	>0,90
RMSEA	<0,05	<0,10

Tablo 3. Araştırmada kullanılan Ölçekler ve Alt Boyutlarının elde edilen bulgulara göre Cronbach Alfa katsayıları

	Madde Sayısı	Cronbach's Alpha
Performans Ölçeği Müşteri Boyutu	5	0,916
Performans Ölçeği Finansal Boyutu	4	0,879
Performans Ölçeği	9	0,929

Ankette kullanılan ölçekler ve boyutları için Cronbach's Alpha katsayısı bulguları Tablo 3’de verilmiştir. Elde edilen bulgulara göre ölçeklerin güvenilirlikleri “oldukça güvenilir” olarak bulunmuştur.

Tablo 4. Performans Ölçeği I. ve II. Düzey DFA Modelleri Uyum İyiliği Katsayısı Bulguları

Uyum iyiliği Kriteri	DÜZEY 1	DÜZEY 2
CMIN/df	1,371	1,321
GFI	0,896	0,888
CFI	0,957	0,951
TLI	0,938	0,929
RMSEA	0,077	0,071

Ölçeğin kavramsal yapısına göre birinci ve ikinci doğrulayıcı faktör analizi modeli oluşturulmuş ve elde edilen bulgular, Tablo 4 'de verilmiştir. Tablo 4 incelendiğinde modelin uyum iyiliği kriteri değerleri kabul edilebilir aralıkta olduğu görülmektedir.

Tablo 5: Ankete katılan firmaların faaliyet gösterdiği sektörlere göre dağılımı

	Sayı	Yüzde
Gıda	65	27,3
Tekstil	33	13,9
Metal	24	10,1
Kimya-İlaç	18	7,6
Plastik	14	5,9
Diğer	84	35,2
Total	238	100

Tablo 6. Ankete katılan firmaların çalışan sayısına göre dağılımı

	Sayı	Yüzde
1-50 kişi	145	60,9
51-100 kişi	46	19,3
101 kişi ve üstü	47	19,7
Total	238	100,0

Katılımcı firmaların çalışan sayısına göre dağılımı Tablo 6'da verilmiştir. Elde edilen bulgulara göre katılımcı firmaların % 60,9'u 1-50 arası çalışana, %19,3'ü 51-100 arası çalışana, %19,7Si 101 ve üstü çalışana sahiptir.

Tablo 7. Ankete katılan firmaların yaşına göre dağılımı

	Sayı	Yüzde
1-5 yıl	53	22,3
6-15 yıl	110	46,2
16 yıl ve üstü	75	31,5
Total	238	100,0

Katılımcı firmaların yaşlarına göre dağılımı Tablo 7'de verilmiştir. Elde edilen bulgulara göre katılımcı firmaların %22,3'ü 1-5 yaş aralığında, %46,2'si 6-15 yaş aralığında ve %31,5'i 16 yıl ve üstü yaşadılar.

Tablo 8: Firma Performans Ölçeği maddeleri için frekans dağılımı ve açıklayıcı istatistikleri*

	Kesinlikle katılmıyorum		Katılmıyorum		Kararsızım		Katılıyorum		Kesinlikle katılıyorum		Ort.	Std. S,
	Sayı	Yüzde	Sayı	Yüzde	Sayı	Yüzde	Sayı	Yüzde	Sayı	Yüzde		
fperform01	14	5,9	18	7,6	64	26,9	79	33,2	63	26,5	3,67	1,123
fperform02	14	5,9	51	21,4	67	28,2	59	24,8	47	19,7	3,31	1,182
fperform03	10	4,2	28	11,8	58	24,4	80	33,6	62	26,1	3,66	1,113
fperform04	6	2,5	22	9,2	73	30,7	75	31,5	62	26,1	3,69	1,036
fperform05	6	2,5	35	14,7	80	33,6	61	25,6	56	23,5	3,53	1,082
Müşteri Boyutu											3,57	0,959
fperform06	12	5,0	40	16,8	70	29,4	68	28,6	48	20,2	3,42	1,136
fperform07	13	5,5	44	18,5	81	34,0	52	21,8	48	20,2	3,33	1,152
fperform08	16	6,7	47	19,7	77	32,4	57	23,9	41	17,2	3,25	1,156
fperform09	13	5,5	51	21,4	81	34,0	51	21,4	42	17,6	3,24	1,140
Finans Boyutu											3,31	0,982
Performans Ölçeği											3,46	0,900

(*: Tabloda kullanılan kısaltmalarla birlikte ölçek ek olarak verilmiştir.)

Firma Performans Ölçeği Müşteri Boyutu maddeleri için frekans dağılımı ve açıklayıcı istatistikleri Tablo 8’de verilmiştir. Ortalamalar incelendiğinde en yüksek ortalamanın 3,69’la fperform04 maddesinde, en küçük ortalamanın da 3,31’le fperform02 maddesinde olduğunu görüyoruz.

Firma Performans Ölçeği Finans Boyutu maddeleri için frekans dağılımı ve açıklayıcı istatistikleri Tablo 8’de verilmiştir. Ortalamalar incelendiğinde en yüksek ortalamanın 3,42 ile fperform06 maddesinde, en küçük ortalamanın da 3,24’le fperform09 maddesinde olduğunu görüyoruz.

Araştırma hipotezlerinin test edilmesi için ANOVA testi kullanılmıştır. ANOVA testi; birden fazla grup ortalamalarında istatistiksel olarak farklılık olup olmadığına karar vermek için kullanılır. Hipotez testi sonucunda gruplar arasında farklılık olduğuna karar verilirse farklılığın kaynağını belirlemek için yapılan testlere çoklu karşılaştırma testleri denir. Bu çalışmada çoklu karşılaştırma testlerinden Tukey testi kullanılmıştır.

Tablo 9. Performans Ölçeği ve boyutlarının çalışan sayısı değişkeni bakımından incelenmesi

	Çalışan sayısı	N	Ort.	Std. Sapma	F	p	Farklılığın kaynağı
Performans Ölçeği	1-50 kişi	145	3,33	0,828	5,169	0,006	1-50 kişi ile 101 kişi ve üstü
	51-100 kişi	46	3,48	0,866			
	101 kişi ve üstü	47	3,81	1,057			
	Total	238	3,46	0,900			
Müşteri Boyutu	1-50 kişi	145	3,46	0,887	4,045	0,019	1-50 kişi ile 101 kişi ve üstü
	51-100 kişi	46	3,60	0,925			
	101 kişi ve üstü	47	3,91	1,133			
	Total	238	3,57	0,959			
Finans Boyutu	1-50 kişi	145	3,18	0,932	4,919	0,008	1-50 kişi ile 101 kişi ve üstü
	51-100 kişi	46	3,34	0,968			
	101 kişi ve üstü	47	3,69	1,061			
	Total	238	3,31	0,982			

Performans ölçeği ve boyutlarının çalışan sayısı değişkeni bakımından farklılık olup olmadığı ANOVA testi ile incelenerek elde edilen bulgular Tablo 9’da verilmiştir. Elde edilen bulgulara göre Performans Ölçeği ve boyutlarında çalışan sayısı değişkeni bakımından istatistiksel olarak anlamlı

fark bulunmuştur. Farklılığın kaynağı olan gruplar TUKEY testiyle belirlenerek ilgili boyutların karşısında yazılmıştır.

ANOVA testi sonuçlarına göre H_2 , H_{2A} ve H_{2B} hipotezleri kabul edilmiştir.

Tablo 10. Performans Ölçeği ve boyutlarının firma yaşı değişkeni bakımından incelenmesi

		N	Ort.	Std. Sapma	F	p	Farklılığın kaynağı
Performans Ölçeği	1-5 yıl	53	3,72	0,946	3,332	0,037	1-5 yıl ile 6-15 yıl
	6-15 yıl	110	3,34	0,860			
	16 yıl ve üstü	75	3,44	0,896			
	Total	238	3,46	0,900			
Müşteri Boyutu	1-5 yıl	53	3,83	1,052	3,381	0,036	1-5 yıl ile 6-15 yıl
	6-15 yıl	110	3,42	0,929			
	16 yıl ve üstü	75	3,61	0,903			
	Total	238	3,57	0,959			
Finans Boyutu	1-5 yıl	53	3,59	0,943	2,791	0,063	
	6-15 yıl	110	3,23	0,982			
	16 yıl ve üstü	75	3,23	0,985			
	Total	238	3,31	0,982			

Performans ölçeği ve boyutlarının firma yaşı değişkeni bakımından farklılık olup olmadığı ANOVA testi ile incelenerek elde edilen bulgular Tablo 10'da verilmiştir. Elde edilen bulgulara göre Performans Ölçeği ve boyutlarında firma yaşı değişkeni bakımından istatistiksel olarak anlamlı fark bulunmuştur. Farklılığın kaynağı olan gruplar TUKEY testiyle belirlenerek ilgili boyutların karşısında yazılmıştır.

ANOVA testi sonuçlarına göre H_1 ve H_{1A} hipotezleri kabul edilmiş, H_{1B} hipotezi reddedilmiştir.

SONUÇ VE ÖNERİLER

Firma performans ölçeği Yıldız ve Çetindaş (2018)'in "Stratejik kaynak kullanımının firma performansı üzerindeki etkisinde tedarik zinciri çevikliğinin aracılık rolü" çalışmasında; uyarladığı ölçek kullanılmıştır. Firma performans ölçeği, müşteri performansı boyutunda (5 ifade), finansal performans boyutunda (4 ifade) toplam 9 ifadeden oluşmaktadır.

Elde edilen açıklayıcı istatistik bilgilerine göre; finans boyutundaki algının (ortalama: 3,27), müşteri boyutundaki algıdan (ortalama: 3,22) daha yüksek olduğu görülmektedir ayrıca hem finans ve müşteri boyutunun hem de genel firma performansı algısının orta düzeyde olduğu değerlendirilmektedir. Firma çalışan sayısı bakımından değerlendirildiğinde çalışan sayısı arttıkça firma performansı algısının da arttığı, ancak faaliyet süresi arttıkça firma performansı algısının azaldığı görülmektedir. Bu sonuç çalışan sayısı fazla ve yeni kurulan firmaların firma performansına daha fazla önem verdikleri şeklinde yorumlanabilir.

Performans ölçeği çalışan sayısı bakımından değerlendirildiğinde hem müşteri hem finans boyutları ve hem de ölçeğin tamamı için çalışan sayısı arttıkça performans algısının da arttığı görülmektedir. Çalışan sayısının firma büyüklüğü için temel göstergelerden birisi olduğu göz önüne alınırsa, bu sonuç firmalar büyüdükçe performans algılarının da daha yüksek olduğu şeklinde yorumlanabilir.

Performans ölçeği çalışan sayısı bakımından değerlendirildiğinde, çalışan sayısı bakımından ortaya çıkan algıdan farklı olarak, hem müşteri hem finans boyutları ve hem de ölçeğin

tamamı için yaşı daha genç olan firmalarda performans algısının daha yüksek olduğu görülmektedir. Bu sonuç sektör açısından değerlendirildiğinde, faaliyet süresi yüksek olan firmalardaki performans algısının düşük olmasının nedenlerinin ortaya çıkarılması gereken ciddi bir durum olduğu görülmektedir.

Çalışma sadece Mersin ilini kapsayan bir bulgudur. Bu nedenle araştırmaya konu olan değişkenler arasındaki ilişkinin farklı evrenler üzerinde analiz edilmesi, sonuçlarının bu çalışma ile kıyaslanması daha geniş bir bakış açısı kazandırabilir.

Araştırmada elde edilen bulgulardan birisi de firma yaşı arttıkça firma performansının algısının azaldığı görülüyor. Firmaların yaşları bağımsız değişken ve bu konuda iyileştirme yapılması imkânsızdır. Bu nedenle Sektör yöneticileri ve politika belirleyicilerinin bu konuda çözüm projeleri üreterek firma yaşı yüksek olan firmalarda değişkenlerin değerlerinin yükseltilmesini sağlamaları gerekmektedir.

REFERENCES

Ağdelen,Z.; H. Erkut,H.(2008) Firma Kurumsal ve Yönetimsel Özelliklerinin İnsan Kaynakları Yönetimi Üzerindeki Etkisinin Analizi. *GAU J. Soc. & Appl. Sci.*, 3(6), 37-55

Alpar, R. (2013). *Uygulamalı Çok Değişkenli İstatistiksel Yöntemler*, Detay Yayıncılık, Ankara

Anderson, E. W., C. Fornell, and R. T. Rust. (1997). Customer satisfaction, productivity and profitability: Differences between goods and services. *Marketing Science* 16 (2): 129–145.

Anderson, E. W., Fornell, C. ve Lehmann, D. R. (1994) .Customer Satisfaction, Market Share, and Profitability: Findings from Sweden, *Journal of Marketing*, 58, ss. 53 66

Banker, R.D., Mashruwala, R.(2007). The Moderating Role of Competition in the Relationship between Nonfinancial Measures and Future Financial Performance. *Contemporary Accounting Research* Vol. 24 No. 3 PP.763-793 doi:10.1506/car.24.3.4

Bonoma, T.V.; Clark, B.H. (1988). *Marketing Performance Assessment*. Boston, MA: Harvard Business School Press

Brito, L. A. L.; Vasconcelos, F. C. (2003). Firm Performance in an extremely environment: year, industry and firm effects. In: Encontro Anual Da, 27 Atibaia: ANPAD, www.anpad.org.br.

Çopuroğlu F. Ve Korkmaz, İ.H.(2018). Vekalet Teorisi, Sermaye Yapısı ve Firma Performansı Arasındaki İlişkinin İncelenmesi. *G. Ü. İslâhiye İİBF Uluslararası E-Dergi* Yıl:2018, 2(2):21-33

Debusk, G., Brown, R., Killough, L.(2003). Components and Relative Weights in Utilization of Dashboard Measurement Systems Like the Balanced Scorecard. *The British Accounting Review*. Vol: 35, Issue 3

Elitaş C., Ağca, V. (2006). Firmalarda Çok Boyutlu Performans Değerleme Yaklaşımları Kavramsal Bir Çerçeve, *Sosyal Bilimler Dergisi*. Cilt 8, Sayı 2 s.343-370

Ittner, C. D.; D. Larcker. (1998). Are nonfinancial measures leading indicators of financial performance? An analysis of customer satisfaction. *Journal of Accounting Research* 36 (Supplement): 1–35

İlhan, M.; Çetin, B. (2014). LISREL ve AMOS Programları Kullanılarak Gerçekleştirilen Yapısal Eşitlik Modeli (YEM) Analizlerine İlişkin Sonuçların Karşılaştırılması, *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi*, Cilt 5, Sayı 2, Kış 2014, 26-42.

Kaplan, R.; Norton, D.P. (1996). *Balanced Scorecard*, İngilizceden Çeviren: Serra Egeli. İstanbul: Sistem Yayıncılık..

Khan, M.K., Nouman, M., Imran, M. (2015). Determinants of Financial Performance of Financial Sectors (An assesmet through economic : Value added), *MPRA Munich Personal RePEc Archive*. No.81659,1-30

Khan, H.Z.; Halabi, A.K.; Khan, Md R. (2011). Non- Financial Perfomance Measures- Organizational Perfomance Relationship in the Bangladeshi Firms: The Moderator Role of Environmental Uncertainty and Corporate Culture. *SSRN Electronic Journal*, DOI:10.2139/ssrn.1965612

Kristensen, K., Martensen A., Gronholdt L.(2004), *Customer Satisfaction and Business Perfomance, Business performance measurement Theory and practice*, Cambridge University Press, Newyork, ISBN 0-511-04157-8 eBook (netLibrary)

McNair, C.J., Lynch, R. L., Cross, K. F. (1990). Do Financial and Nonfinancial Performance Measures Have to Agree?. *Management Accounting; Montvale Vol. 72, Iss. 5, 28.*

Mustafa, O.(2019). *Sermaye Yapısı Kararlarının Şirket Finansal Performansına Etkisi: Borsa İstanbul Örneği*, İstanbul Üniversitesi Sosyal Bilimler Enstitüsü, İşletme Bilim Dalı, Yüksek Lisan Tezi, İstanbul

Öncü ,M.A., Bayat, M., Kethüda, Ö., Zengin, E. (2015). Yenilik ve Müşteri Performansının Finansal Performans Üzerindeki Etkisi: Orta Ölçekli Sanayi İşletmelerinde Bir Araştırma. *Marmara Üniversitesi İ.İ.B. Dergisi*. Cilt 37, Sayı 1, s. 149-164

Rajan R.G.;Zingales, L. (2005). What do we know about capital structure? Some evidence from international data, *Journal of Finance*, 50(14): 21-60

Reichheld, F., W. E. Sasser Jr. (1990). Zero defections: Quality comes to services. *Harvard Business Review* 68 (September–October): 56–69.

Ruri, J.K., Omagwa, J. (2018). Capital Structure amd Financial Performance of Small and Medium Enterprises in Embu County, Kenya. *IOSR Journal of Business and Management*. V 20, I 5

Salim, M., Yadav, R. (2012). Capital Structure and Firm Perfomance :Evidence from Malaysian Listed Companies. *International Congress on Interdisciptinary Busşness and Sociak Science* 65,156-166

Şenol, Z. (2019). *Firma Performansı*, Nobel Yayıncılık, Kitap Bölümü, Ankara,s.279-298

Tucker M. and Pitt M. (2008). Customer Perfomance Measurement facilities management A strategic approach *International Journal of Productivity and Performance Management* Vol. 58 No. 5, 2009 pp. 407-422

Yamane, T. (2001). *Temel Örnekleme Yöntemleri*. Çev: Alptekin Esin, M. Akif Bakır, Celal Aydın, Esen Gürbüzsəl, Literatür Yayınları İstanbul 2001

Yıldız, B. ve Çetindaş, A.(2018).Stratejik Kaynak Kullanımının Firma Performansı Üzerindeki Etkisinde Tedarik Zinciri Çevikliğinin Aracı Rolü, *Business & Management Studies: An International Journal*, 6(4): 878-897.

Yığiter, Ş.Y. (2011). İçsel Performans Göstergeleri Performans Göstergeleri ve Müşteri Memnuniyeti İlişkisi, *Akademik Bakış Dergisi*, Sayı 23, s.1-17

EK 1: Firma performansı ölçeği:

fperform01	Firmamızın önceki yıllara göre müşteri memnuniyeti artmıştır.
fperform02	Firmamızın önceki yıllara göre müşteri şikayetlerine cevap verme süresi azalmıştır.
fperform03	Müşterilerin firmamıza bağlılığı önceki yıllara göre artmıştır.
fperform04	Müşterilerin markalarımıza olan sadakati önceki yıllara göre artmıştır.
fperform05	Müşterilerimizin gözünde ürünlerimizin güvenilirliği önceki yıllara göre artmıştır.
fperform06	Firmamız önceki yıllara göre karlılığı artmıştır.
fperform07	Firmamızın önceki yıllara göre satışları yükselmiştir.
fperform08	Firmamızın önceki yıllara göre pazar payı artmıştır.
fperform09	Firmamızın önceki yıllara göre yatırımlarının getirisi artmıştır.

AFTER MEGA PROJECT KANAL ISTANBUL, ISTANBUL LOGISTICS VILLAGE
LOCATION PROPOSAL

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Abstract

In the globalizing world, the disappearance of borders and the increasing trade volume have made logistics activities and logistics sector very important. In order for companies to have a say in international markets under tough competition conditions, they need to minimize logistics activities. Logistic villages play an important role in developing countries in order to carry out logistics activities with the least cost.

Establishment of a logistics village that will prevent traffic congestion and reduce commercial costs, especially in a metropolitan city like Istanbul, which has a great historical background and depth, is the center of the world for logistics, connects two continents, has a high commercial and human density, has become an indispensable need. In this study, since it is aimed to provide information about logistics villages, to provide information about the current status of mega projects in Istanbul and to propose a logistics village model to Northern Marmara, a wide document review was made on these issues. Statistical data on published books, journals, articles, theses and some research results on related subjects were obtained.

This study and its data were analyzed and evaluated for use in our study. As a result of the evaluations, an integrated logistics village model proposal was presented to the mega projects being implemented.

Keywords: Logistic, Logistic Village, Mega Project

**A SATISFACTION PERSPECTIVE FOR PERFORMANCE-BASED PAY SYSTEM:
COMPARING DIFFERENCES IN THE EMPLOYEES**

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Abstract

Performance-based pay system emerges as a significant model in the economic organization of today's societies, and can be regarded as the source of the solution and sometimes as the source of the problem, because of its multi-component structure. The research has been made based on the proposition that “whether satisfaction with performance-based payment differs according to the demographic characteristics of the employees”. The study aimed to compare differences of the employees from the “gender, age, marital status, educational status, tenure, monthly income, work arrangement, employment contract, and organization size” standpoint. This research was carried out from the satisfaction perspective since the limited number of studies focusing on how the performance-based pay system is perceived by the employees is available. The Performance-Based Payment Satisfaction Scale (PEDOS) was applied to 497 participants from the private sector. One of significant findings of the research is that the perception of satisfaction with performance-based payment was identified as higher in those aged between 31-40 years, as these employees are experienced in business life, have higher life responsibilities and higher expectations, commonly are married. In other words, for the employees between the ages of 31-40, there are more factors that motivate them in their organizations, increase their organizational justice and commitment, and have a positive attitude towards performance-based payment because of the high level of satisfaction with this system. Another striking finding of the research is that full-time employees are more sensitive to the performance-based payment system and have a higher level of anxiety towards the system since full-time employees spend more for their organizations compared to part-time employees, have a greater sense of responsibility and loyalty towards their organizations. This study is the first of its kind and adds to the international aspect, it is assumed to fill an important gap in the literature.

Keywords: Performance-Based Pay, Performance-Based Pay Satisfaction, PEDOS Scale.

Introduction

Nowadays, many performance evaluation systems are utilized in both public and private sectors, and organizations aim to ensure that employees are both satisfied and motivated by associating wage with performance increase in order to achieve their goals. The common belief about employee motivation is that rewards, especially “in cash”, increase employees' interest in their work and their performance. However, studies conducted in the 1950s and afterwards have revealed that the reward factor reduces long-term motivation.

On the other hand, when the current studies in the literature are reviewed, it is determined that the performance evaluation systems applied in many organizations have deficiencies in many aspects such as limited wage budget, considerations related to performance evaluation system, difficulties in associating performance and rewards, costs, trust in the fair execution of the

system (Akçakanat & Çarıkçı, 2019; Sabuncuoğlu, 2013; Uyargil, 2013) and cannot meet all the needs, however the performance-based payment system appears as an important model in the economic organization of today's societies, and can sometimes be viewed as the source of the solution and sometimes as the source of the problem, as a result of its multi-component structure. In that the performance-based payment system is unquestionably related to "performance", however, the major focus is the "payment system", naturally is about the relationship between "pricing/salary system" and "performance".

Moreover, the limited number of studies focusing on how the performance-based pay system is regarded by the employees, and the lack of studies that directly focus on this issue are significant handicaps nowadays. This study aimed to compare differences of the employees from the "gender, age, marital status, educational status, tenure, monthly income, work arrangement, employment contract, and organization size" standpoint.

Literature Review

Generally speaking, performance is not just a concept discussed today, and it is admitted that the concept of performance emerged with the capitalist system, that even in the feudal society, there was a performance evaluation of the slaves. It is definitely worth discussing what similarities there are between the performance imposed on a slave in those days and the performance imposed on the employees in modern or post-modern organizations nowadays.

When the literature is reviewed, it is noticed that the term of performance has diverse definitions, while Venkatraman and Ramanujam (1986) expresses it as the test of time for any strategy, Neely et al. (1995) defines it as the effectiveness and efficiency of goal-directed action, Daft (2007) illustrates it as the organization's achievement of its determined goals by using its resources, and Cascio (2008) describes it as the employee's successful performance of his/her duties, while Uysal (2015) portrays the performance as the performance of an individual or a group while performing a job within a certain period of time as "quantitative or qualitative results of effort and action".

However, the application of performance evaluations in the industry dates back to the 1800s. It is noted that the system called "silent observation" was studied by Robert Owen in a cotton mill in Scotland. By this system, Owen used "character books" recorded daily reports of the workers of the cloth factory, and these character books had blocks of each side of painted in different colours, showing the degree of the employee from good to bad (Kumar, 2005). Whereas the beginning of performance appraisal practices in organizations dates back to the early 1900s in US public institutions with F. Taylor's work measurement studies, which is known, in this management model, "human" is often in the background, and performance evaluation methods were developed mostly based on personality traits (Uyarlıgil, 2008). In the Taylorist approach, it is assumed that employees will show the expected performance if they are rewarded when they exhibit target behaviours, and they are penalized when exhibiting undesirable behaviours. In summary, the method of increasing performance in this period was rewarding the good and punishing the bad (Pink, 2015).

Besides interestingly, it shows that performance appraisal was a common practice that existed in the Ottoman period as well, and official documents were recorded in the "Sicil-i Ahval (Records of Events)" registers, which were first used in the Ottoman State Organization, as well as the behaviors, attitudes, morals and trajectories of the civil servants (Gündüz, 2011). It is also recognized that the first registry evaluation in the history of the Republic of Turkey was the appraisal given to Ismet Pasha by Mustafa Kemal Atatürk (Bulut, 2004).

Then, historically, the emergence of the Human Relations Approach accepting that man is not only an economical or mechanical being but also a social creature. This approach was a turning point for contemporary motivation practices of today. The discovery that meeting

one's expectations was a magical motivation and trigger of performance has led to the emergence of the concept of intrinsic motivation. Over time, it has also been noted that extrinsic rewards can partially reinforce motivation and performance, and sometimes even create negative effects (Deci, 1971; Harlow et al., 1950; Lazear, 2000; Kohn, 1993; Mellström and Johannesson, 2008; Pink, 2010).

On the other hand, the critical point here is that the most common mistake made in the application of performance evaluation methods is to choose one or more of the existing evaluation methods used by similar organizations, to adapt them to their organization or to apply “a uniform evaluation method” for all employees. These common mistakes are like expecting “a shirt purchased to fit everyone”. However, with performance evaluation, any information can be gathered about business performance and the evaluation contributes to the development of the business.

In the selection of the performance evaluation method to apply to an organization, first, it requires reviewing the vital parameters of that organization, and then adapting the tried and successful methods to the texture of the said organization. Indeed, Lepper, Greene and Nisbett (1973) and Ariely et al. (2009) state that the dominant approach to the process is “conditional rewards”, and external rewards such as performance-based compensation or “fringe benefits” are commonly used to increase employee motivation and satisfy them.

As for performance-based payment system appears as one of the most common wage systems in use today for purposes such as achieving higher productivity and profitability, providing organizational justice by paying higher wages to high-performing employees, and increasing the motivation of employees. The performance-based payment system establishes a relationship between the performance level and the wage level. In parallel with their human resources policies, organizations can apply different remuneration systems (seniority-based wage system, performance-based wage system, skill-based wage system, team-based wage system, incentive wage system) under their structural characteristics (Sabuncuoğlu, 2013). In that case, this system is the practice of “differentiating” the wages of the employees in line with the performance that emerges depending on the targets set for the work done (Şendođdu, 2014).

Organizations, on the one hand, plan to reward performance improvement with an increase in wages, and on the other hand, they try to motivate their employees to reach their strategic goals. In addition, maybe most importantly, the organizations do not waver to give significant weight to the employee satisfaction since undoubtedly, “the money”, is not only a crucial motivation but also a satisfaction, commitment or justice tool for the employees.

However, when reviewed the literature, the findings show that the wage or payment systems should be fair enough in order to increase the organizational commitment of the employees. Due to the nature of “distributive justice”, which is one dimension of organizational justice, employees constantly compare the results they get from the performance evaluations with their effort they spend for the organization and decide whether the results of the performance evaluation, that is, the outputs, are fair (Stoffey & Reilly, 1997). In this point, Burton et al. (2008) and He et al. (2017) also supported the idea that there is a relationship between organizational justice and job performance. Moreover, from the organizational commitment standpoint, Wang et al. (2010) argued that the effect of organizational justice on performance occurs through organizational commitment, mostly through the “interactional justice”. Allen and Meyer (1990) argued that employees who identify with their organization and have emotional attachment to their organization would show higher performance compared to the other employees, while Penley and Gould (1988) stated that employees who are committed to their organization will dedicate themselves to the organization and will show high performance. On the other hand, Kuvaas (2006) found that intrinsic motivation has both a mediator and a moderator role in the relationship between satisfaction with the performance

evaluation process. As a matter of fact, Dawley et al. (2005) stated that when employees establish an emotional bond with their organization, in other words, when employees have a kind of attraction between their organizations and their organizational commitment levels are high, employees feel themselves to be the part of the organization. They see themselves as a “force multiplier”, adopt the goals and objectives of their organization, increase their performance and motivation. In that case, performance-based payment systems and the perceptions of the employees’ satisfaction can be considered as strong predictors of their performance.

Methods and Data

The research group contains 497 respondents, those who work in different business lines in the private sector (banking, restaurant, finance etc.) are paid performance-based payments in their organization. While creating the research group, "exponential non-discriminative snowball sampling" was adopted.

Performance-Based Payment Satisfaction Scale (PEDOS) developed by Çoban, Pişkin and Ersoy-Kart (2021) and Personal Information Form were used as the data collection tools in this research. PEDOS Scale, comprising 21 items and a two-factor structure, and the cronbach's alpha reliability coefficients of the subscales with 0.97 (*Positive Attitude*) and 0.89 (*Anxious Attitude*) respectively, was applied to measure the satisfaction level of the research group towards performance-based payment.

SPSS 26 was applied in the analysis of the data collected and it was calculated with a confidence level of 95%. Frequency (n) and percentage (%) for qualitative variables, mean (X), standard deviation (ss), minimum and maximum statistics for quantitative variables were calculated. The “independent groups t and ANOVA tests” were used to analyse the differences in scale scores according to demographic variables.

Findings

During the research, it has been investigated whether the variable of satisfaction with performance-based payment differs according to the demographic characteristics of the employees. Thereby, “t-test” and “ANOVA test” were applied within the analysis. After ANOVA test performed, "Tukey-Kramer test" was conducted to determine from which group the difference originated.

Table 1 presents the statistically significant difference between the groups in terms of satisfaction with performance-based payment (positive attitude, anxious attitude) according to age and the difference between the groups in terms of positive attitude dimension is found significant ($F(1-497) = 8,387, p < 0.05$). The level of satisfaction (positive attitude) from performance-based payment is higher in those aged *between 31-40 years* than those aged 20 and under, 21-30, and 41 and over. However, the difference between the groups in terms of anxious attitude (satisfaction with performance-based payment) dimension was not significant ($F(1-497) = 1.227, p > 0.05$). According to these results, *the level of satisfaction (positive attitude) with performance-based pay increased with the age.*

Table 1. Comparison of Variables by Age

		n	Avr	sd	F	p
Positive Attitude	Below 20	40	54,13	13,97	8,387	0,000*
	21-30	230	54,29	14,10		
	31-40	147	59,46	6,52		
	Above 41	80	59,13	6,20		
Anxious Attitude	Below 20	40	13,63	4,15	1,227	0,299
	21-30	230	14,56	3,90		
	31-40	147	14,84	3,28		
	Above 41	80	14,76	3,20		

*p<0,05

Table 2 shows the statistically significant difference between the married and singles in terms of satisfaction with performance-based payment (positive attitude) (p<0,05). According to these results, *satisfaction with performance-based payment (positive attitude) of married people was found to be higher than that of singles.*

Table 2. Comparison of Variables by Marital Status

		n	Avg	sd	t	p
Positive Attitude	Married	285	59,24	7,02	5,628	0,000*
	Single	212	53,02	14,91		
Anxious Attitude	Married	285	14,81	3,19	1,479	0,140
	Single	212	14,31	4,17		

*p<0,05

Table 3 presents the statistically significant difference among people with different educational backgrounds in terms of satisfaction with performance-based payment (positive attitude, anxious attitude). Satisfaction with performance-based payment (positive attitude) decreases as education level increases, however, satisfaction with performance-based payment (positive attitude) level is lower in those with high school education status. As the level of education increases, the anxiety about performance-based payment increases, however, the anxiety about performance-based payment is higher in undergraduates than in the others. According to the results, *as the education level increases, satisfaction with performance-based pay (positive attitude) decreases (the lowest among high school students), and anxiety about performance-based pay increases (the highest among undergraduates).*

Table 3. Comparison of Variables by Educational Status

		n	Avg	sd	F	p
Positive Attitude	Primary & Secondary School	40	59,23	5,54	1,991	0,114
	High School	157	54,94	12,96		
	Two-year College	175	57,05	10,77		
	Undergraduate and above	125	57,17	11,78		
Anxious Attitude	Primary & Secondary School	40	13,13	3,15	6,724	0,000*
	High School	157	13,90	4,02		
	Two-year College	175	15,19	3,38		
	Undergraduate and above	125	15,12	3,39		

*p<0,05

Table 4 describes the statistically significant difference among people with different monthly income in terms of satisfaction with performance-based payment (positive attitude, anxious attitude). As the monthly income level rises, satisfaction with the performance-based payment (positive attitude) increases. However, the satisfaction level of the performance-based

payment is higher for those with a monthly income of over 10000 TL¹. As the monthly income level rises, the anxiety against performance-based payment increases, however, the anxiety about performance-based payment is higher in those with a monthly income between 6001-10000 TL. According to the results, *as the monthly income situation increases, conspicuously, both the level of satisfaction (positive attitude) and the anxiety level with performance-based payment increases.*

Table 4. Comparison of Variables by Monthly Income

		n	Avg	sd	F	p
Positive Attitude	Minimum Wage	86	46,21	16,67	35,506	0,000*
	Minimum Wage-6000 TL	337	59,12	8,43		
	6001-10000 TL	44	55,70	11,38		
	Over 10000 TL	30	59,17	5,47		
Anxious Attitude	Minimum Wage	86	13,02	4,68	7,436	0,000*
	Minimum Wage-6000 TL	337	14,82	3,31		
	6001-10000 TL	44	15,66	3,09		
	Over 10000 TL	30	15,00	3,48		

*p<0,05

Table 5 presents the statistically significant difference between full-time employees and part-time employees in terms of satisfaction with performance-based payment (anxious attitude) (t=3.427, p<0.05). *The anxiety level of full-time employees about performance-based pay was found to be higher than part-time employees.*

Table 5. Comparison of Variables by Work Arrangement

		n	Ort	ss	t	p
Positive Attitude	Full Time	457	56,79	11,14	1,340	0,181
	Part Time	40	54,25	14,97		
Anxious Attitude	Full Time	457	14,76	3,59	3,427	0,001*
	Part Time	40	12,73	3,81		

*p<0,05

Table 6 explains the statistically significant difference between the groups in terms of satisfaction with performance-based payment (positive attitude, anxious attitude) among people with different tenure in their company. According to the results, *as the tenure increases, satisfaction with performance-based payment (positive attitude, anxious attitude) increases, and the level of satisfaction with performance-based payment (positive attitude) and the level of anxiety about performance-based payment are higher in those who have worked for over 10 years.*

Table 6. Comparison of Variables by Tenure

		n	Avg	sd	F	p
Positive Attitude	1 year	107	53,19	13,95	4,730	0,001*
	2-3 years	153	56,85	11,81		
	4-5 years	111	56,14	12,13		
	6-10 years	63	58,84	7,87		
	Over 10 years	63	60,24	4,60		
Anxious Attitude	1 year	107	13,78	3,63	5,193	0,000*
	2-3 years	153	14,73	3,82		
	4-5 years	111	13,97	3,75		
	6-10 years	63	15,67	3,15		
	Over 10 years	63	15,70	2,95		

*p<0,05

¹ TL: Turkish Lira (10000 TL: 1370 USD, when the study conducted in January-April 2021)

Table 7 presents the statistically significant difference between the groups in terms of satisfaction with performance-based payment (positive attitude, anxious attitude) among people with different organization size. *As the size of the organization increases, the level of satisfaction with performance-based payment (positive attitude) increases.* However, the level of satisfaction with performance-based payment (positive attitude) is higher in those with a small organization size (10-49 employees). *As the size of the organization increases, the level of anxiety against performance-based payment increases,* however, the level of anxiety against performance-based payment is higher in those with a large organization size (250 and more employees).

Table 7. Comparison of Variables by Organization Size

		n	Avg	sd	F	p
Positive Attitude	Micro (less than 10 employees)	89	50,21	16,04	13,604	0,000*
	Small (10-49 employees)	201	58,83	8,95		
	Medium (50-249 employees)	125	58,17	9,45		
	Large (over 250 employees)	82	55,60	11,58		
Anxious Attitude	Micro (less than 10 employees)	89	13,74	4,53	3,733	0,011*
	Small (10-49 employees)	201	14,38	3,26		
	Medium (50-249 employees)	125	15,11	3,49		
	Large (over 250 employees)	82	15,28	3,51		

*p<0,05

No significant difference was found by “gender” and “employment contract (indefinite-term contract, fixed term contract)” in terms of satisfaction with performance-based payment shown on Table 8 and 9.

Table 8. Comparison of Variables by Gender

		n	Avg	sd	t	p
Positive Attitude	Female	262	56,93	11,25	0,700	0,485
	Male	235	56,20	11,78		
Anxious Attitude	Female	262	14,32	3,74	-1,794	0,073
	Male	235	14,91	3,52		

*p<0,05

Table 9. Comparison of Variables by Employment Contract

		n	Avg	sd	t	p
Positive Attitude	Indefinite-Term Contract	413	56,92	10,91	1,809	0,074
	Fixed Term Contract	74	53,76	14,29		
Anxious Attitude	Indefinite-Term Contract	413	14,63	3,59	0,396	0,693
	Fixed Term Contract	74	14,43	4,06		

*p<0,05

Discussion

With the difference analysis carried out within the research, when the employees are compared in terms of *age*, satisfaction with performance-based payment (*positive attitude*) perception levels increases with age, however, in those aged 31-40 was found to be higher than those aged 20 and under, between 21-30 and 41 and over. It is assumed that this result is closely related to the fact that employees aged 20 and under are in their first years of business life. Besides, there are more factors that motivate the employees in their organizations, increase their organizational justice and commitment, and enable them to have a positive attitude towards performance-based pay, as employees between the ages of 31-40 are experienced in business life, have higher life responsibilities and have higher expectations. This finding supports the studies of Baday (2016), Öztürk (2002) and Uzuner (2014). In addition, there are also studies in the literature that reveal different results; Bayar (2019),

Demir (2013), Ergin (2012), Kovan (2020), K rođlu (2011),  zt rk (2002) and Van Staveren (2014) argued that there is no significant difference in the employees' perceptions of performance-based payment in terms of age factor. As a result, in this study, findings supported the studies revealing that there is a significant difference in the perceptions of satisfaction with performance-based payment depending on the age factor, and it was found that the perception of satisfaction with performance-based payment was higher in those aged between 31-40 years.

When the employees are compared in terms of *marital status*, the satisfaction level of performance-based payment of married people was found to be higher than that of singles. The parallelism of these findings with the findings obtained depending on the age factor is remarkable. Being married and being between the ages of 31-40 supported the conclusion that there are more factors that motivate them in their organizations, increase their organizational justice and commitment, and they have positive attitude towards performance-based payment because of their high level of satisfaction with performance-based payment, have higher life responsibilities between the ages of 31-40, and have higher expectations. This age range is the period when people's marriage, family responsibilities and expectations increase, and this result supports the research of Ergin (2012). According to this result, it is predicted that the motivation of married people is higher, that married employees are more committed to their organization and that it is costly to leave the organization. They embrace corporate values more, and single employees are less attached to their organizations and have a more positive approach to job opportunities that are attractive to them. Similarly, it was observed that the perception of distributive and interactional justice was significantly lower in singles. However, there are studies in the literature that reveal different results; Uzuner (2014) argued that single employees have a more positive attitude towards the performance-based payment system. Baday (2016), Bayar (2019), Kovan (2020) and K rođlu (2011) argued that there is no significant difference in the employees' perceptions of performance-based pay in terms of marital status factor.

When the employees are compared in terms of *educational status*, it was found that as the education level increases, satisfaction with performance-based payment (positive attitude) decreases and the satisfaction level of performance-based payment (positive attitude) is the lowest in those with high school education level. On the other hand, as the education level increases, the anxiety about performance-based payment increases and the level of anxiety about performance-based payment was higher in undergraduates than in the others. In terms of satisfaction with performance-based payment, Kovan (2020) obtained results similar to this research findings and found that associate degree graduates have higher positive perceptions towards the bonus system, whereas Baday (2016) argued that employees with a master's degree have higher perceptions of the performance-based wage system.

When the employees are compared in terms of *monthly income*, satisfaction with performance-based payment (positive attitude) increased and those with a monthly income of more than 10000 TL had a higher level of satisfaction with performance-based payment than others; it was found that the level of anxiety about performance-based payment increased and the level of anxiety about performance-based payment was higher in those with a monthly income of 6001-10000 TL. These results support Kılıç (2019) and Uzuner (2014)'s research results. According to their studies, it has been observed that as the monthly income of the employees increases, their perceptions of the performance-based payment system are more positive, whereas Kovan (2020) argues that there is no significant difference between income and premium system.

When the employees are compared in terms of *work arrangement*, the research revealed that full-time employees have a higher level of anxiety about performance-based pay than part-time employees. This result supports the researches of Akar and Yıldıırım (2008), Bakan

(2018) and Dawley et al. (2005) and states that full-time employees spend more for their organizations compared to part-time employees, have a greater sense of responsibility and loyalty towards their organizations since they want to stay in the organization. For this reason, it is possible to infer that full-time employees are more sensitive to the performance-based payment system and have a higher level of anxiety towards the system.

When the employees are compared in terms of *tenure*, it was found that as the tenure increases, the level of satisfaction with the performance-based payment (positive attitude) and the level of anxiety towards performance-based payment increase, and the satisfaction with the performance-based payment (positive attitude) and the level of anxiety towards performance-based payment are higher in those with tenure of more than 10 years.

When employees are compared in terms of organization size and as the organization size increases, the satisfaction with performance-based payment (positive attitude) increases and the satisfaction with performance-based payment (positive attitude) is higher in those with a small organization size (10-49 employees); however, it was found that the level of anxiety about performance-based payment increased and the level of anxiety about performance-based payment was higher in those with a large organization size (250 and more employees). Kalleberg and Van Buren (1996) and Wallace and Kay (2009) argued that small businesses may offer internal rewards such as greater freedom of work environment compared to large organizations, while large organizations may offer external rewards such as greater earnings and additional payments to their employees. On the other hand, Artz (2008) and Baurer (2004) stated that performance pay increases satisfaction more in medium (50-500 employees) and large organizations (more than 500 employees), whereas employees in small organizations (less than 50 employees) may not respond positively performance pay. They argued that there was no significant difference among the employees of small organizations regarding the payment.

Last, but not least, When the employees are compared in terms of *gender* and *employment contract*, it was found that there is no significant difference in terms of satisfaction with performance-based payment (positive attitude, anxious attitude).

On the other hand, since the subject is related this research, it is worth pointing out that Çoban (2021) states that “*satisfaction with performance-based pay regulates the relationship between organizational justice and organizational commitment*” and he argues that the “anxious attitude” dimension of the satisfaction with performance-based payment has a moderator role in the effect of “interactional justice” on “continuance commitment and normative commitment”. He observed that while the level of anxious attitude towards performance-based payment is high together with that the interactional justice is high, the levels of continuance commitment and normative commitment are higher than the situation with low interactional justice. This result supports the research of Dessler (2017), Folger and Konovsky (1989) and Keleş (2006). The increase that the performance-based payment system will provide in the amount of wages received by the employees will highlight the motivating feature of the wage on the organizational commitment (Tang et al., 2000). When employees see that the wage system (additional payment/premium system) applied in the organization is fair, their organizational commitment will also be positive (Folger & Konovsky, 1989; Keleş, 2006). According to Adams' (1965) equality theory about wages and additional payments, which are one of the most sensitive issues for employees, if there is an imbalance between the efforts made by the employees and the rewards they receive, the employees will start to worry and try to eliminate this injustice (Dessler, 2017).

Conclusion

In this research, it is aimed to reveal new connections related to the performance-based payment system with the subject and the way it is handled, and to present useful views and findings to the literature by making a new original study. With this study, the differences of the personal characteristics of the employees such as “gender, age, marital status, educational status, tenure, monthly income, work arrangement, employment contract and organization size” in terms of the performance-based pay system satisfaction are compared and, the results obtained based on the findings of the research are explained. In this respect, the fact that this study is the first on its subject adds an international dimension to the study. Comprehensive analyses were made on the data collected in research and contributed to the empirical literature.

Performance-based payment system, which is an important model in the economic organization of today's societies and continues to spread rapidly, has an application area that continues to expand both in the public and private sectors. While the accumulation of knowledge about the system is increasing day by day with the contributions of different disciplines in a wide area ranging from its application to its results, the need for alternative approaches continues. The results of this study are very important because of the need for new research on the performance-based payment system, which affects both the economic policies and the conditions and lives of many employees in social life. On the other hand, the subject and scope of the research are also the factors that increase the importance of the study.

In addition, one of the most striking aspects of this research is that “whether satisfaction with performance-based payment differs according to the demographic characteristics of the employees”, which has not yet been found in international literature within this “comprehensive approach”, is discussed. At this point, since this study is the first study in this area, it has a significant mission and is assumed that the research will fill an important gap in the literature with this feature.

In the light of the results obtained from the research, the first suggestion for the future studies to be done is about the different research groups. The research was conducted in the private sector in Türkiye. It is highly suggested that the execution of similar studies to be carried out in the field with more employees in the public and/or private sector, in different cultures, and in different business lines will make significant contributions to the literature.

This research was carried out with a quantitative design and revealed the relationships between the variables. The second suggestion is related to the design of the future research, and it is recommended that future research in this field with a qualitative design will provide an understanding that will illuminate different dimensions of the subject.

References

- Adams, J.S. (1965). Inequity In Social Exchange, in Berkowitz, L.(ed.). *Advances in Experimental Social Psychology*, New York: Academic Press.
- Akar, C., Yıldırım, Y. (2008). The Relationships Between Managers' Organizational Commitment, Job Satisfaction and Role Stress Sources: A Field Application in the White Meat Industry with the Structural Equation Model. *Journal of Gazi University Faculty of Economics and Administrative Sciences*, 10 (2), 97-113.
- Akçakanat, T., Çarıkçı, İ.H. (2019). *Performance Based Wage System and Its Application in Health Institutions*, Istanbul: Hiper Yayın.

- Allen, N.J., Meyer, J.P. (1990). The Measurement and Antecedents of Affective, Continuance and Normative Commitment to The Organization. *Journal of Occupational Psychology*, 63, 1-18.
- Ariely, D., Bracha, A., Meier, S. (2009). Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially. *American Economic Review*, 99 (1), 544-555.
- Artz, B. (2008). The Role of Firm Size and Performance Pay in Determining Employee Job Satisfaction Brief: Firm Size, Performance Pay, and Job Satisfaction. *Labour*, 22 (2), 315-343.
- Baday, M. (2016). A Field Study on the Effects of Performance-Based Remuneration System on Motivation. Master's Thesis. Istanbul Gelisim University Institute of Social Sciences, Istanbul.
- Bakan, İ. (2018). *Fundamentals of Organizational Strategies- Organizational Commitment: Concept, Theory, Cause and Consequences*, Ankara: Gazi Kitapevi.
- Baurer, T.K. (2004). High Performance Workplaces and Job Satisfaction: Evidence from Europe, *IZA Discussion Paper*, 1265, 1-33.
- Bayar, M. (2019). Investigation of the Effect of In-Service Training of Personnel and Motivation on Performance in Human Resources Management: An Application in Private Health Institutions in Ankara Province. PhD Thesis, Istanbul Gelisim University, Institute of Social Sciences, Istanbul.
- Bulut, Z.A., (2004). Performance Evaluation Studies and Applied Methods in Businesses. *Journal of Legislation*, 79.
- Burton, J. P., Sablinski, C. J., Sekiguchi, T. (2008). Linking Justice, Performance, and Citizenship Via Leader-Member Exchange. *Journal of Business and Psychology*, 23(1-2), 51–61.
- Cascio, W.F. (2008). *Managing Human Resources: Productivity, Quality of Work Life, Profits* (8th Ed.), New York: McGraw-Hill.
- Çoban, N.O. (2021). The Role of Organizational Commitment and Organizational Justice in the Relationship between Performance-based Pay Satisfaction and Motivation. PhD Thesis, Ankara University Institute of Social Sciences, Ankara.
- Çoban, N.O., Pişkin, M., Ersoy Kart, M. (2021). The Performance-Based Pay System Satisfaction Scale (PEDOS) Development Study, *Journal of Social Security*, 11(1), 195-214
- Daft, R.L. (2007). *Management* (8th Ed.), Ohio: Thomson South-Western.
- Dawley, D.D., Stephens, R.D., Stephens, D.B. (2005). Dimensionality of Organizational Commitment in Volunteer Workers: Chamber of Commerce Board Members and Role Fulfillment, *Journal of Vocational Behavior*, 67, 511-525.
- Deci, E. (1971) *Effects of Externally Mediated Rewards on Intrinsic Motivation*. *Journal of Personality and Social Psychology*, 18 (1).
- Demir, R. (2013). A Study on Physicians' Attitudes Towards Performance-Related Remuneration and Performance-Based Supplementary Payment System in Public Hospitals. PhD Thesis. Istanbul University Institute of Social Sciences, Istanbul.

- Dessler, G. (2017). *Human Resources Management* (15th Ed.), New Jersey: Pearson-Prentice Hall.
- Ergin, G. (2012). The Relationship Between Performance Evaluation and Motivation and an Application on Municipal Employees. Master's Thesis. Istanbul Aydın University Institute of Social Sciences, Istanbul.
- Folger, R., Konovsky, M. (1989). Effects of Procedural and Distributive Justice on Reactions to Pay Raise Decisions. *The Academy of Management Journal*, 32 (1), 115-130.
- Gündüz, A., (2011). Civil Servants Born in Kırşehir According to the Registers of Sicill-i Ahval (1879-1909). *History Studies*, 3 (1), 131-154.
- Harlow, H.F., Harlow, M.K., Meyer, D.R. (1950). Learning Motivated By a Manipulation Drive. *Journal of Experimental Psychology*, 40, 228-234.
- He, W., Fehr, R., Yam, K.C., Long, L.R., Hao, P. (2017). Interactional Justice, Leader–Member Exchange, and Employee Performance: Examining The Moderating Role of Justice Differentiation. *Journal of Organizational Behavior*, 38(4), 537–557.
- Kalleberg, A.L., Van Buren, M.E. (1996). Is Bigger Better? Explaining The Relationship Between Organization Size and Job Rewards. *American Sociological Review*, 61 (1), 47–66.
- Keleş, H.N. (2006). A Research on the Effect of Job Satisfaction on Organizational Commitment in Pharmaceutical Production and Distribution Companies. PhD Thesis, Selcuk University Institute of Social Sciences, Konya.
- Kılıç, Ş. (2019). Applicability of Performance Based Remuneration in Turkish Public Administration within the Framework of 360 Degree Performance Evaluation System: A Study in Kırıkkale Municipality. Master's Thesis. Kırıkkale University Institute of Social Sciences, Kırıkkale
- Kohn, A. (1993). *Punished By Rewards: The Trouble with Gold Stars, Incentive Plans, A's, Praise, and Other Bribes*. Boston: Houghton Mifflin.
- Kovan, Ö. (2020). The Effect of Performance Based Bonus Applications Used in Radiology Department on Employee Satisfaction: A Special Health Group Example. Master's Thesis. Acıbadem Mehmet Ali Aydınlar University Health Sciences Institute, Istanbul.
- Köroğlu, Ö. (2011). The Relationship of Factors Affecting Job Satisfaction and Motivation Levels with Performance: A Study on Tourist Guides. Ph.D. Thesis, Balıkesir University Institute of Social Sciences.
- Kumar, D., (2005). Performance Appraisal: The Importance of Rater Training. *Journal of The Kuala Lumpur Royal Malaysia Police College*, 4, 1-17.
- Kuvaas, B. (2006). Work Performance, Affective Commitment and Work Motivation: The Roles of Pay Administration and Pay Level. *Journal of Organizational Behavior*, 27(3), 365-385.
- Lazear, E.P. (2000). Performance Pay and Productivity. *The American Review Economics*, 90 (5), 1346-1361.

- Lepper, M., Greene, D., Nisbett R. (1973). Undermining Children's Intrinsic Interest with Extrinsic Rewards: A Test of the Overjustification Hypothesis. *Journal of Personality and Social Psychology*, 28 (1), 129-137.
- Mellström, C., Johannesson, M. (2008). Crowding Out In Blood Donation- Was Titmuss Right?. *Journal of the European Economic Association*, 6 (4), 845-863.
- Neely, A., Gregory, M., Platts, K. (1995). Performance Measurement System Design-A Literature Review and Research Agenda. *International Journal of Operations & Production Management*, 15 (4), 80-116.
- Öztürk, H. (2002). Motivation Levels and Performance Levels of Nurses. PhD Thesis. Istanbul University Institute of Health Sciences, Istanbul.
- Penley, L., & Gould, S. (1988). Etzioni's Model of Organizational Involvement: A Perspective for Understanding Commitment to Organizations. *Journal of Organizational Behavior*, 9(1), 43-59.
- Pink, D. (2010). Forget carrots and sticks, they don't always work. *Telegraph*, 8 May 2020. <http://www.telegraph.co.uk/finance/yourbusiness/business-thinking/7752986/Forget-carrots-and-sticks-they-dont-always-work.html>.
- Pink, D. (2015). *Drive-How Do We Get Motivated? How Do We Motivate?* (Translated: Levent Göktem). Istanbul: Kapital Medya Hizmetleri.
- Sabuncuoğlu, Z. (2013). *Human Resources Management*. Istanbul: Beta Basım Yayın Dağıtım.
- Stoffey, R.W., Reilly, R.R. (1997). Training Appraisees to Participate in Appraisal: Effects on Appraisers and Appraisees. *Journal of Business and Psychology*, 12, 219–239.
- Şendoğdu, A. (2014). *Human Resources Management in Banks: Recruitment Process and Performance Evaluation*. Ankara: Nobel Yayıncılık.
- Tang, T.L., Kim, J.K., Tang, D.S. (2000). Does Attitude Toward Money Moderate The Relationships Between Intrinsic Job Satisfaction and Voluntary Turnover, *Human Relations*, 53 (2), 213-245.
- Uyargil, C., (2008). *Performance Management System in Businesses*, Istanbul: Arıkan Basım-Yayın.
- Uyargil, C., (2013). *Performance Management System* (3rd Ed.), Istanbul: Beta Yayıncılık.
- Uysal, Ş. (2015). An Overview of Definition, History, Purpose and Basic Elements of Performance Management System. *Electronic Journal of Vocational Colleges-October 2015*, 32-39.
- Uzuner, M.T. (2014). Performance Based Remuneration Systems and Applications in Bilecik Ministry of Health Hospitals. Master's Thesis. Gazi University Institute of Social Sciences, Ankara.
- Van Staveren, G.A. (2014). An Investigation Into Teacher Motivation and the Role of Merit Pay. PhD. Thesis, Oakland University, Michigan.
- Venkatraman, N., Ramanujam, V. (1986). Measurement of Business Performance in Strategy Research: A Comparison of Approaches. *Academy of Management Review*, 11(4), 801– 814.

Wallace J.E., Kay, F.M. (2009) Are Small Firms More Beautiful or Is Bigger Better? A Study of Compensating Differentials and Law Firm Internal Labor Markets. *The Sociological Quarterly*, 50 (3), 474–496.

Wang, X., Liao, J., Xia, D., Chang, T. (2010). The Impact of Organizational Justice on Work Performance: Mediating Effects of Organizational Commitment and Leader-Member Exchange. *International Journal of Manpower*, 31, 660-677.

CONSUMERS IN LUXURIOUS RESTAURANTS NEED UNIQUE

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Abstract

Luxury, which expresses the unnecessary, excessive, ostentatious situation that manifests itself in clothing, goods, spending, and lifestyle, corresponds to the expectations of the ideal self. In this case, it helps to increase the demand for the luxury lifestyle that is accessible. It can feel good once the person achieves his/her goals. Finding the ideal consists of completing the desires and goals. Luxury is convenience and comfort. By catching this privilege, the consumer, who expects to be unique, also reaches the ideal self. Today, the need to be unique, which is also in the field of social psychology, is associated with the new generation of consumers. In the service sector, also known as the third sector, it has not been studied to determine to what extent the service is produced instead of the product and to what extent consumers expect to meet their uniqueness. It is a restaurant where the customer's eating and drinking needs are served for a fee. Derived from the French word to restore, revitalize, it is a space consisting mostly of a large dining hall and kitchen. This work; The relationship between these consumers and the extent to which they are affected in restaurants while receiving service has been examined. The data were obtained by applying a face-to-face survey method to consumers in 30 luxury restaurants in Istanbul. The results of the research have concluded that there is a positive and significant relationship between the uniqueness needs of consumers using luxury restaurants and the intention to choose luxury. Regarding the results of the research, necessary studies were carried out within the framework of the literature, and the limitations of this study were determined, and in the conclusion part, suggestions were made for future studies.

Keywords: Consumer, Luxury Restaurant, Need for Uniqueness

**SERA GAZLARI EMİSYONUNDAN KAYNAKLANAN KÜRESEL ISINMA VE
İKLİM DEĞİŞİKLİĞİNİN ETKİLERİNE KARŞI KARBON FİYATLANDIRMA
MEKANİZMALARININ DEĞERLENDİRİLMESİ: KARBON VERGİLERİ VE
EMİSYON TİCARET SİSTEMLERİ (ETS)**

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Özet

Dünya’da atmosferdeki sera gazlarının artması küresel ısınmaya, küresel ısınma iklim değişikliğine sebep olmaktadır. Bu bağlamda sera gazlarının azaltılması amacıyla küresel düzeyde önemli faaliyetlerin yürütüldüğü görülmektedir. Avrupa’da Finlandiya, İzlanda, Norveç, İsveç, Danimarka, Estonya, Letonya, İrlanda, Slovenya, İsviçre, Polonya, Portekiz ve Birleşik Krallık; Avrupa dışında ise Meksika, Kolombiya, Şili, Hindistan ve Japonya ulusal düzeyde karbon vergisi uygulamaktadır. Avrupa’da 2005 yılında dünya’nın ilk Emisyon Ticaret Sistemi (ETS) kurulmuştur. AB, Emisyon Ticaret Sistemi kapsamında emisyon yoğun elektrik, çimento, demir-çelik sektörlerinde karbonu fiyatlandırmaktadır. İklim değişikliğinin azaltılması ve finansmanı için Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi (BMİDÇS) kapsamında Paris İklim Anlaşması 2015 yılında imzalanmış ve 4 Kasım 2016 tarihinde yürürlüğe girmiştir. Türkiye bu anlaşmayı 7 Ekim 2021 tarihinde onaylayarak anlaşmaya taraf olmuştur. Avrupa Birliği 11 Aralık 2019 tarihinde Avrupa Yeşil Mutabakatını açıklamıştır. Avrupa Yeşil Mutabakatı ile AB, 2030’a kadar karbon emisyonlarını en az yüzde 55 azaltmayı (1990 yılına kıyasla), 2050 yılında ise karbon nötr olmayı hedeflemektedir. Avrupa Yeşil Mutabakatı kapsamında uygulanması öngörülen “Sınırdaki Karbon Vergisi Mekanizması” önemli bir düzenleme olarak öne çıkmaktadır. AB, “Sınırdaki Karbon Vergisi Mekanizması” ile karbon emisyonunu azaltmayı amaçlarken, Avrupalı yerli üreticiyi karbonun fiyatlanmadığı ya da karbon emisyon maliyetinin düşük fiyatlandığı AB dışındaki ülkelerin rekabetine karşı korumayı hedeflemektedir. AB, Yeşil Mutabakata uyumu birlik dışındaki ülkelere de beklemektedir. Aksi taktirde birlik dışındaki ülkelere yapılacak ithalata karbon vergisi adı altında vergi uygulanması öngörülmektedir.

Bu çalışmanın amacı, küresel iklim değişikliği ile mücadele için geliştirilen karbon fiyatlandırma mekanizmalarını incelemek ve bu mekanizmaların Türkiye açısından etkilerini tespit etmek, Türkiye için önerilerde bulunabilmektir. Çalışma kapsamından Yeşil Mutabakatın en çok etkileyeceği ülkelerin başında Türkiye’nin olduğu anlaşılmaktadır. Avrupa Birliği tarafından yayımlanan Yeşil Mutabakat ile ihracatının yarısını Avrupa Birliği’ne yapan Türkiye için özellikle karbon emisyonu yoğun sektörler olan demir-çelik, alüminyum, çimento, elektrik ve gübre sektörlerine büyük maliyetler getirebileceği söylemek mümkündür. Eğer gerekli düzenlemeler yapılmazsa ihracat ürünlerinin fiyatını arttırarak Türkiye’nin rekabet gücünü olumsuz olarak etkileyebilecek bir maliyet söz konusu olabilecektir. Buna göre, “Yeşil Ekonomi” ya da “Düşük Karbonlu Büyüme” olarak adlandırılan sürdürülebilir büyümeye yönelmeli, üretilen malların karbon ayak izi hesaplanmalı, “Karbon Fiyatlaması Sistemi” kurulmalıdır. Türkiye “Yeşil Mutabakat Çalışma Grubu” oluşturmuş ve “Yeşil Mutabakat Eylem Planı” ortaya koymuştur. Bu alandaki eylem planının hızlı bir şekilde uygulamaya geçirilmesi gerekmektedir.

Anahtar Kelimeler: Küresel İklim Değişikliği, Sürdürülebilirlik, Avrupa Yeşil Mutabakatı, Emisyon Ticaret Sistemi, Karbon Vergisi.

**EVALUATION OF CARBON PRICING MECHANISMS AGAINST THE IMPACTS
OF GLOBAL WARMING AND CLIMATE CHANGE RESULTING FROM
EMISSIONS OF GREENHOUSE GASES: CARBON TAXES AND EMISSIONS
TRADING SYSTEMS (ETS)**

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Abstract

Increasing greenhouse gases in the atmosphere on Earth causes global warming, thus leading to climate change. Therefore, in a bid to reduce green gases, various important initiatives have been undertaken at both international and national level. Some European countries, for example, including Finland, Iceland, Norway, Sweden, Denmark, Estonia, Latvia, Ireland, Slovenia, Switzerland, Poland, Portugal, the United Kingdom implement carbon tax, as well as some other countries except European continent, such as Mexico, Colombia, Chile, India, and Japan. Apart from this, another important initiative is establishment of the Emissions Trading System. The world's first Emissions Trading System (ETS) was set up in Europe in 2005. The system charges a carbon price especially in emission-intensive electricity, cement, iron and steel sectors. Again, in an attempt to reduce and finance the climate change, Paris Climate Agreement was adopted in 2015 and entered into force on 4 November 2016 under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC). Turkey ratified this agreement on 7 October 2021. The European Union released EU green deal on 11 December 2019. So that EU aims to reduce carbon emissions by at least 55 percent (compared to 1990) by 2030 and to become carbon neutral in 2050. At this respect, Carbon Border Adjustment Mechanism is an important step through this process both in terms of preventing carbon leakage and protect European domestic producers against countries outside the EU where carbon is not priced or the cost of carbon emissions is low. The EU expects compliance with this deal from countries outside the union as well. Otherwise, it is probable that a tax will be imposed on imports from countries outside the union under the name of a carbon tax.

The aim of the study is multifold: to examine the carbon pricing mechanisms aimed to combat global climate change; to determine the effects of these mechanisms on Turkey and to make suggestions for the case of Turkey. It is apparent from this study that Turkey is among the leading countries that will be most affected by green deal announced by EU. Because EU is the largest export partner of Turkey, and this deal can place a great burden especially carbon-intensive sectors, such as iron, steel, aluminum, cement, electricity and fertilizer sectors. If the necessary measures are not taken, the price of export products will increase, and this situation in turn will adversely affect Turkey's competitiveness. For this reason, Turkey should opt for sustainable growth also known as "Green Economy" or "Low-Carbon Growth", measure the carbon footprint of manufactured goods, and set up the "Carbon Pricing System". By far, Turkey has established a "Green Deal Working Group" and developed "Green Deal Action Plan". However, these steps should not remain unfulfilled. Turkey should implement this action plan immediately.

Keywords: Global Climate Change, Sustainability, Europe Green Deal, Emission Trading System, Carbon Tax.

TÜRKİYE’NİN SANAYİLEŞMEDE STRATEJİK TERCİHLERİ

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Özet

Türkiye, Osmanlıdan ilkel ve geleneksel teknolojiye dayalı tipik bir tarım ekonomisi devraldı. 1923 yılında düzenlenen İzmir İktisat Kongresinde piyasa sistemi yönündeki stratejik bir tercih yapıldı. Hızla köklü toplumsal, ekonomik, kültürel ve kurumsal reformlar yapıldı. Girişimciliğin gelişmediği bir ortamda sanayileşme görevini devlet üstlendi. Yoğun bir hazırlık dönemi sonrasında Birinci Beş Yıllık Sanayi Planı Mayıs 1934’te uygulanmaya başladı. II. Dünya Harbi sanayileşme sürecini kesintiye uğrattı. 1950 yılında seçimle gelen yeni iktidar 1960’a kadar sanayileşmede özel girişimciliği destekledi. 1960 -1980 döneminde karma ekonomik sistem olarak, devlet ve özel girişimcilik birlikte, “Planlı Kalkınma” stratejisini başlattı. Bu süreçte ülke ekonomisi, tüketim malları sanayisini kurdu ve aramaları sanayi üretimine yöneldi. Ancak 1930’lu yıllardan beri uygulanan “ithal ikameci sanayileşme stratejisi”, “kapalı” bir ekonomi modeli yaratırken ihracat yetersizliği ekonomide döviz darboğazı yarattı.

1980 yılında devreye giren “dışa açılma” stratejisi köklü reformlar ve davranış değişikliği gerektiriyordu. Bu yöndeki uyum yetersizlikleri, enflasyon, politik sistem ve ekonomi yönetiminde istikrarsızlık getirdi. Ayrıca ICT, bilgi toplumu ve küreselleşme süreçlerine yeterli uyum sağlanamadı. Bu yüzden 1990’lı yıllarda ekonomik ve politik krizler yaşandı. 2002 Sonrasında iktidar olan siyasi İslamcı muhafazakâr parti, hızlı bir özelleştirme süreci ile devlete ait fabrikaları sattı. Sanayileşme stratejisi terk edildi. Rekabet gücü düşük teknolojiye dayalı “ticaret” stratejisi daha çok öne çıktı. Düşük teknoloji, sanayi temeli ve üretim potansiyeli zayıf bir sanayi yapısı içinde, ithalata bağımlı bir sanayi yapısı oluştu. Bu tercih ekonomide fakirleştiren büyüme sürecini başlattı. Düşük teknolojik düzey, düşük verimlilik ve düşük üretim ortamında rasyonellikten yoksun politik tercihler ekonomik krizleri tetikledi.

M. Porter’ in tanımlamaları ile **faktör güdümlü** bir ekonomik yapılanma ile yola çıkan Türkiye ekonomisi, 1930’lu yıllardan itibaren **yatırım güdümlü** bir stratejiye geçiş yapmıştı. Ancak 1980 sonrasında izlediği **ticaret güdümlü strateji** tercihi; teknoloji, endüstriyel üretim, verimlilik, yenilikçilik, küresel rekabet ve rasyonel politika temellerinin zayıflığı nedeniyle, **post modern refah güdümlü** bir stratejiye dönüştü. Bu tercih çok yönlü krizlere davetiye çıkardı. Çıkış yolu, küresel ticaret ve üretim ağlarıyla bütünleşmiş yenilik güdümlü bir sanayileşme tercihi ile sağlanabilir. Pür ticaret stratejisinin ileri ve geri bağlantıları sınırlı kalırken yüksek katma değer yaratma potansiyeli yetersiz kalıyor. Yenilikçi sanayileşme stratejisi ile bütünleşen bir küresel ticaret stratejisi, Çin ve Güney Kore örneklerinde olduğu gibi, kalıcı başarıyı getirebilmektedir.

Anahtar Kelimeler: İthal ikamesi stratejisi, İhracata dayalı strateji, Refah güdümlü strateji, Yenilik güdümlü strateji

TURKEY'S STRATEGIC PREFERENCES IN INDUSTRIALIZATION

Abstract

Turkey inherited a typical agricultural economy based on primitive and traditional technology, from the Ottoman Empire. At the Izmir Economy Congress held in 1923, a strategic choice was made in the direction of the market economy. Social, economic, cultural and institutional reforms made rapidly during this era. In an environment where entrepreneurship did not develop, the state took the responsibility of the task of industrialization. After an intense preparation period, the First Five-Year Industrial Plan began to be implemented in May 1934. This Industrialization process interrupted by the World War II. The new ruling party that came with elections in 1950 supported private entrepreneurship in industrialization until 1960. Thus, the strategic deficiency of the statist period was completed. In the 1960-1980 period, as a mixed economic system, the state and private entrepreneurship together launched the "Planned Development" strategy. In this process, the country's economy established the consumer goods industry and it turned to intermediate goods production. However, while the "import substitution industrialization strategy" implemented since the 1930s created a "closed" economy model, the insufficiency of exports created a foreign exchange bottleneck in the economy.

The strategy of opening up in 1980 required radical reforms and behavioural changes. Inadequate adjustments in this direction brought inflation and instability to the management of the economy and the political system. In addition, adequate adaptation to ICT, information society and globalization processes could not be achieved. That's why there were economic and political crises in the 1990s. The political Islamist conservative party that came to power after 2002 sold the state-owned factories with a rapid privatization process. The industrialization strategy was abandoned. The strategy of "trade" based on low-competitive technology became more prominent. An import-dependent industrial structure has emerged within an industrial structure with low technology, weak industrial base and production potential. This preference started the growth process that impoverished the economy. In the low technological level, low productivity and low production environment, political choices devoid of rationality, triggered economic crises.

The Turkish economy, which started out with a **factor-driven** economic structure with the definitions of **M. Porter**, had switched to an investment-driven strategy since the 1930s. However, with the **trade-driven strategy** preference followed after 1980; It has turned into a **post-modern welfare-driven** strategy due to the weakness of technology, industrial production, efficiency, innovation, global competition and rational policy foundations. This choice has led to multiple crises. The way out can be provided by an **innovation-driven** industrialization preference integrated with global trade and production networks. While the forward and backward links of the **pure trading strategy** remain limited, the potential to create high added value remains insufficient. A global trade strategy integrating with an innovative industrialization strategy can bring lasting success, as in the examples of China and South Korea.

Keywords: Import-substitution strategy, Export-driven strategy, Welfare-driven strategy, Innovation-driven strategy

OSMANLI MİRASI VE BATI

Osmanlıdan Miras Kalan

Osmanlı İmparatorluğu, sanayi uygarlığı öncesi dönemde tarım toplumu olarak süper güç konumunda bir ekonomi, devlet ve toplum yapısına sahipti. Ancak bu dönemin toplum yapısı, tarıma dayalı geleneksel toplum yapısıdır. Bu toplum yapısında **temel üretim faktörü topraktır**. Tarımsal üretim ve tarımsal ürün ticareti ekonomik ilişkileri belirler. Tarım toplumlarında kullanılan teknolojiler, **geleneksel tarım teknolojilerdir**. Kültürel alanda durağan değerler, mitolojik değerlerle beslenmiş dini inançlar toplumun işleyiş ve yönlenmesinde etkilidir. Osmanlı toplumunda iktidarın başında, otoriter Padişah ve bunun emrinde güçlü bir merkezi ordu ve merkezi bürokrasi yer alıyordu.

Toplumsal farklılaşma ve işbölümünün düşük olduğu Osmanlı tarım toplumunda, toprağın merkezi yönetimi devlete daha fazla güç sağlıyordu. Tımarları, sultan dağıtırdı. Tımar sahibi devletin memuru idi. Her aileye bir çift öküzün sürebildiği bir arazinin mülkiyeti değil, sadece işletim ve kullanım hakkı veriliyordu. Toprağın ve üretimin merkezden kontrolü, güçlü merkezi ordu ve bürokrasinin finansmanı sağlanıyordu. Toplum tabanında toprağı işleyen bir sosyal sınıf olarak "çiftçilik" sistemine dayalı aile işletmeleri bulunuyordu (Bkz Erkan-Erkan,1998;s.71-92). Osmanlı aldığı topraklarda, tabandaki halkı daha çok kendi haline bırakıyordu. Osmanlıdaki Tımarlı sipahi-reaya ilişkisi ile Batı toplumlarının özel mülkiyete dayalı senyör-köle ilişkisi birbirinden oldukça farklıdır. Osmanlı'nın merkezi yönetimi, ekonomik alanda üretimden çok, gelirin paylaşım, dağıtım ve tüketimiyle ilgili bir örgütlenme özelliği gösteriyordu.

16. ve 17. yy. da Osmanlı'da el sanatları, çinicilik, dokumacılık ve gemi yapımı gibi alanlarda Batıdan geri değildi. Ancak Batı'da sanayi devriminin devreye girmesi ile aradaki fark 18. ve 19.yy.da güçlü biçimde açıldı. Batı sermayesinin Osmanlı topraklarına girmesiyle işbirliği veya Batı kontrolünde kurulan sanayi dalları oldu. Osmanlı'nın son döneminde, verilen imtiyazlar, ayrıcalıklar ve kontrol mekanizmaları yoluyla ülke, Batının pazarı durumuna geldi. Osmanlı'da 1913-1915'te bir sanayi sayımı yapıldı. Bu sayım Batı Anadolu'daki sanayi işyerlerini ve diğer illerdeki 10'un üzerinde işçi çalıştıran işletmeleri kapsadı. İmparatorlukta 264 işyeri mevcuttu. Bunların yüzde 56.1'i gıda ve dokuma olmak üzere iki sektörde toplanmıştı. Bunları yüzde 19.4 ile kırtasiye izliyor. Bu işyerleri, daha çok İstanbul, İzmir ve Bursa'da yoğunlaşmış durumdaydı. Bu işletmelerde sermaye ve emek miktarının ancak yüzde 15'lik oranı Türklere aitti. Bu işletmelerde Rumların payı sermayede yüzde 50; emekte yüzde 60 oranlarında bulunuyordu. Ermenilerin payı ise sermayede yüzde 20 ve emekte 15 oranlarında; buna karşın Yahudilerin payı sermayede yüzde 5 ve emekte 10 değerlerine ulaşıyordu. Görüldüğü gibi bu Sanayi sayımına göre, Rum ve Ermeni azınlıklarının ekonomideki ağırlıkları yüzde 70-75 oranlarının üzerinde paylara ulaşırken Türklerin payı sadece yüzde 15 oranında kalıyordu (DİE,1973; s.142)

İşletmelerin yaklaşık yüzde 94'ü çevirici güç kullanıyordu. Kullanılan ortalama çevirici güç 85 beygir olarak, küçük işletme özelliği gösteriyordu. Bu işletmeler önce I. Dünya Harbi, arkasından Yunan İşgali ve Kurtuluş Savaşında yıkıma uğradı. Cumhuriyet, Osmanlı'dan, **geri** kalmış, yarı-yıkılmış ve yıkılmış bir tarım ülkesi devraldı. Osmanlı ekonomisi ve maliyesi tamamen yabancı ülkelerin kontrolüne girmişti. Ulaşım ve altyapı yetersiz, iç ticaret ve ulaştırma kısıtlıydı. Dış ticaret açık veriyordu. Duyun-u Umumiye, Cumhuriyet yönetime 86 milyon altın lira borç bırakmıştı.. Nüfusun yüzde 75'i tarımda çalışıyordu. Tarımsal teknoloji ilkel ve kapalı ekonomi nedeniyle tarımsal ürünleri pazarlama olanakları yoktu. 1923 yılında milli gelir içinde sanayinin payı yüzde 13,2, imalat sanayinin payı yüzde 12,3 idi. Kişi başına milli gelir 75 TL (45 dolar) dolaylarında bulunuyordu (Erkan,H.2000;.s. 44 vd).

Batının Sanayileşmesi

Batı'da Rönesans ve Amerika Kıtasının keşfi, Avrupa'da yeni bir Toplum ve ekonomik yapılanmanın önünü açmıştı. Batı yeni kıtalar keşfetmiş ve Avrupa'ya kıymetli maden akımı başlamıştı. Avrupa'da ticaret kapitalizmi, servet birikimine yol açıyordu. Ayrıca Avrupa'da tarım toplumunda var olan özel mülkiyet; toprak sahiplerinin elinde servet birikimine yol açmıştı. Yeni ticaret yollarının açılmasıyla ticari kapitalizm (merkantilizm), "burjuvazi" sınıfını doğurdu. Özellikle, Akdeniz ve Kuzey İtalya'da gelişen ticaretle birlikte, mimari ve güzel sanatlarda yaşanan canlanma Rönesans'ı yarattı. Rönesans'la birlikte, ortaçağın "mistik dünya görüşünden, akıl ve akla sahip insanı ön plana çıkardı. Daha sonra Rönesans yanında reform hareketleri, aydınlanma çağı ve hümanizma hareketlerini tetikledi. Akıllı temel alan bu paradigma zamanla, Newton yasalarında net ifadesini buldu. Doğada olan her şey, bir ilahi güçle değil; yine doğada olan bir nedenle açıklandı. Böylece "mekanik nedensellik" dediğimiz sanayi uygarlığını yaratan paradigma olgunlaştı. Bu süreç mekanik teknoloji ve aletlerin doğmasına hizmet etti. Yeni teknolojiler üretim sürecinde işbölümü ve uzmanlaşma yarattı. Yeni makine parkları, yani sermaye mallarına dayalı üretimi besledi. Böylece sanayi uygarlığı sermaye birikimine dayanarak, temel üretim faktörü toprak yerine makine ve sermayeyi ikame etti. Sanayi uygarlığı ile yeni bir kültür ve yeni bir ideoloji doğdu. Sanayi uygarlığı, feodalite gibi kent uygarlığı değil; ulus uygarlığı ve ulus ideolojisini doğurdu. Ekonomide, sanayileşme ve sanayinin ihtiyaç duyduğu hammadde kaynakları edinmek çağın temel politikası oldu.

Osmanlı'nın bünyesi böyle bir yapılanmaya uygun değildi. Osmanlı coğrafyasında çok sayıda "millet" yaşıyordu. Ancak dışarıda olup bitenden etkilenerek girilen bazı reform girişimleri merkezi ordu ve merkezi bürokrasi düzeyinde kaldı. Oysa sanayi uygarlığının iç dinamiği sermaye birikimi ve mekanik teknolojilerin kullanımına dayanıyordu. Osmanlı toplum ve düşünce yapısı bu yeni gelişmenin algılanmasını engelledi. Dış dinamik ise Osmanlı'yı hammadde kaynağı olarak sömürgeleştirmek istedi. 1838 İngiliz Ticaret Anlaşması, Osmanlı pazarlarını batı kapitalizmine açtı. Kırım Harbi ertesinde Batıdan alınan borçlar Osmanlı'yı finansal açıdan Batının kontrolüne soktu (Düyun-u Umumiye). Diğer yandan "**ulusçuluk ideolojisi**" çok sayıda milletin yaşadığı imparatorluğu parçalanmaya itti. Nihayet İngiliz ve Fransız işbirliği ile **I. Dünya Harbi'nde** Osmanlı'ya son darbe vuruldu.

CUMHURİYETİN İLK YILLARI

Ekonomide Kurumsal Dönüşüm (1923-1930)

Cumhuriyetin rotası, **İzmir İktisat Kongresi'nde** (17 Şubat 1923) tüm toplum kesimlerini içeren 1135 delegenin katılımı ile belirlendi (Bknz. Erkan, H. ;2015;s.28 vd). Kongre metinleri, 1930'a kadar sürecek dönemin politikası için yönlendirici oldu. Kongrede zımnen piyasa sistemi ve özde liberal nitelikli politikalar benimsendi. Yeni kurulacak sistem, ekonomik alanda olduğu kadar toplumsal alanda da köklü bir dönüşüm gerekiyordu. Bu dönemde "Kalkınmanın ortam ve iklimini" yaratacak ön koşullar hazırlandı. Finans alanına ilişkin yasal düzenlemeler ile ekonomi ve maliye alanlarına ilişkin çok sayıda hukuksal düzenleme getirildi. Sanayi teşvik yasası 1927 yılında çıkarıldı. Para politikası karar birimi olan merkez Bankası 1930'da kuruldu. Nisan 1930'da ulusal sanayinin gelişme yollarını aramak üzere bir Sanayi Kongresi toplandı. Sanayinin gelişimi için devletin desteği yetmeyince, bu konuda devletin bizzat kendisi daha aktif olma yollarını aradı. Lozan düzenlemeleri bitince, 1930'da gümrükleri bizzat kendi kontrolüne alan devlet, dış açık vermek yerine dış ticaret fazlası vermeye başladı. İhracat daha çok tarımsal ürünlerden oluşuyordu. 1923'den 1928'e tüketim malları ithalatı yüzde 81'den yüzde 64'e gerilerken, yatırım malları ithalatı yüzde 6'dan yüzde 15'e çıkmıştır. Ekonomide

çerçeve düzenlemeler yanında daha çok kendi haline ve doğal koşullara bırakıldı. **M. Porter'in** (1990)deyimi ile **faktör güdümlü gelişme stratejisi** geçerli oldu.

Dönemin reform hareketleri sadece ekonomik alanla sınırlı değildi. Çok daha önemli ve o günün Türk toplumu açısından gerçekleştirilmesi zor kurumsal düzenlemeler yapıldı. Daha Kurtuluşan önce, 23 Nisan 1920 de Türkiye Büyük Millet Meclisini toplandı. Savaşı Meclis Hükümeti yürüttü. 20 Ocak 1921 de İlk Anayasan yapıldı. 1 Kasım 1922 de Saltanatın kaldırıldı. 29 Ekim 1923 de Cumhuriyet ilan edildi; 1924 'de hilafet kaldırıldı.1925 de laiklik ilkesinin gereği olan reformlar ve 1926 yılı başından itibaren İslami takvim yerine batı takvimine geçildi. Medeni kanununun İsviçre'den, Ceza kanununun İtalya'dan, Ticaret kanununun, Kıta Avrupa'sından alınarak uyarlandı. 3 Kasım 1928'den itibaren Arap harfleri yerine Latin alfabesine geçildi. Kısaca 1923-30 süreci, toplumsal, politik ve kültürel dönüşüm ve kurumlaşma yılları oldu (Erkan., H, 2015;s. 32 vd.)

Devletçi Sanayileşme Dönemi (1930-1939):

1923'te Cumhuriyetle başlayan liberal politikalar sanayileşme açısından tatminkar değildi. Zira yoksul ve tarıma dayalı ekonomide özel sermaye birikimi yoktu. Osmanlı'da ticaret ve sanayi azınlıkların elinde olduğu için **girişimcilik kültürü** gelişmemişti. Dünya ekonomik krizi bir talep daralmasından kaynaklanıyordu. Daralan talebi canlandırmak, dünya ülkelerinde de devletin ekonomide aktif olmasını gerektiriyordu. 1932 yılına kadar devletin ekonomide aktif olmasını sağlayacak seri yasal düzenlemeler yapıldı. 1931-32'de hazırlığı yapılan Birinci Beş Yıllık Sanayi Planı Mayıs 1934'te uygulamaya kondu (Ülken;Y.1981). Böylece devlet öncülüğünde sanayileşme, planlı biçimde gündeme geldi. Bu planla dokuma, maden, seramik, şişe, cam, por-selen, kimya sanayilerinde toplam 16 fabrika kuruldu. İşletmelerin hepsi ithal ikamesi sağlayan endüstrilerdi. **Sümerbank ve Etibank** kuruldu. İş Bankası'nın sanayileşmede katkıları devreye girdi. Bu Planı döneminde, öngörülen yatırım tutan 44 milyon TL iken uygulamada 100 milyon TL'yi buldu. Yatırımların yüzde 36'sı dokuma, yüzde 23'ü demir-çeliğe ayrıldı. Planda öngörülen işletmelerin faal olmasıyla yıllık 75 milyon TL üretim gerçekleşti. Bu üretim, toplam ithalatın yüzde 43'üdür. Bu dönemdeki sanayileşmenin itici gücü Sümerbank oldu. Sanayi Planı zamanından önce başarı ile bitirildi. Sanayileşmede ciddi bir atılım sağlandı. Enflasyon yaşanmadı. İkinci Beş Yıllık Sanayi Planı 1938-43 yılları için 1936'da hazırlık başladı. Daha kapsamlı, ara mallarının üretimine ve ihracata yönelik bir planlama öngörüldü. Ancak İkinci Dünya Harbi'nin ayak sesleri yüzünden uygulamaya geçmedi. Bu dönemde 1938 yılı dışında dış ticaret açığı verilmedi. Temel mal ve ürünlerde önemli ithal ikameleri sağlandı. Bu yüzden dönem, **ithal ikameci sanayileşme dönemi** olarak da adlandırılır (Kuruç ,B.; 1987 ve Erkan, H. 2015; s 34 vd). Sanayileşmede yaşanan bu ataklar **Porter'in** deyimi ile faktör güdümlü gelişme stratejisinden **yatırım güdümlü gelişme stratejisine** geçişi sağladı.

Harp Ekonomisi Dönemi (1940-1950)

İkinci Dünya Harbi'ne Türkiye katılmadı. Ancak ekonomisi savaştan köklü biçimde etkilendi. Sanayileşme hamlesi kesintiye uğradı. Çalışabilir kuşak silah altına alındı. Tarım başta olmak üzere üretim daraldı. Öncelikle askeri ihtiyaçların karşılanması yoluna gidildi. Bu durum fiyat artışları, hayat pahalılığı, karaborsa ve harp zenginlerini gündeme getirdi. Bunu düzeltmek ve kontrol altına alma düşüncesiyle Milli Koruma Kanunu (1940) ve Varlık Vergisi (1942) gibi yasalar çıkartıldı. Dönemin ilk yarısında ekonomi yıllık ortalama yüzde 6.6 oranında küçüldü.. 1939'da 2.044 TL olan kişi başına gelir 1945'te 1259 TL'ye geriledi. Ancak 1946'da harp sonrasında, askerden dönen genç nüfus sayesinde tarımsal ürünlerde sıçrama yaşandı ve yüzde 32'lik bir büyüme hızına ulaşıldı.. 1945-50 arasında da ekonomide yüksek büyüme hızları sürdü. Ayrıca ekonomide özellikle 1947'de bir seri yasal düzenlemeler yapıldı. 1946'da çok partili sisteme geçiş, politik açıdan ülkede yeni bir dönemi başlattı. Harp ekonomisi döneminde, geçmişin yatırımları ve tarımda askerlik çağı dışındaki nüfus sayesinde ekonomi zayıflayarak

ayakta kaldı. Yeni yatırımlar gündeme gelmedi. Yeni kurulan fabrikalar yanında ekonomi daha çok doğal koşullarca belirlenirken **faktör güdümlü gelişme stratejisi** ile yetindi.

SANAYİLEŞMEDE YÖN ARAYIŞI

Özel Girişimci Sanayileşme Arayışı (1950-1960)

1930'lann Devletçi ve 1940'lann Harp Ekonomisi uygulamaları ile harbin toplumdaki tahribatı yeni arayışları da etikledi. 1946'da kurulan DP kadroları yeni bir dönemin başlamasını sağladı. DP, 1950'de iktidar olunca, devletçi gelenek yerine, liberal eğilimleri daha güçlü olan yeni bir dönem başladı. 1930'lann yerli sanayiye, devlet eliyle kurma gayretleri başarılı olmuş, ancak harp nedeniyle aksamıştı. İthal ikameci politika, yavru sanayilerin palazlanması için dışa kapalı, korumacı politikalara ağırlık vermişti. 1947'deki Marshal Planı çerçevesinde Türkiye Batı ve ABD ile daha yoğun ilişkiye girdi. Kore Savaşı ve arkasından NATO üyeliği Türkiye'nin **dışa açık politika** üretmesine yol açtı. Dışa açık politikada, tarımsal ürünler ihracı yanında, tarıma dayalı sanayileşmeye yönelim gösterdi. Özel girişimcilikle birlikte tüketim malları sanayi ağırlık kazandı. Bu durum batı ülkelerinin sanayi ürünlerine yeni bir pazar yarattı. Türk tanırında traktör ve gübre kullanımı hızla arttı. Demiryolu yerine karayolları ve dolayısı ile motorlu araç ithaline yönelik gelişmeler oldu. Tüketim mallarına öncelik veren hafif sanayileşme modeli için pazarların bütünleşmesi ve kentlerin birbirine bağlanması gerekiyordu. Bu nedenle karayolu başta olmak üzere altyapı yatırımları önem kazandı. 1930'lann devlet eliyle sanayileşmesi, 1950'lerin özel girişimciliği teşvik politikası, ülke sanayileşmesinde kamu ve özel kesimin birlikte ve birbirini tamamlayacak bir gelişme sürecine fırsat yarattı. 1950-55 arasında yıllık ortalama büyüme hızı yüzde 7 iken, 1955-60 arasında ise büyüme yavaşladı ve yüzde 5 dolayında bir hıza ulaşabildi. 1930'lann mirası olan KİT'lerin özel sektöre devri, 1950'lerde de gündemde kaldı; ancak getirilen yeni yapılanma, KİT'leri daha da güçlendirdi. Daha çok ulaşım altyapısı ve özel girişimcilikle, tarıma dayalı sanayilere öncelik verilirken, yatırım güdümlü yıllara hazırlık özelliği taşıyan bir strateji ile yetinildi.

Planlı Sanayileşme Dönemi (1960-1980)

Türkiye 1963'te ilk Kalkınma Planını uygulamaya koydu. Bu planlar 1930'lann sektörel sanayi planından daha kapsamlı bir makro kalkınma planıdır. Planlı dönem 1980'deki politika değişikliğine kadar sürdü. Türkiye ekonomisi bu dönemde, her ile bir fabrika kurulması sevdası ile sanayileşme süreci yaşadı. Bu dönemde ekonomide sanayi ve hizmet sektörlerinin ağırlığı arttı. 1960-79 arasında ekonomide negatif büyüme hızı ile karşılaşılmaz. Ortalama büyüme hızı yüzde 6'dır. Sanayideki üretim endeksi ilk plan döneminde (1963-67), 1962'deki değeri 100 alındığında 1967'de 183'e yükseldi. İkinci plan döneminde sanayi yine sürükleyici sektör oldu. İmalat sanayisinin milli gelirdeki payı hızla arttı. Ekonomide tüketim mallarından ara mallan üreten sanayilere yönelim 1965'ten sonra yavaş da olsa hızlandı. Tüketim malları sanayi içinde de tarıma dayalı sanayilerin payı azalma gösterirken, dayanıklı tüketim mallarının payı daha hızlı bir artış gösterdi. Ekonomide sanayi sektörünün payı giderek daha belirgin konuma geldi. Bu süreçte özel kesim hızlı bir gelişme gösterirken, kamu yatırımları da ağırlığını korudu. Sanayileşen Türkiye'nin yaygın altyapı ihtiyacı, yol, ulaşım, haberleşme ve enerji gibi alanlarda kamu yatırımlarının payını artırdı. Ayrıca kamu doğrudan özel mal üreten alanlarda da aktif olarak varlığını sürdürdü. Ekonomide sermaye birikimindeki zayıflık, bir yandan kamunun payının yüksekliğine, diğer yandan ekonomide küçük işletmelerin payının yüksek olmasına yol açtı.

Bu dönemde sanayideki büyüme hızı uzun süre yüzde 10'a yakın veya yüzde 10'un üzerinde gerçekleşti. Hizmetler sektöründeki gelişme hızı, sanayi sektörünün altında, ancak genellikle ona paralel bir gelişme gösterdi. 1950-80 dönemi içinde yurtiçi tasarrufların GSMH içindeki payı yüzde 12-15 dolayından yüzde 20-22' dolayına çıktı. Buna paralel olarak sabit sermaye ya-

tırımlarının GSMH içindeki payı yine yüzde 11-15 dolayından yüzde 22 dolaylarına yükseldi. Tarımsal ürünlerin ihracattaki payı 1950'de yüzde 90'ın üzerinde iken, 1980 yılında yüzde 57'ye geriledi. Sanayi sektörünün payı ise yüzde 36'ya ulaştı. İthalatta ise daha hızlı bir patlama yaşandı. 1950'de kişi başına ithalat 14 dolar dolayında ve 1960'da 17 dolar iken, 1980'de 178 dolar düzeyine yükseldi ve ithalatın ağırlığı hammaddeye kayd.

Önceki dönemlerde Türkiye ekonomisi, belirgin biçimde daha çok “**doğal üretim faktörlerinin sürüklediği**” bir tarım ülkesi olma özelliği gösteriyordu. Bu nedenle önceki dönemlerdeki gösterdiği ekonomik kalkınma süreçleri, **M. Porter**'in deyimi ile “**faktör güdümlü kalkınma stratejisi**” içinde gerçekleştirmiş oldu. Buna karşın planlı kalkınma döneminde, sanayileşmede kat ettiği yol ile sanayi ürünü olarak tüketim ve ara mallarını üretebilir duruma geldi. Özellikle yüksek tasarruf ve yatırım oranları sayesinde, sanayileşmeye verdiği yoğun ağırlık nedeniyle, **M. Porter**'in deyimi ile “**yatırım güdümlü kalkınma stratejisi**” uyguladı. Böylece sanayi ve yatırım güdümlü kalkınma aşaması olgunlaşma dönemine girdi.

İhracata Yönelik Sanayileşme (1980-1990)

1980'de yaşanan askeri darbe ertesinde önce karaborsayı önleyecek olan **24 Ocak ekonomik önlemleri** alındı. Fiyat istikrarında ilk iki yılda olumlu sonuçlar elde edildi. Piyasa sistemi yönünde belli bir bilinçlenme yaşandı. Merkezi kararlar yerine, piyasa sistemi ile uyumlu ve piyasa güçlerini öne çıkaran uygulamalara gidildi. Yapılan düzenlemelerle toplumda özellikle piyasa sistemi ve girişimcilik bağlamında belli bir zihniyet değişimi devreye girdi. Esasen bu değişim, bir bakıma bütün dünyada yeni devreye girmekte olan bilgi toplumu ve küreselleşme sürecine geçişin Türkiye'ye yansıyan rüzgarıydı. Bu sayede 1930'larda başlayan dış rekabetten korunan ithal ikameci sanayileşme modeli terk edilerek, dışa açılma ve ihracatın sürüklediği bir ekonomik modele geçiş öngörüldü. Bunun için ihracata teşvikler ve kolaylıklar getirildi. İhracat artışı, 1980 ekonomik krizine yol açan döviz darboğazına çözüm getirdi. Yüksek enflasyon ilk yıllarda yüzde 100'ün aşan değerlerden yüzde 25'e doğru çekildi. Ancak ilerleyen yıllarda yeniden döneme damgasını vurdu. Bir yandan yüksek enflasyon, bir yandan dönemin başında sendikal hareketlerin yasaklanması, ücret ve maaşlarda hızlı düşüşe yol açtı. Gelir dağılımında köklü bozulmalar yarattı. Bu dönemde devlet, doğrudan verimli yatırımlardan çekilerek sadece altyapı alanına yöneldi. 1984'e kadar yüzde 4 veya altında kalan büyüme, 1988'e kadar geçen sürede yeniden hızlandı, 1986-87'de yüzde 7-10 dolaylarına yükseldi. Ancak son iki yılda yüzde 2'nin altında büyüme hızları gerçekleşti.

Dönem içinde kişi başına milli gelir, 1987 fiyatlarıyla 1980'deki 1338 dolarlık bir değerden, 1990 yılında 1762 dolara yükseldi. Yurtiçi tasarruf ve sabit sermaye yatırımlarının GSMH içindeki oranları, 1980-85 arasında yüzde 16-20 arasındaki değerlere düşerken, dönemin ikinci yansında hızlanarak yeniden yüzde 20'nin üzerindeki değerlere ulaştı. Ülkenin dışa açılma süreci nedeniyle 1980'de 11 milyar doların altında olan dış ticaret hacmi 1990'da 35 milyar doların üzerine çıktı. İhracatın GSMH içindeki payı 1980'de yüzde 4 dolayında iken 1989'da yüzde 10'un üzerinde gerçekleşti. İthalatın GSMH'daki payı ise aynı dönemde yüzde 11 dolayından 14.5'e çıktı. İhracata ithalatı karşılama oranı dönemin başındaki yüzde 40'luk düzeyden yüzde 70'lerin üzerindeki değerlere çıktı. Ancak dönem içinde TL; dolar karşısında ciddi değer kaybına uğradı. 1980'de ortalama dolar kuru 76 iken, 1990'da 2607'ye ulaştı. Türkiye 1987'de Avrupa Topluluğuna üyelik için başvurdu. Türkiye'nin üyeliğe, "ehil" olmakla birlikte, yeterli olmadığı gerekçesiyle reddedildi.

1980'li yılların **ihracata dayalı gelişme stratejisine paralel olarak**, toplumda geleneksel düşüncelerden **liberal düşünceye doğru** belli çevrelerde kısmi bir **zihniyet yenilenmesi** yaşandı. Ancak bu dönemin ihracat potansiyeli, bir dönem öncesinin sanayi potansiyel ve tabanından yararlandı. Döneme **yüksek enflasyon ve faiz sarmalı** damgasını vurdu. **Yatırım güdümlü sanayileşme süreci** önemli ölçüde aksamaya uğradı ve belli işyerleri kapandı veya

yabancılara satıldı. Bu arada **yenilenme ve yenilikçilik** yönünde yeterli yapısal dönüşümü gerçekleştirildi. Dışa açılma süreci sayesinde ihracatta bir gelişme yaşandı ise de, bu katkı yeni ve yenilikçi gelişme ve teknolojilerden değil; önceki gelişme dönemi olan yatırım ve üretim potansiyelinden beslendiği için **Porter**'in deyimini ile “**yenilik güdümlü gelişme**” düzeyine çıkamayıp, **geçmişin nimetlerini ve birikimini** kullanan “**refah güdümlü gelişme stratejisi**” düzeyinde **durağanlaşmaya** daha yakın bir görünüm sergiledi.

Ekonomide Krizli Yıllar (1990-2001) :Refah Güdümlü Gelişmenin İflası

1990'lı yıllar ekonomide yüksek enflasyonun sürdüğü; 1994, 1998-99 ve 2001 ise ekonominin krize girdiği yıl oldu. Bu dönemde enflasyonun ortalama düzeyi sürekli yükseldi. 1980'de olduğu gibi enflasyon, yüzde 100'ün üzerindeki değerlere bu dönemde yeniden ulaştı. Bütçe açıklan, KİT açıklan, belediyelerin açıkları, sosyal güvenlik kurumlarının ve tarımsal destek fiyatları verilen birliklerin açıkları hızla arttı. Bunlar, "5 kara delik" olarak gündeme geldi. Açıkların kapatılması için kamunun-sürekli borçlanma yoluna gitmesi, bütçe üzerinde faiz yükünün sürekli tırmanması sonucunu doğurdu. Enflasyonist ortamda devletin sürekli borçlanmaya yönelmesi, enflasyon-faiz ve borç sarmalını giderek güçlendi. Bütçedeki faiz yükünün oranı 1999 için yüzde 50'ye doğru tırmandı. Reel yatırımlar gerilerken, işletme karlarının yüzde 70'leri aşan kısmını faaliyet dışı alandan; yani faizden elde etmeye başladılar. Yüzde 100 devlet güvencesinin bulunduğu bu dönemde banka sayısı 80'i aştı. 1991 ve 1994 kriz yılı dışında ekonomi hep yüzde 6'nın üzerinde büyüme hızına sahip oldu. Zaman zaman yüzde 8-9'a dolaylarında büyüme hızlanıyordu. Ancak kriz yılında ekonomi yüzde 6 oranında küçüldü. 1998 yılında kişi başına düşen milli gelir cari fiyatlarla 3.156 dolara ulaştı. 1980'li yıllarda başlayan dışa açılma 1990'lı yıllarda devam etti. Özellikle dışa açık sektörlerde, turizm ve tekstil başta olmak üzere, belli sektörlerde büyüme canlılığını sürdürdü. İhracatın GSMH'daki payı, 1990'lı yılların ilk yansında yüzde 8.5 dolayına kadar düştü. Ancak 1994 krizinden sonraki dönemde yeniden yüzde 13-14'lere doğru tırmandı. İthalatın payı, ise yüzde 14 dolayından, yüzde 24 dolayına çıktı. Bu durum **cari işlemler açığını** artırdı. İhracatın ithalatı karşılama oranı yüzde 50-60 bandına geriledi.

Dönem genellikle koalisyonlarla ve politik istikrarsızlıkla geçti. Kentsel nüfusun payı yüzde 65'e ulaştı. Biriken sorunlara çözüm üretilemezken, ekonomide faiz ve kent rantından dolayı kesimsel zenginleşme süreci yaşandı. Bu durum toplumda kolay yoldan kazanç elde etme arayışlarını hızlandırdı. 1980'li yıllar döneminde başlayan “**Refah Güdümlü Gelişme Stratejisi**” güçlenerek sürdü. Bu durum refah güdümlü stratejinin sağlıklı bir ekonomi yaratamayacağını gösterdi. Türkiye, bu dönemi yönetim zaafı içinde yaşadı. 1980'li yıllarda başlayan IMF ile ilişkiler bu dönemin ekonomi politikalarını belirledi. Bu süreçte **IMF**, Türkiye'deki ekonomi politikaları ve istikrar arayışının baş mimarı olarak yerini aldı. AB ile ilişkiler 1994 sonunda gümrük birliğine katılmamız şeklinde gerçekleşti. Bu döneme, 1991'de bir krizle başlayan Türkiye, 1994'te çok daha derin bir krizle sarsıldıktan sonra, 1998 Asya ve Rusya krizlerinin etkisiyle 1999'da da çok derin bir kriz yaşadı. Bu krizde, aynı yıl yaşanan depremin etkileri de vardı. 1990'lı yıllara krizle girildi ve krizle bitirildi. Enflasyon yüzde 60-106 bandında gezindi. Türkiye ekonomisindeki **istikrarsız** görünüm; artan kamu açıkları, yüksek enflasyon seviyesi ve dalgalı büyüme yapısı ile 2000'li yıllara doğru süreklilik kazandı (DPT,1997).

Artan kamu açıkları ve krizlerin etkisiyle reel faizler hızla yükseldi; borç-faiz kısır döngüsü sürdürülemez boyutlara ulaştı. Bu durumu önlemek için, 2000 - 2002 dönemini kapsayan bir makroekonomik program 9 Aralık 1999 tarihinde "**Enflasyonla Mücadele Programı**" uygulamaya konuldu. Bu program IMF tarafından 3 yıllık bir Stand-by anlaşması ile desteklendi. İlk aylarında yaşanan olumlu gelişmelere karşın, ilerleyen aylarda programda ciddi hedef sapmaları ve bazı yapısal reformlardaki gecikmeler ile duyulan güven zayıfladı. Ayrıca 2000 yılının ikinci yarısında dış kaynak girişi azaldı. Aşırı değerli TL ile birlikte

bankaların açık pozisyonları, programı sürdürülemez kıldı. Bankacılık kesiminde Kasım Krizi oluştu. Alınan önlemler ve IMF ile varılan anlaşma sonucunda mali piyasalardaki dalgalanmalar kısmen giderildi. Ancak yükselen iç borç stoku, düşmemekte direnen enflasyon ve TL'nin aşırı değerlenmesi, kur çapasının sürdürülebilirliğini engelledi. Piyasada, krizin başlaması sadece bir "kıvılcım" bekliyordu. 19 Şubat 2001'de önemli bir Hazine ihalesi öncesinde Başbakan ile Cumhurbaşkanı arasındaki bir tartışma krizi tetikledi. 22 Şubat'ta yaşanan devalüasyonla 14 aydır sürdürülen **kontrollü döviz kuru politikası** yerine, döviz kuru **dalgalanmaya** bırakıldı. Merkez Bankası, doların fiyatını 1 milyon 50 bin lira olarak açıkladı. Böylece yüzde 40 dolaylarında bir devalüasyon yaşandı. Gecelik faiz oranları görülmedik oranlara, yüzde binler ve on binlere fırladı.

Post Modern Muhafazakar Dönem ve Sanayisiz Ticaret Stratejisi (2001-2022)

Şubat krizinin ardından **Kemal Derviş**, krizden 3 ay sonra, 14 Nisan 2001'de **Güçlü Ekonomiye Geçiş Programı (GEGP)** oluşturdu. Türkiye 1961'den beri IMF ile 19. stand by anlaşmasını yaptı. Bunların bir çoğu başarısızlıkla sonuçlanırken, 2001 yılında yapılan ve en kapsamlısı olan anlaşma kararlılıkla uygulandı. **Güçlü Ekonomiye Geçiş Programının** nihai hedefi, ekonomide yapısal dönüşümü gerçekleştirmek oldu. GEGP ile ekonomisinin 2001 sonrası performansında, faiz-dışı fazla ve dönem boyunca para politikasında gösterilen kararlılık belirleyici oldu. Karşılaşılan "cari işlemler açığı kısmen doğrudan yabancı sermaye girişleri ve kısmen kısa vadeli sermaye girişlerine dayandırıldı. Bu dönemde Türkiye'nin dış borçları artış gösterdi.

2002 yılı Kasımında yapılan seçimler ertesinde kendini "muhafazakar demokrat" olarak tanımlayan AKP hükümeti kuruldu ve bugüne kadar kesintisiz iktidarda kaldı. Yapılan hesaplamalara göre 2003 -2016 döneminde ekonomi yıllık bazda ortalama yüzde 4.8 oranında büyüdü. Bu dönemde enflasyon ortalama yıllık bazda yüzde 10,4 ve işsizlik 10,7 olarak gerçekleşti. Dönem boyunca bütçe ortalama yıllık bazda 3,2 açık verirken cari açık yıllık bazda ortalama yüzde 5 açık verdi. Ekonominin 2020ye kadar geçen döneminde ise büyüme yıllık bazda ortalama yüzde 2'nin altında bir değer aldı.

Günümüzde dünya ülkelerinin çoğu hızlı biçimde bilgi teknolojilerini içeren ileri teknoloji ürünler üretim ve ihracatına yöneldiler. Türkiye Bilgi ekonomisi ve bilgi toplumuna geçiş konusunda yeterli adımları atamadı. Bilgi teknolojilerinin üreticisi değil, daha çok tüketicisi/kullanıcısı konumunda kaldı. Diğer yandan Türkiye ekonomisinin yüksek büyüme hızları ağırlıklı olarak, dış ticaretin, özellikle de ithalatın sürüklediği bir büyüme olarak gerçekleşti. İthalatın geri bağlantılara dış ülkelere yansıdığı için ekonomide üretim ve gelir yarama potansiyeli sınırlı kaldı artan enflasyon ve işsizlik nedeniyle Türkiye'de "fakirleştiren büyüme" olgusu devreye girdi. Ekonomide tasarruf oranları yüzde 12 dolayına geriledi. Ekonomide yatırım ve üretim potansiyelinin zayıflaması, son 6-7 yılda kişi başına düşen milli gelirin yeniden 8bin dolar düzeyine geriledi. Bu durum ekonomide yoksulluk ve yoksunluk yarattı. Tarım ve sanayi de daralma yaşandı. Sadece ihracat ve ithalat yapan şirketler , yani ticari aktivitenin dış dünya ile bağlantılı olana kesim zenginleşirken, , orta sınıf ve alt gelir düzeyindeki kesimlerde önemli gelir azalışı yaşadı 2022 yılı ile birlikte TÜFE'de yüzde 60 ve ÜFE'de yüzde 115 dolayına çıkan enflasyon, pandemi Ve Ukrayna savaşının etkileri ile birlikte derin bir ekonomik krize dönüştü. Oysa bilgi teknolojileri ve bilgi ekonomilerinde hızlı atak yapan Çin ve Hindistan gibi ülkelerin tasarruf oranları, yüzde 50 ve 30 değerlerine ulaştığı dönemler sonrasında ekonomik olarak çok daha parlak süreçler yaşamaktadır. Bilgi toplumuna hızlı yönelen ülkelerin GSMH'daki Ar-Ge payları yüzde 3,5-4 dolaylarına tırmanırken, Türkiye'nin bu alana ayırabildiği pay henüz yüzde 2'nin altında bulunuyor.

“Muhafazakar demokrat” olarak 2002 de iktidara gelen AKP, ülkenin parlamenter sistemini ortadan kaldırıp, tek adam yönetimine dayalı otoriter bir sisteme yönelişi de ülke ekonomisinin dış kaynak bulama ve sanayileşmesinde olumsuz bir ortam yarattı. Cumhuriyetten beri laiklik vurgusu ile yönetilen Türkiye’de; din ve tarikat vurgulu muhafazakar AKP’nin, 20 yıllık iktidarı, **Türk Toplumunda ve Ekonomisinde Postmodern** bir manzara yarattı. Zira bir yandan 35 yıllık yüksek enflasyon ile 1990’lı yılların üst üste yaşanan kriz ve çözümsüzlük ortamı diğer yandan bilgi teknolojilerinin baş döndüren değişim ve belirsizlikleri toplumda muhafazakar ideolojileri yükselişe sürükledi. Bilgi çağında transnasyonal şirketlerin güç ve serveti küresel ağlarda şekillenirken, kendini güçsüz hissen ülke ve toplumsal gruplarda tepki kültürü olarak muhafazakar ideolojiler yükseldi. Ancak bu durumdan çıkış yolu, muhafazakar ideolojilere yönelmekten değil, çağın getirdiği yeni bilim ve teknolojileri bilinçli olarak, yeni yapı, sistem ve süreçlere taşıyacak reformlardan geçiyor. Bu reformların rotası, bilim temelli şekillenen, **Stratejik planlama ve Vizyoner politika uygulamalarına** ihtiyaç gösteriyor. Böylesi bir strateji, yeni teknolojilerin üretimi için, bilgi ve yenilik yaratmaya yönelik yeni sanayi sektörlerini güçlendirmekten geçiyor. Ayrıca sanayi sektörü taleplerinin, sektörel, mekansal ve yerel bazda kümelenip bütünleşirken; aynı zamanda küresel ticaret ağlarına etkin katılımını gerektiriyor(Erkan-Uysal-Erkan vd. 2007).

Türkiye'deki bugünkü strateji, **M. Porter**’in deyimi ile **yenilik güdümlü** olma düzeyine ulaşamadı. Ayrıca ileri teknoloji üreten sanayi yatırımlarına yönelemedi. Ekonomide düşük tasarruf oranları ile yeni ve katma değeri yüksek sanayi yatırımlarına da yönelemedi. Bu yüzden **“faktör güdümlü”** yaklaşımın avantajları ile geçmişten gelen ve giderek montaj sanayiine dönüşen, yatırım güdümlü gelişme aşamasının ulaştığı fırsatları kullanmakla yetindi. Böylece düşük düzeyde **“refah güdümlü”** bir strateji içinde sıkışıp kalırken yoksullaştıran büyüme ile karşılaşıldı. Zira Turizmdeki gelişme, tamamen, doğal ve tarihi faktörlerin bize sağladığı bir avantajın kullanımına dayanıyor. Üç kıta arasında merkezi konumda olmamız ülkeye doğal, topoğrafik ve stratejik avantajlar sağlarken, teknoloji ve yenilikçilikteki yetersizlikler yüzünden, bu avantajlar yeterince değerlendirilemiyor. Tekstil ile giyim ve hatta otomotiv gibi bazı sektörlerdeki kısmi avantajlar ise **yatırım güdümlü aşama ve deneyimlerin** uzantısı olarak kalıyor. Ancak **geleceğin bilgi ve yenilik üretimine dayalı rekabetçi bir sanayi ortamı geçiş için yeterli olamıyor**. Nitekim küresel Rekabet gücü veya bilgi toplumuna hazır olma açısından yapılan uluslararası karşılaştırmalı araştırmalarda Türkiye, **yenilikçi ekonomiler** arasında değil, **ekonomik kaynak ve etkinlik ekonomileri** grubunda yer alıyor

SONUÇ

Türkiye’nin sağlıklı bir ekonomiye yönelebilmesi için neler yapmak gerekir şeklinde sorguladığımızda aşağıdaki sonuçlara ulaşmaktayız. Bilimin ışığı doğrultusunda doğru ekonomik ve toplumsal politika stratejileri oluşturulmalıdır. Bununla birlikte, tutarlı, yeterli, bütünleştirilmiş para ve maliye politikaları ile çağın gereklerine uygun yapısal değişim, dönüşüm ve sistemsel ekonomik ve toplumsal politikalar, birbirini destekleyen süreçler içinde uygulanmalıdır. Ayrıca, Türkiye’nin katma değeri yüksek, AR-GE temeli gelişmiş, yenilik güdümlü bir yenilikçi sanayileşme stratejisini uygulamaya koyması zorunludur. Ülke içinde uygulanan yenilikçi sanayileşme stratejisinin yanında, yeni küreselleşmenin getirdiği küresel ağlarda etkin konumlar edinmeye yönelik dış ticaret stratejileri de birlikte geliştirilmelidir.

KAYNAKÇA

- DİE, 1973. Türkiye'de Toplumsal ve Ekonomik Gelişmenin 50.Yılı, Yayın No: 683, Ankara
- DİE, 1994. İstatistik Göstergeler 1923-1992; Yayın no 1682
- DPT, 1997. Ekonomik ve Sosyal Göstergeler 1950-1998, Ankara
- ERKAN H 1998. Bilgi Toplumu ve Ekonomik Gelişme. 4. Baskı, T. İş Bankası Yayınları, Ankara.
- ERKAN H, Erkan C 1998. Kültür Politikamızda Yeni Boyutlar. Kültür Bakanlığı, Ankara.
- ERKAN H 2000. Bilgi Uygarlığı İçin Yeniden Yapılanma, İmge Yayınları ,Ankara.
- ERKAN H, Uysal Y, Erkan C 2007. Türkiye İçin Bilgi Bazlı Sürdürülebilir Sanayileşme Stratejisi. EĞİAD, İzmir.
- ERKAN H 2015. İzmir Kent Ansiklopedisi, Ekonomi. I. Cilt, İzmir Ekonomisi Genel Görünüm; s.11-58; İBB, İzmir.
- KURUC B 1987. Mustafa Kemal Döneminde Ekonomi. Bilgi Yayınevi, Ankara.
- ÜLKEN Y 1981. Atatürk ve İktisat. T. İş Bankası Yayınları, Ankara.
- PORTER M 1990. The Competitive Advantage of Nation. Free Press, New York.

ACTIVITIES DONE UNDER SOCIAL RESPONSIBILITY PROJECTS BEFORE
PANDEMIC

Canan ERKAN

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Abstract

“We should measure success in terms of results we create for ourselves insofar as others.”

Diversity and pluralism in the structure of science technology and society together with the information society has led to the development of the Social Responsibility consciousness of enterprises and individuals. Diversified social structure revealed the inevitability of cooperation and collaboration between institutions. While individual and corporal interests were taking place, their impacts on other parts of society had to be taken into account. Therefore, Social Responsibility has become a matter of concern to everyone. In this context, some other universities and, since 2009, Ege University has added Social Responsibility Course to their academic program. Dokuz Eylül University has included this subject to its academic program 6 years ago. We have continued the subject for approximately 25 years, more systematically for 15 years in my university as academic, social, cultural and artistic activities that have developed each year.

In these studies, with more than 150 university students' active participation, we have determined new themes each year and organized activities that have almost become a tradition. These include the following as main headings:

- Academic; Conferences, Panel Discussions, Seminars, Meetings, International Symposiums (which approximately 7000 students have participated until today),
- Trainings for primary and secondary education students (with animations); trainings for hygiene, first aid, earthquake, traffic rules, violence to women and child abuse, green consciousness, child yoga trainings (to 18 schools and approximately 4000 students in Aegean Region),
- Book and stationary support to village or school libraries (approximately 4000); 800 sapling deliveries; 2000 sapling planting;
- 100 wheelchair deliveries + 3 battery-operated wheelchair deliveries,
- Culture and Art Trips; Ephesus, Seljuk, Virgin Mary, Şirince, Math School and Exhibition visits;
- ASSM (Ahmet Adnan Saygun Art Centre) Music Recitals
- State Opera and Ballet [Lüks Hayat (High Life), Yarasa (Die Fledermaus), Don Giovanni]
- Education support for 18 of our students.

The main object of our activities is that our students are brought up as individuals who are researchers, who have ethical principles as well as being productive, who are sensitive to environment, society and world, who have a high responsibility consciousness, who are developed and mindful in aesthetic concern, cultural and social areas, and also to support

them in using their personal abilities within values like cooperation, respect, friendship, mutualization, empathy, understanding and tolerance; in having organizational abilities and high self-confidence; having developed abilities such as self-knowing and learning by doing.

Keywords: Personal Development, Social Responsibility, Awareness

PANDEMİ ÖNCESİNDE GERÇEKLEŞTİRİLEN SOSYAL SORUMLULUK PROJELERİ ETKİNLİKLERİ

Özet

“Başarıyı, kendimiz olduğu kadar, diğerleri için de yarattığımız sonuçlar bakımından ölçmeliyiz.”

Bilgi toplumu ile birlikte bilim teknoloji ve toplum yapılanmasındaki çeşitlenme ve çoğulculuk, kurumların işletmelerin ve bireylerin Sosyal Sorumluluk bilincinin gelişmesini beraberinde getirmiştir. Çeşitlenen toplum yapısı, kurumlar arasında işbirliğinin ve ortak çalışmanın kaçınılmazlığını ortaya çıkardı. Bireysel ve şirketsel çıkarlar gerçekleşirken bunların toplumun diğer kesimleriyle olan etkilerin dikkate alınması gerekti. Bu nedenle Sosyal Sorumluluk herkesi ilgilendiren bir konu oldu. Bu bağlamda Ege Üniversitesi 2009 yılından itibaren ve diğer bazı üniversiteler ders programlarına Sosyal Sorumluluk Dersini ilave ettiler. Dokuz Eylül Üniversitesi de bu konuyu 6 yıl öncesinde ders programına aldı. Konuyu yaklaşık 25 yıldır, daha sistematik olarak 18 yıldır, üniversitemde her yıl giderek gelişen akademik, sosyal, kültür ve sanatsal etkinlikler olarak sürdürdük.

Bu çalışmalarda, 150 den fazla üniversite öğrencimizin aktif katılımları ile her yıl yeni temalar belirleyerek, adeta gelenekselleşen etkinlikler düzenledik. Bunlar ana başlıklar olarak şunlardan oluşuyor:

- Akademik; Konferans, Panel, Seminer, Toplantı, Uluslararası Sempozyum (bugüne kadar 7000 civarında öğrencinin katıldığı),
- İlk ve Ortaöğretim öğrencilerine eğitim; (animasyonlu) hijyen, ilk yardım, deprem, trafik kuralları eğitimleri, kadına şiddet ve çocuk istismarı, doğa bilinci, çocuk yogası eğitimleri Ege bölgesindeki 18 okula 4000 civarında öğrenciye),
- Köy yada okul kütüphanesine kitap ve kırtasiye desteği (4000 civarında) 800 adet fidan teslimi; 2000 adet fidan dikimi;
- 100 adet tekerlekli sandalye teslimi + 3 adet akülü sandalye teslimi,
- Kültür ve Sanat gezileri; Efes, Selçuk, Meryemana, Şirince, Matematik Okulu ve Sergi ziyaretleri;
- ASSM Müzik Dinletileri
- Devlet Opera ve Balesi (Lüks Hayat, Yarasa, Don Giovanni)
- 18 öğrencimize eğitime destek katkısı.

Çalışmalarımızın asıl amacı, öğrencilerimizin araştırmacı, üretici oldukları kadar etik ilkelere sahip; çevreye, topluma ve dünyaya duyarlı, sorumluluk bilinci yüksek; estetik duygu, kültürel ve sosyal alanlarda duyarlı gelişmiş bireyler olarak yetişmeleridir. Kişisel yeteneklerini işbirliği, saygı, dostluk, yardımlaşma, empati, anlayış ve hoşgörü değerleri içinde; organizasyon becerileri ve özgüvenleri yüksek, kendini tanıma ve yaparak öğrenme yetileri gelişmiş bireyler olmalarına destek olmaktadır.

Anahtar Kelimeler: Kişisel Gelişim, Sosyal Sorumluluk, Farkındalık

1. SOCIAL RESPONSIBILITY AS SOCIAL VALUE SYSTEM

“**Social responsibility**” in today's societies is a **system of value judgment** that is gaining importance in the rift relationship of the current life. To take initiatives in this direction **can only be the work of man and communities with certain values and value systems**. Therefore, I will try to emphasize “**social responsibility**” as a **system of values**.

Every **man and community** has certain **values and a system of values** in their courses of life. **Values in terms of man** are **those required to strive for, show effort for and realize**. Or, those that are adapted, aspired, cared for and preferred. These qualities are the perceptions **personally and subjectively referred and ascribed** by man to events, phenomena and objects.

Social and generic values come to the fore as **principles and beliefs reflecting the emotions, opinions, purposes and interests considered as appropriate and required by the majority in order to maintain the existence, unity and operation and continuity** of the group or the society. These are the basic standards that are desired or undesired, liked or disliked by the group. However, values do not have an independent entity from the subject, i.e. man and social groups. They don't exist spontaneously. Therefore, they reflect what should be, not what is. **The fact that values are personal and dependent on the subject** have always been a matter of discussion amongst subjects. Therefore, one always talks about **value relativism**.

On the other hand, values are grouped as;

- **Hedonistic (hedonist) values:** pleasure-pain;
- **Information values:** right-wrong;
- **Moral values:** good-bad;
- **Aesthetic values:** beautiful-ugly; and
- **Religious values:** good deed-sin.

In addition, the question of the existence of a reality of the values or them being the subject of a judgment has been a matter of discussion in philosophy. **Values relate to the subject's desire, purpose, needs and expectations. For this reason, as qualities the subject has referred and ascribed to objects and phenomena, they find their validity in the life of the subject. They do not have a spontaneous existence independent of the subject.**

Max Scheler, who has conducted long researches on values, claims that the most important thing that separates people from animals is **not mind, but the senses of value**. Because other living things do not have feelings of love, hate, choice and preference feelings and performances. Because, the object of the sense of value is not in nature. It comes to the fore in man who is in the position of subjects and inner world of man. Emotional performances are experienced and understood in the inner life of man based on values. They do not be the subject of objective observation and explanation as nature events. Then, the sense of **social responsibility** is a phenomenon experienced in the inner world of man. Man who feels this, cannot easily stifle this feeling.

The sense of value is something felt; it is not information of object. The sense of value always exists as an ideal. However, this feeling varies in every age and culture. New meanings are ascribed to it. The old meaning is left behind. For example, as an ideal, “good”

exists in every age. But, every culture's and age's understanding of "good" is different from the other.

Values are felt not as laws "imperative" to be respected, but as "necessary" principles. Therefore, man feels himself "responsible" for realizing the values he has. This sense of "responsibility" is the basic characteristic that distinguishes people from other living things.

The process of realizing the value is not available in other creatures of nature. It is experienced only as a man-specific purpose. Intellectual freedom directs people to the choice and determination of values in the course of life. At this point, freedom is an opportunity. Being dedicated to achieving certain values is an opportunity particular to man. If man does not use this opportunity of choice, he remains only as a natural being.

In contrast, **Nietzsche** argues that **if values are created in the context of "will power", man should go beyond himself and become a "superman". Therefore, man should create new values instead of adopting values as they are. For this reason, he has to criticize the existing one, to assert new values and to reassess it.**

In this case, the values are not what is readily available, but always something that must be re-created. **Men become "supermen" to the extent that they can create new values from a certain perspective in every moment of life. For Nietzsche, human freedom is to create values with his own will power and to live according to these values.** Thus, he accepts that the source of the values is man and opposes to any kind of absolute value.

As can be seen in the explanations in summary, it is revealed that **values are subject originated and personal, that they emerge historically and are in constant change, therefore values pluralism is inevitable. Values relate to what man makes man feel within the conditions of historical existence. For this reason, it is a distinctive, particular example of Nietzsche's pursuit of being "superman" with his own will power. However, many people who develop these characteristics in their own personality are committed to a very high level of social responsibility. The first ones that come to my mind are the names of Atatürk and Nehru, the great thinkers and scientists dedicated to humanity with their work and the founders of the three great religions.**

However, in the course of daily life, we can take on examples of personal, social and communal responsibility in many areas, on the course of our own chosen values. For more than 20 years, I have been trying to achieve a good example of this through "Personal Development Seminars" which include academic, social and cultural dimensions that I am organizing for students, again with their participation. It is possible to evaluate these studies as Social Responsibility, Awareness, and Community Service Practices in terms of the content of the projects realized. We are carrying out many projects with our students who volunteer in our team each year. Many organizations think that they must not be unresponsive to the problems of the environment in which they live, but very few are aware of the fact that their acceptance and sustainability depends on the response of the environment. Being aware of this, our faculty has assigned me to teach Social Responsibility courses in our department that will constitute the corporate spirit of our organization with the purpose that its students can be brought up as individuals having ethical values, who are qualified and sensitive for the society as well as being researchers and producers. For many years, hundreds of projects have been realized with our volunteer teams, which have been changing every year.

We have been carrying out successful academic, social, cultural and artistic social responsibility projects with our students in different faculties and departments of our university. We have realized these activities with the participation of formal education and

evening education students I teach in DEÜ Faculty of Economics and Administrative Sciences, Department of Economics, Management, Labour Economics and Industrial Relations and Econometrics. Our Social Responsibility and Personal Development activities have grown even stronger and have become quite comprehensive with both social responsibility and artistic activities with the participation of Master's Degree students from DEÜ Faculty of Law, Department of Textile Engineering, Faculty of Education, Seferihisar Fevziye Hepkon Applied Sciences Academy and from other universities of Izmir, such as Aegean University, Celal Bayer University, Izmir University of Economics, Yaşar University and Beykent University.

We set out different themes each year with our volunteer students who are sensitive to their environment, society and the world and who have a sense of responsibility.

2. OUR THEMES

- **Education is not Only Teaching; it is to Reveal Individual Characteristics. (PDS 5)**
“Awareness and Personal Development in Information Age” Prof.Dr.Hüsnü ERKAN
- **Those Who Set Out for Success Never Get Tired (PDS 6)**
“Success Focus and Information Society” Prof.Dr. Hüsnü ERKAN
- **From Personal Development to Social Development (PDS 7)**
“Social Responsibility and Development in the Information Age” Prof.Dr.Hüsnü ERKAN
- **From Social Development to Social Leadership (PDS 8)**
“Social Leadership in Information Age” Prof.Dr.Hüsnü ERKAN
- **From Social Leadership to Social Responsibility (PDS 9)**
“Social Responsibility in Information Age Network Society” Prof.Dr.Hüsnü ERKAN
- **Innovation for Creating the Future in Information Age (PDS 10)**
“My life has gone with yesterday, how many words there are, they belong to yesterday. Now, new things should be said.” Prof.Dr. Hüsnü ERKAN
- **Creativity in Information Age (PDS 11)**
“Information and Creative Thinking” Prof.Dr. Hüsnü ERKAN
- **Cognitive Creation in Information Age (PDS 12)**
“Brain, Mind and Science” Prof.Dr. Hüsnü ERKAN
- **Learning to Think in Information Age (PDS 13)**
“Connectionist Thinking” Prof.Dr. Hüsnü ERKAN
- **New Phase of Information Society; Industry 4.0 (PDS 14)**
“Digital Transformation and Age of Smart Machinery” Prof.Dr. Hüsnü ERKAN
- **Personal Development Seminars and Industry 4.0 Awareness Trainings (PDS 15)**
“Cognitive Consciousness in Industry 4.0 Platform” Prof.Dr. Hüsnü ERKAN

The opening speech of our seminars will be held by Prof. Dr. Hüsnü Erkan, who has been offered the Doctorate of Honorary Philosophy by Cambridge International Biographical Centre.

3. OUR PERSONAL DEVELOPMENT SUBJECTS

Our subjects discussed in our Personal Development Seminars under the above themes are:

- Atatürk and Leadership Secrets
- Leadership and Motivation
- Professional Ethics
- Time Management
- Team Work
- Communication and Body Language
- Man – Woman Communication
- CV Preparation and Interview Methods

- NLP; Positive Thinking
- Self Confidence
- Empathy
- Prejudice
- Mobbing
- Addiction
- Anger, Stress and Crisis Management
- Violence to Women and Child Abuse
- Stories of Success, Marginal People
- Emotional, Intuitive and Creative Intelligence
- Information Society and Nano Technologies
- Innovativeness, Creativeness and Entrepreneurship
- Effects of Social Networking Sites on People

Every year we start with the opening of our faculty and after an intense preparation and studies, we conduct 40 academic, social and cultural activities every week throughout the year on Thursdays. Our students prepare, organize and present the subjects above.

4. OUR CONFERENCES, PANELS, SEMINARS AND SYMPOSIUMS

We organize Conferences, Seminars and Panels in accordance with our main theme as academic activities. Every year, we have conducted the following traditionally;

- **StartApp** meetings
 - **Meetings of Acquainting, Planning and Programming**
 - **Commemorating and Understanding Atatürk** Atatürk's Thought System: Being the thinker of the 21st century in the 20th century (Prof.Dr. Hüsnü ERKAN)
 - Panels were held on **Prevention of Violence to Women and Child Abuse** in our 10th, 11th, 12th, 13th and 14th seminars (Adv. Banu Aşkın and Adv. Maksut Bozacı – from Izmir Bar)
 - **Book Discussions** (Sapiens and Homo Deus)
 - Professional Ethics, Self Confidence, Effective Communication and Body Language,
 - Stories of Success Discussions (Ayşe Doğrusöz and Umut Ovalı)
 - **Interactive Motivation Event**
 - Briefing on **ERASMUS+, AIESEC, WORK & TRAVEL....**
 - **Learning to Think** (Prof.Dr. Hüsnü ERKAN)
 - CV preparation and interview methods
 - **Industry 4.0 Near Future** (Academic Member Dr. Canan ERKAN)
 - **DETTO Technology Transfer Briefing Visit...**
 - **Discussion with our Teachers of whom we have read books** (Discussions with our teachers; Prof.Dr. Hüsnü ERKAN, Prof.Dr. Temel ERGUN, Prof.Dr. Alp TİMUR, Prof.Dr. Mustafa ÖZATEŞLER, Mod. Prof.Dr. Yaşar UYSAL)
 - **International Symposium “INDUSTRY 4.0 Digital Transformation”** (Dr. Jonathan Liebenau LSE, Dr. Gül Berna Özcan Royal Holloway, Dr. Candan Ertübey University of Bedfordshire)
 - Artificial Intelligence Motivation Speech (Toygun TUNCER – Özgörkey Otomotiv General Manager, IT Director)
 - We have conducted the trainings of Financial Literacy ‘I Can Manage My Money’ and ‘Social Media’.
- (Within the framework of Habitat Association, Microsoft and Visa Cooperation project)

4.1 OTHER ACTIVITIES

We enrich each of our academic projects with social, artistic and cultural activities. Our example activities:

- Sema show
- Folk dances
- Dance shows
- Band Concert
- Turkish Classical Music Concert
- Violin and Piano Concerts
- Tai Chi Philosophy and application
- Street Art Atelier Performance
- Performance of our Capoeira Community
- Performances of Seferihisar Theatre Company
- Street Art Atelier Performances
- Performance of Kendo Company of Izmir University of Economics

Such projects increase the motivation of our students. We meet with the success of our work and make self-assessment within the framework of respect. We are preparing our plan for the next work by revealing our achievements and mistakes.

Our seminar is held with participation of 500 people consisting of the Rector, Assistants to the Rector, Deputy Governors, Mayors, District Governor, Deans, Department Heads, Bar President, President of Foundation, Representatives of Non-Governmental Organizations, Panellists, our old students who have worked in previous seminars and who now practise their professions, parents of students and our students.

On the other hand, brochures are distributed, and informative trainings are provided in chosen primary schools by our teams newly formed each year and who give support.

4.2 TRAININGS PROVIDED IN VILLAGE SCHOOLS

Trainings on subjects such as the following and trainings with animated narrating are provided by mobile volunteer team:

- Dental health and training (theatrical show, with a gift of toothpaste and brush)
- Healthy and balanced nutrition,
- Hygiene,
- First aid,
- Child abuse, (hand brochure)
- Earthquake Training,
- Traffic Rules Training,
- Environmental consciousness, sapling planting,
- Child Yoga training

18 elementary and secondary schools in Aegean Region are provided with trainings. In these schools; 4000 books were presented to the school or village library. Thousands of pencils, pencil sharpeners and erasers have been presented to all students in the schools visited, with face painting and music accompanied by Nasrettin Hodja and Snow-White clothing.

4.3 SUPPORTS PROVIDED TO SCHOOLS AND STUDENTS

Also; the school visits are carried out with our seminar team, which is usually renewed every year.

- Encyclopaedia,
- Books
- Back-packs
- Geographical and political maps of Turkey and the world,
- Wall clocks, balls
- Back-packs
- **STATIONARY** (pencils, pencil sharpeners, erasers, colour pencils, coloured papers, crepe paper, flags, ...)
- **SAPLINGS** are presented....
- **KITE FESTIVALS** are organized.

In this context, some schools in the suburbs of Izmir were also visited, as were all schools in Selçuk.

4.4 DELIVERY OF WHEELCHAIRS

From our seventh seminars, wheelchairs were delivered within the framework of blue cover projects, and after that through our own means. Those who need first were determined considering their reports.

- A total of 100 WHEELCHAIRS were delivered, including the seminar, where Sunay Akın has participated as a guest speaker, 3 of which were battery-operated, were delivered until this day.

4.5 OUR CULTURAL AND ART TRIPS

Culture and art events are organized with the seminar team, which is generally renewed every year. Historical, touristic and interesting structures such as Kuşadası, Virgin Mary, Ephesus, Selçuk, Şirince and Mathematics School are integrated with Çeşme, Alaçatı, Urla, Çeşmealtı motivation trips, Yeşil Höyük trip, Car Museum (Torbalı), etc. With the same team, theatre, opera, and symphony performances are seen, of which a significant part of it experiences in life for the first time. The opera and operettas we have seen are; Lüküs Hayat (Luxurious Life), Yarasa (The Bat) and Don Giovanni.

4.6 OUR SOCIAL RESPONSIBILITY PROJECTS

In addition to our Social Responsibility Projects, Brother-Sister project, book-reading event for the visually impaired, blood donation, Nursery Home visits, Down Cafe visits, Animal shelter constructions and visits, **VAN EARTHQUAKE** donations and supply, clothing, household goods donations to **SYRIANS** were made with the cooperation of Izmir Metropolitan Municipality.

4.7 EDUCATION SUPPORT FOR THE STUDENTS IN NEED

We are also trying to provide **Education support** to university students in need. To date, close to 20 students have received this type of support. I received the support of my husband, my family and my close environment and my students in many conferences organized regularly. In addition, the support we received from our friends from Izmir Universities and the Izmir Bar Association enriched our work. All of these activities were financed under difficult conditions. Particularly, the students organize charity bazaars and we can get some help from some individuals and institutions. We get involved in this area with our familiar and close environment where these are not enough.

5. 2018-2019 MAIN THEME: “INDUSTRY 4.0 AWARENESS TRAININGS WITH PDS 15”

This is due to the fact that we have seen that our students' Innovation and Industry 4.0 Perception is low in the last three years, in our academic studies. According to the results of the communiqué we have presented under the name of “A Research on the Changing Tendency of Generation Y Innovation Perception in the University Education Process” at the 1st International Scientific Researches Conference Humanity and Social Sciences IBAD-2016, Madrid-Spain, our students follow and use the innovations, but they are aware of them as consumers, not as producers of innovations. Again, we have seen this adequacy in the results of the communiqués we have presented at the International ASOS – 2017 under the name of “Industry 4.0 and its Applicability Analysis in Turkey” and at the 8th International Science and Technology Conference-Europa ISTEK 2017 Berlin/Germany, under the name of “Turkey’s Industry 4.0 Preparation priorities”. Finally, upon the results of our two communiqués we have presented as “A Research on the University Students’ Perception of Industry 4.0” at the VI. International Multidisciplinary Congress of Eurasia IMCOFE-2018, Rome-Italy, issued as a full text, and upon the positive contributions of PDS 15, awareness, social responsibility studies on the development of our students, we have focused on Industry 4.0 Awareness Trainings. For this, we have wanted to conduct a questionnaire and determine their priorities and focus on technological innovations in our studies, academic conferences and seminars we will organize throughout the year and determine the contributions of our trainings to our students’ development in this matter. We have presented the results of our first questionnaire at University of Democracy in the 1st International Conference on Critical Debates in Social Science, ICCDSS-2018, with “A Research on the Perception of Industry 4.0 in Students Starting University” which will be evaluated as in-book study. As we have predicted, we saw that their awareness was quite low. Following the Academic Conferences, Panels and Symposiums, we would like to evaluate our contributions to the awareness of our students who are responsible for shouldering and carrying forward all these developments according to the results of the questionnaire that we will finally conduct after our International Symposium.

The subject and results of our other communiqué that we have presented in Rome as a full text “The Analysis of the Values Gained by Participation in Social Responsibility Activities” with PDS makes the theme of this year meaningful. Because, we saw that our activities during the year made very positive contributions to our students. Therefore, our students' voluntary and willingness to learn by having fun in these studies strengthens our expected results.

Based on all these studies, also in this study, I have planned to make “A Qualitative Research on the Gains of Students who have Actively Participated to PDS and to the PERSONAL DEVELOPMENT SEMINARS for 2 or more years”. The method will be data collection with open-end questions and the analysis will be thematic method analysis. The study is a retrospective and thematic research and a comparative analysis of how people evaluate themselves before and after the seminar (Self Esteem). The questions have been sent to the students who have been volunteers in PDS for a long time via e-mail. We believe that there may be a delay in feedback due to the exam period, but it may catch up with the congress.

“PERSONAL DEVELOPMENT SEMINARS 15 EVENT CALENDER”

15 February 2018 Erasmus + and AIESEC Briefing

1 March 2018 Interactive Meeting - ÇAM

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

- 7 March 2018* Book Discussion (Homo Deus Sapiens -Yuval Noah Harari)
Fast and Slow Thinking
- 8 March 2018* Violence to Women, Child Abuse
Moderator: Assist. Prof.Dr. Canan ERKAN
Adv. Banu Aşkın İnce
Adv. Maksut BOZACI
- 13 March 2018* State Opera and Ballet (Don Giovanni)
- 15 March 2018* Prof.Dr. H. ERKAN, Learning to Think, (İİBF, Seferihisar, Faculty of Education)
- 18 April 2018* Familiarisation Trip to Village Schools (Book, Stationary Support)
- 19 April 2018* Discussion with our Teachers and Music Concert (Blue Hall İİBF)
Moderatör: Prof.Dr. Yaşar UYSAL
Prof.Dr. Hüsnü ERKAN
Prof. Dr. Mustafa ÖZATEŞLER,
Prof. Dr. Temel ERGUN,
Prof. Dr. Alp TİMUR
- 20 April 2018* Ephesus, Selçuk, Şirince, Kuşadası, Virgin Mary Training and Culture, Art Trip,
Aziz Nesin Math School

Kite Festival (Face Colouring, Snow White..) The Future of our Country is in our Hands Project, Carbon Footprint, Sapling Planting, Scattering the Pips of Fruits to the Nature

**3 – 4 May 2018 INTERNATIONAL SYMPOSIUM
INDUSTRY 4.0 DIGITAL TRANSFORMATION SYMPOSIUM**

Project Coordinator and Manager:
Assist. Prof.Dr. Canan ERKAN
Moderator: Prof Dr. Hüsnü ERKAN (President of UBS Foundation)

- 3 May 2018*
Dr. Jonathan Liebenau, London School of Economics,

Dr. Gülberna Özcan, Royal Holloway,

Dr. Candan Ertübey University of Bedfordshire

Dr. Ferda KONYA (DEU: Conservatory) Opera Dinletisi

- 4 May 2018* Toygun Tuncer CEO Özgörkey Companies
4 May 2018 Financial Literacy Education (Habitat Association)
(İİBF Conf.H.10:00 (Delivery of Wheelchairs, Sema Show, Folk Dances, Band...))
- 17 May 2018* SWOT Analysis, Assist. Prof.Dr. Canan Erkan
- 09 October 2018* Acquainting, Planning, Programming Meeting and Noah's Pudding Event
(Conference Hall)
- 21 October 2018* Start Up Meeting (Origin Co-Working Space)
- 23 October 2018* "You Read, too" Book Reading Awareness Event (Hasanağa Reads)
- 23 October 2018* TRT Radio 1 Introduction of PDS
- 07 November 2018* ATATÜRK's System of Thought: To be the 21st Century Thinker in the 20th Century (Prof.Dr. Hüsnü Erkan; Doç.Fevzi Çakmak)
- 09 November 2018* Visit to DEÜ's Technology Development Units (Depark, Detto, Bambu,

6th INTERNATIONAL NEW YORK CONFERENCE ON EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES

Izmir Biomedicine Genom Centre, Management Information Systems)

04 November 2018 Digital Transformation (Assist. Prof.Dr. Canan ERKAN) Legal Consequences of

Search Engines (Adv.Resul GÖKSOY); Privacy Act (Adv.Hakan ERİŞ)

11 December 2018 Learning to Think (Prof.Dr. Hüsnü Erkan)

08 March 2019 Violence to Women, Child Abuse (Adv. Banu Aşkın İnce)

Moderator: Prof Dr. Hüsnü ERKAN (President of UBS foundation)

Adv. Banu Aşkın İnce

Theatre Company - İİBF. Blue Hall 15.00

4 – 5 April 2019 DIGITAL SURVIVAL SUMMIT (CREATING THE TECHNOLOGY, SYSTEM AND SOCIETY OF THE FUTURE)

Project Coordinator and Manager:

Assist. Prof.Dr. Canan ERKAN

Moderator: Prof Dr. Hüsnü ERKAN (President of UBS Foundation)

4 April 2019

Doğan Ufuk GÜNEŞ Chairman of the Software Industry Association

Erkut EKİNCİ Hugo Boss IT Director

Atilla SEVİNÇLİ EBSO Industry 4.0 Commission Chairman

Murat MERDİN MET Advanced Technology

Av. Resul GÖKSOY LLM. İzmir Bar Association

5 April 2019

Prof.Dr. Yaşar UYSAL (DEÜ) Dokuz Eylül University

Prof.Dr. Vahap TECİM (DEÜ) Dokuz Eylül University

(Technologies that make life easier)

Prof.Dr. Haluk SOYUER (EÜ) Ege University

(Industry 4.0 Process)

Prof.Dr. C. Coşkun KÜÇÜKÖZMEN Izmir University of

Economics (Fintech and its Future)

Doç.Dr. Ahmet KOLTUKSUZ Yaşar University

(Future Technologies)

Toygun TUNCER Toygun Tuncer CEO Özgörkey

Companies – (Artificial Intelligence Discussion)

5 April 2019 (Hugo Boss Trip) (Car Museum Trips)

6. RESULT

What enables us to continue all these for years is what we get from students. In the students, there are gains such as self-confidence development, behaviour change, teamwork learning, awareness, and acquisitions in social relations, getting a positive point of view and preparing for life. Most of our former students come back to these seminars every year and pass on their achievements to new students. Up to now, we have reached around 7000 viewers and listeners with the active participation of approximately 3000 students every year from around 150 universities, with our studies. In addition, around 4000 primary and secondary school students have been given awareness training.

It has been observed that the students have gained values such as learning and teaching from each other and together by doing and experiencing, gaining self-confidence, socializing, taking social initiatives, undertaking social responsibilities, creating solutions and have switched to higher values in being beneficial to the society, being productive, having the power to self-decide and being conscious individuals and the sustainability of PDS is also possible with the acquisition of these value.

REFERENCES

- Erkan H 2005. Ekonomi Politikası ve Sosyal bilimlerde Değer Yargısı Sorunu; *Ekonomi Politikasının Temelleri*. 23-40, İlkem, İzmir.
- Erkan H 2003. Bilimde Değer Yargıları ve Bilgi Çağında Etik Değerler; Bilimsel Düşünce ve Araştırmada Etik. Editörler: H. Güven ve S. Gidener, 47-75, DEÜ yayını, İzmir
- Özlem D 2002. Felsefe Tarihinde Değer Kavramı, *Kavramlar ve Tarihleri I*; 203-235, İnkilap, İstanbul.
- Porter ME and Kramer MR 2005. Kurumsal Hayırseverliğin Sağladığı Rekabet Avantajı; *Şirketlerin Toplumsal Sorumluluğu*. 35-69, HBR, MESS, İstanbul.

**THE IMPORTANCE OF SUSTAINABILITY IN TERMS OF THE BALANCE OF
PRODUCTION AND CONSUMPTION**

Ece Tosunoglu

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Tosunoğlu Textile

Abstract

The concept of sustainability displays a stance against consumerism. Ecological integrity in design is an approach that is the focus of existence in terms of vital balance. To achieve this balance, it is aimed to reduce the damage to nature in the production and consumption relationship. At the same time, it is aimed to control and reduce the water consumption used in production and to prevent the threat of drought in the future. It is of great importance to prevent possible threats to the world and the creatures living in the world by designing sustainable, recyclable, environmentally friendly products that are less harmful to the environment. Sustainable fabrics should be sustainable not only as a material but also considering the use, washing, and recycling stages. First, by using the energy obtained by solar panels in production, natural resources are used without harming nature. Secondly, REPET yarn is used to ensure sustainability in designs. It is a danger for the world that the use of plastic is excessive, and plastic does not dissolve in nature for many years. REPET is a recycled polyester yarn produced by waste pet bottles. In this way, it is aimed to use resources efficiently to turn possible dangers into benefits and to prevent the damage caused by plastic wastes to the environment. With the effect of the pandemic, this process that the world is in has once again revealed the necessity of a sustainable life strikingly. In addition, natural yarns such as linen, hemp, wool, and cotton provide added value to fabrics with their natural structure without requiring any other chemical treatment. Natural fibers, which vary according to their properties, can have anti-bacterial, more durable, and more flexible structures. Fabrics are designed and produced using natural and recyclable materials, with methods that minimize the damage to nature, greatly reduce the damage caused by excessive consumption. The good productions made thanks to well-designed designs can guide the consumer and consumption. For this reason, sustainable production has great importance for a sustainable world.

Key Words: Sustainable, Recycle, Repet

**DOĞRUDAN YABANCI YATIRIMLARIN CO2 EMİSYONU VE YENİLENEBİLİR
ENERJİ İLE İLİŞKİSİNİN İNCELENMESİ: GELİŞMİŞ VE GELİŞMEKTE OLAN
ÜLKELER ÜZERİNE BİR UYGULAMA***

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Özet

Uluslararası ticarete serbestleşme ve doğrudan yabancı sermaye akımları özellikle son zamanlarda önemli küresel seviyelere ulaşmıştır. Çeşitli ticaret anlaşmaların yapılması ve uluslararası şirketlerin kurulması sonucunda, yatırımlar dünyanın hemen her yerine serbestçe yapılmaktadır. Gelişmekte olan ülkeler hem sermaye birikimlerini hem de verimliliklerini artırmak istedikleri için gelişmiş ülkelere gelen yatırımları teşvik etmektedir. Doğrudan yabancı yatırım (DYY) gelişmekte olan ülkelerdeki ekonomik kalkınmaya katkıda bulursa da yaratabileceği çevresel etkiler tartışılmaktadır. DYY girişleri, ev sahipliği yapan ülkelerde çevresel problemlere sebep olmaktadır. Ekonomik faaliyetlerdeki hızlı artış çevre sorunlarına yol açarken; çevre sorunları da ülkelerin ekonomik yapılarını olumsuz bir şekilde etkilemektedir. Bu sebeple, sürdürülebilir ekonomik kalkınmanın sağlanması için çevresel kaynakların etkin kullanımı son derece önem arz etmektedir. Dünya çapında artan küresel ısınma ve iklim değişikliği tehdidi karşısında ekonomik büyüme, enerji tüketimi ve çevre kirliliği giderek daha fazla ilgi görmektedir. Günümüzde ülkeler, enerji ihtiyaçlarını giderebilmek için daha çok enerji üretirken atmosfere salınan sera gazı emisyonlarını azaltmak için çeşitli politikalar uygulamışlardır. Bu çalışmadaki amaç hem gelişmiş ve hem de gelişmekte olan ülkelerde DYY'lerin çevre kirliliğinin göstergesi olan karbondioksit emisyonlarının (CO₂) ve yenilenebilir enerji (YE) tüketimini hangi ölçüde etkilediğine dair ampirik kanıtlar elde etmektir. Bu bağlamda; 48 gelişmiş ve gelişmekte olan ülke üzerinden 1990-2018 yılları arası baz alınarak, Westerlund eşbütünleşme ve Dumitrescu-Hurlin nedensellik testleri kullanılarak analizler yapılmıştır. Elde edilen sonuçlara göre incelenen tüm ülkeler için DYY ile YE ve CO₂ emisyonu uzun dönemde birlikte hareket etmektedir. Bununla birlikte yalnızca gelişmekte olan ülkeler için DYY'den CO₂ emisyonuna ve YE tüketimine doğru tek yönlü bir nedensellik tespit edilmiştir.

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EXAMINATION OF THE RELATIONSHIP WITH CO2 EMISSION OF FOREIGN
DIRECT INVESTMENTS AND RENEWABLE ENERGY: AN APPLICATION ON
DEVELOPED AND DEVELOPING COUNTRIES

Abstract

Liberalization in international trade and foreign direct capital flows have reached significant global levels especially recently. As a result of various trade agreements and the establishment of international companies, investments are freely made almost anywhere in the world. Developing countries encourage investments from developed countries because they want to increase both their capital accumulation and productivity. Although foreign direct investment (FDI) contributes to economic development in developing countries, its environmental impacts are discussed. FDI inflows cause environmental problems in host countries. While the rapid increase in economic activities causes environmental problems; environmental problems also negatively affect the economic structures of countries. Therefore, effective use of environmental resources is extremely important for sustainable economic development. In the face of increasing global warming and climate change threat worldwide, economic growth, energy consumption and environmental pollution are attracting more and more attention. In recent years, countries have implemented policies to reduce greenhouse gas emissions released into the atmosphere while producing more energy to meet their energy needs. The aim of this study; The aim is to obtain empirical evidence on the extent to which foreign direct investments in developed and developing countries affect carbon dioxide emissions (CO₂) and renewable energy consumption, which are indicators of environmental pollution. In this context; Westerlund panel cointegration and Dumitrescu-Hurlin panel causality analyzes were conducted on 48 developed and developing countries, based on the years 1990-2018. According to the results obtained, FDI, renewable energy and CO₂ emissions act together in the long run for all countries examined. However, a unidirectional causality running from FDI to CO₂ emissions and renewable energy consumption was found only for developing countries.

Keywords: foreign direct investments, renewable energy, carbon dioxide emissions, economic growth, environmental pollution¹

1. GİRİŞ

Doğrudan yabancı yatırım (DYY), genel olarak bir ülkede şirket satın alarak, kuruluş için temel sermaye sağlayarak veya mevcut bir şirketin sermayesini artırarak o ülkedeki şirketlere yapılan yatırım olarak tanımlanabilmektedir. (Şener ve Kılıç, 2008: 24). Doğrudan yabancı yatırım, ekonomik gelişme ve istihdam gibi konularda ülke ekonomisine fayda sağlarken, CO₂ emisyonları ve YE tüketimi üzerinde de etkisi mevcuttur.

Karbon emisyonu ise en basit tanımıyla karbonun atmosfere salınmasıdır. Karbon emisyonları aynı zamanda sera gazı emisyonlarını da ifade etmektedir. Her iki tanımda da karbondioksit (CO₂) eşdeğerleri hesaplandığından kavram karbon salınımı veya karbon emisyonu olarak da bilinmektedir. İnsanların atmosferde neden olduğu sera gazlarının yoğunluk seviyesi, sanayi devrimi ve dünyanın enerji talebinin artmasından bu yana giderek artmış ve bu artışa paralel

¹ This paper was prepared from the master's thesis titled "Examination of the Relationship with CO₂ Emission of Foreign Direct Investments and Renewable Energy: An Application on Developed and Developing Countries" conducted under the consultancy of Assoc. Prof. Dr. Feyyaz ZEREN and being prepared by Ecrin ÇİFCİ

olarak sera gazlarının ve doğal kaynakların (özellikle fosil yakıtların) enerji kullanımında önemli bir artış gözlemlenmiştir. 1850'den 2011'e kadar geçen süreçte CO2 emisyonlarında %40'lık artış tespit edilmiştir. Bununla beraber Uluslararası Enerji Ajansının tahminlerine göre 2050 yılına gelindiğinde fosil yakıtlara olan talepte artış görülecek ve böylece CO2 emisyon değeri %130 artış gerçekleşecektir (Gazbir, 2018). Bu nedenle, özellikle Avrupa Birliği (AB) ülkeleri ile Birleşmiş Milletler Güvenlik Konseyi vb. kurumlar karbon emisyonlarını azaltmak ve küresel çevreyi iyileştirmek için çok yönlü çalışmalara devam etmektedir.

DYY'nin çevreye olan etkisini literatürde açıklayan iki farklı hipotez mevcuttur. Bu hipotezlerden ilki, Kirlilik Hale Hipotezi ve ikincisi Kirlilik Sığmağı (Kirlilik Cenneti) hipotezidir. Kirlilik Hale Hipotezi, gelişmekte olan ülkelerdeki DYY'lerin sağlayacağı teknolojik gelişim ve yönetsel beceriler ile birlikte çevresel bozulmayı azalttığını, Kirlilik Sığmağı (Kirlilik Cenneti) ise ülkelerin DYY çekebilmek için çevre standartlarında esneklik sağlayacağından dolayı DYY artışının çevresel kirliliği arttıracaklarını kabul etmektedir. (Yıldırım vd., 2017: 100). Dünyada sanayileşme, kentleşme ve nüfus artışı süreci ile beraber enerjiye olan talep her geçen gün artmaktadır. Sanayi devrimi sonrası üretimin hızla artması ve özellikle fosil yakıtlar olmak üzere kaynakların fazla kullanılması CO2 emisyonlarında artmasına sebep olmuştur. Bu zaman zarfında atmosfere salınmış olan sera gazlarının artışıyla; küresel ısınma, çevreye yönelik tehditlerin artışı ve biyolojik dengenin tahrip olması insan sağlığını riske atan ölçülere ulaşmıştır. (Aydın ve Esen, 2018)

Ülkelerin ekonomik kalkınmalarını sağlamaya yönelik faaliyetleri enerji talebinde artışa neden olmaktadır. Ancak çoğu fosil enerji kaynağı bu talebi karşılamak için kullanılmakta ve bu da çevre kirliliğine neden olmaktadır. Fosil enerji kaynaklarının giderek tükendiği, çevre kirliliğinin arttığı ve dışa bağımlılığa yol açtığı durumla karşı karşıya kalan ülkeler, tükenmeyen, kirliliğe neden olmayan YE kaynaklarını değerlendirmeye başlamışlardır. Bu nedenle güneş, rüzgar, biomass ve hidroelektrik gibi YE kaynakları, yenilenemeyen enerji kaynaklarına göre daha az karbon içerir ve çevreye daha az çevre kirliliğine neden olmaktadır. DYY'nin YE tüketimi üzerindeki etkisi olumlu veya olumsuz olabilmektedir. Özellikle, teknoloji yayılım etkisi devreye girdiğinde DYY'nin YE tüketiminde olumlu bir etkisi olduğu gözlenmektedir. (Lee vd., 2011: 3-4) Solarin ve Shahbaz, 2015, s.836). Bununla birlikte, DYY'lerin ekonomik büyüme atağı nedeniyle üretim faaliyetindeki artış, çevre kalitesinin kötüleşmesine yol açmaktadır (Tamazin ve Rao, 2010).

YE sektörünün büyümesi, hükümetler tarafından desteklenerek oldukça önem kazanmıştır. Yenilenebilir enerjiye yatırım yapmanın maliyetinin yüksek olması nedeniyle devletler, yenilenebilir enerji kaynakları kullanan projelerde vergileri azaltmakta ve belirli düzeyde emisyonla neden olan projelerde vergi toplamaktadır. (Apergis ve Payne, 2012: 733; Topçu ve Tuğcu, 2020: 1135). YE teknolojisini teşvik eden politikalar birçok OECD ülkesinde uygulanmaktadır. (Apergis, 2015: 865-866). Bu çerçevede 1997 Kyoto Protokolü ve 2015 Paris Anlaşmaları ile ülkeler iklim değişikliği ile daha fazla mücadele etme kararı almış ve bu nedenle temiz enerji kullanımı savunucuları ikiye katlanmıştır. (Çağlar, 2020: 1). Kirliliğin yüksek olduğu endüstriler kısıtlı çevre düzenlemelerine karşı hassastır ve düzenlemelerinin esnek olduğu yerleşim alanlarını seçmektedir. Çünkü firmalar, yüksek kirlilik azaltma maliyetlerinden yer değiştirerek kurtulmayı hedeflemektedir. Gelişmekte olan veya az gelişmiş ülkeler durumdan yararlanmak için zayıf çevre politikaları uygulamaya devam etmektedir. Özellikle şirket gücünü ve yabancı sermayeyi ülkeye çekmek için rekabet eden ülkeler gevşetilmiş çevre düzenlemeleri kullanabilirler (Aliyu 2005: 2; Maey vd. 2003: 7). Ayrıca doğrudan yabancı yatırımın kayırılacağı ve kirliliğin artış göstermesine neden olacağı ülkeler sermaye yoğun ülkelerdir. Çünkü yüksek kirlilik seviyesine sahip çok uluslu şirketler sermaye yoğun endüstrilerdir. Bu nedenle şirketler ülke dışına yatırım yapmaya karar verdiklerinde çevreyi çok kirleten bir şirket nispeten yüksek sermaye-emek oranı ve göreceli bir

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çevre düzenlemesi derecesi düşük olan gelişmekte olan bir ülkeyi seçecektir. (Cole ve Elliot 2005: 531-535). Bu sebeple asgari çevre standartlarının global ölçekte tanımlanmasına ve uygulanmasına ihtiyaç vardır. Buna ek olarak, çevre için hassasiyet gösteren sektörler için ayrıntılı çalışmalar yapılmalıdır (Maey vd. 2003: 9).

2. LİTERATÜR TARAMASI

Literatürde DYY, YE ve çevre arasındaki ilişkiyi inceleyen birçok çalışma bulunmaktadır. Çalışmalar genellikle ülke ya da ülke grubu bağlamında Çevresel Kuznets Hipotezi, Kirlilik Sığınağı (Kirlilik Cenneti) Hipotezi ve Kirlilik Hale Hipotezinin geçerliliğini araştırmaktadır. Bu çalışmada mevcut olan üç örneklemin bir arada ele alındığı kaynaklar sınırlı olduğundan, çalışmanın literatür taraması üç ayrı bölüme ayrılarak gerçekleştirilmiştir. Birinci bölüm de Doğrudan Yabancı Yatırımlar (DYY) ve CO2 Emisyonu ilişkisini inceleyen, ikinci bölümünde DYY ve Yenilebilir Enerji ilişkisini inceleyen ve son olarak ise CO2 Emisyonu ve YE arasındaki ilişkiyi inceleyen çalışmalara yer verilerek literatür çalışması sonlandırılacaktır.

Tablo 1: DYY ve CO2 Emisyonu İlişkisi Literatür İncelemesi

Kaynak	Ülke	Veri	Yöntem	Bulgular
Hoffman vd. (2005)	112 Ülke	15 ve 28 Değişen Yıllar arası	Granger Nedensellik Testi	DYY ve CO2 emisyonu arasında nedensellik ilişkisi olduğu sonucuna ulaşılmıştır.
Pao ve Tsai (2011)	Brezilya, Rusya, Hindistan, Çin	Rusya (1992–2007) hariç, 1980- 2007	Panel Eşbütünlüşme	Uzun vadede CO ₂ emisyonların enerji tüketimi esnek ve DYY'lerin esnek olmadığı sonucuna ulaşılmıştır.
Blanco vd. (2011)	18 Latin Amerika	1980-2007	Granger Nedensellik Testi	DYY ile CO2 emisyonu arasında nedensellik ilişkisinin varlığı sonucuna ulaşılmıştır.
Al-mulali (2012)	12 Orta Doğu Ülkeleri	1990- 2009	Pedroni Panel Eşbütünlüşme	DYY' lerin ve CO2 emisyonunu arttırdığı sonucuna ulaşılmıştır.
Kim ve Adilov (2012)	164 ülke	44 yıldan fazla	OLS Regresyon Analizi	DYY'nin CO2 emisyonunu arttırdığını fakat gelişmekte olan ülkeler için DYY'nin CO2 emisyonunun azalmasına sebep olduğu gözlemlenmiştir.
Lee (2013)	G-20 Ülkeleri	1971- 2009	Johansen eşbütünlüşme testi	DYY'lerin CO2 emisyonu düzeyini azalttığı sonucuna ulaşılmıştır.
Ridzuan vd. (2014)	ASEAN-5 ülkeleri	1970-2008	ARDL sınır testi	Tayland, Filipinler ve Endonezya için KSH kabul edilmiş Malezya ve Singapur, DYY ve CO2 salımı arasında bir ilişkinin olmadığı sonucuna ulaşılmıştır.
Akın (2014)	12 üst gelir grubu ülke	1970-2012	Genelleştirilmiş Momentler Metodu	DYY ve CO2 emisyonu arasında istatiki olarak anlamlı ve negatif yönlü bir ilişkinin varlığı tespit edilmiştir.
Kiviyiro ve Arminen (2014)	6 Sahra Altı Afrika Ülkeleri	1970- 2009	ARDL Eşbütünlüşme	DYY ve CO2 emisyonu arasında eş bütünlüşmenin varlığı sonucuna ulaşılmıştır.
Mert ve Bölük (2016)	21 Kyoto ülkesi	1992–2004	Panel Eşbütünlüşme	Panel nedensellik testleri, değişkenlerden karbon emisyonlarına, doğrudan yabancı yatırımlara kadar önemli uzun vadeli nedensellikler olduğunu göstermektedir.

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Tablo 2: DYY ve Yenilenebilir Enerji İlişkisi Literatür İncelemesi

Kaynak	Ülke	Yıl	Yöntem	Sonuç
Hassaballa (2014)	22 Gelişmekte olan ülke	1973-2010	Granger Nedensellik Testi	YE tüketimi ve DYY arasında çift yönlü bir ilişki olduğu sonucuna ulaşılmıştır.
Doytch & Narayan (2016),	74 Ülke	1985-2012	Blundell–Bond Dinamik Panel Tahmini	DYY, yenilenemeyen enerji tüketiminin azaltılmasına katkıda bulunduğu sonucuna ulaşılmıştır.
Hagert ve Marton (2017)	56 Ülke	1990-2010	Sabit Etkiler Modeli	DYY'nın YE üzerinde negatif etkisinin olduğu sonucuna ulaşılmıştır.
Kutan vd. (2017)	BRICS ülkeleri	1990-2012	Çeşitli Panel Ekonometrik Yöntemler	DYY'de görülen artışın YE tüketimini artırdığı sonucuna ulaşılmıştır.
Er vd. (2018)	Türkiye	1990-2015	ARDL Yöntemi	YE tüketiminin, uzun vadede doğrudan yabancı yatırım girişlerinin tarafından belirleneceği sonucuna ulaşılmıştır.
Kılıçarslan (2019)	BRICS-T ülkeleri	1996-2015	Pedroni Eşbütünleşme Testi ARDL Yöntemleri	DYY'de götülen artışın YE tüketimini negatif olarak etkilediği sonucuna ulaşılmıştır.
Ergun vd. (2019)	21 Afrika ülkesi	1990-2013	Panel Sabit Etkiler ve Rassal Etkiler Yöntemi	DYY'deki artışın YE tüketimini artırdığı sonucuna ulaşılmıştır.
Arı (2021)	Türkiye	1984-2019	Johansen Eşbütünleşme testi, Hacker-Hatemi (2006) nedensellik testi	DYY ve YE arasında uzun dönem ilişki ve nedensellik ilişkisi bulunmamaktadır.

Tablo 3: Yenilenebilir Enerji ve CO2 Emisyonu İlişkisi Literatür İncelemesi

Kaynak	Ülke	Yıl	Yöntem	Sonuç
Say ve Yücel (2006)	Türkiye	1970-2002	Regresyon Analizi	İki değişken arasında güçlü bir ilişki tespit edilmiştir.
Apergis vd. (2010)	Gelişmiş ve Gelişmekte olan 19 ülke	1984-2007	Panel Hata Düzeltme Modeli	YE tüketimi ve CO2 emisyonu arasında istatistiki olarak anlamlı bir ilişkinin var olduğu tespit edilmiştir.
Apergis ve Payne (2014)	11 Güney Amerika Ülkesi	1980–2010	Eşbütünleşme ve Hata Düzeltme Modeli	Kişi başına yenilenebilir karbon emisyonları, uzun dönemli eşbütünleşmenin varlığını göstermektedirler.
Çoban ve Kılınç(2015)	Türkiye	1990-2012	EşBütünleşme Testi Granger Nedensellik Testi	CO2 emisyonu ile YE arasında eşbütünleşmenin ve tek yönlü nedensellik ilişkisinin var olduğu saptanmıştır.
Bento ve Moutinho (2016)	İtalya	1960-2011	Granger Nedensellik Testi	YE üretiminin CO2 emisyonunu azalttığı sonucuna ulaşılmıştır.
Bilgili vd. (2016)	17 OECD ülkesi	1977-2010	FMOLS-DOLS eşbütünleşme tahmincisi	YE tüketimi CO2 emisyonunu azaltmakta olduğu ortaya konmuştur.
Bhattacharya vd. (2017)	85 gelişmiş ve gelişmekte olan ülke	1991-2012	Eşbütünleşme testi Panel Veri Analizi Heterojen Panel Nedensellik Testi	YE tüketiminin CO2 emisyonunu azalttığı sonucuna ulaşılmıştır.
Okumuş (2020)	Türkiye	1968-2014	ARDL sınır testi	YE tüketiminin kısa vadede CO2 emisyonunu azalttığı sonucuna ulaşılmıştır.

3. VERİ SETİ VE YÖNTEM

Gelişmiş (GÜ) ve gelişmekte olan ülkelerde (GOÜ) doğrudan yabancı yatırımların (DYY) çevre kirliliğinin göstergesi olan karbondioksit emisyonlarının (CO2) ve YE tüketimini hangi ölçüde etkilediğine 48 gelişmiş (24) ve gelişmekte olan (24) ülke üzerinden 1990-2018 yılları arası baz alınarak ekonometrik analizler yapılmıştır. Çalışmada panel zaman serisi incelemesi yapılmış olup DYY, CO2 ve YE verileri Dünya Bankası veri tabanından (www.data.worldbank.org) alınmıştır.

Bir ülkede meydana gelen şok diğer bir ülkeye de etki edebilmektedir. Bu nedenle analize yatay kesit bağımlılığının (YKB) varlığı test edilerek başlanmıştır. Ülkeler arasında YKB'nin var olup olmadığına bağlı olarak birinci nesil veya ikinci nesil testler kullanılmalıdır.

YKB testlerinin en güncel olanı, denklemde de görülebilen Pesaran, Ullah ve Yamagata (2008) tarafından geliştirilmiş olan Lagrange Çarpanı (LM_{adj}) testidir.

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N T \hat{P}_{ij} \frac{(T-k) \hat{P}_{ij}^2 - \mu_{Tij}}{\sqrt{v_{Tij}^2}} \right)$$

$$LM_{adj} = \left(\frac{2}{N(N-1)} \right)^{1/2} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \left[p_{ij}^2 \left(\frac{(T-K-1) p_{ij} \mu_{Tij}}{\gamma_{tij}} \right) \sim N(0,1) \right]$$

Yukarıdaki mevcut olan denklemde ρ , kalıntıların ikili bağıllılığının örnek tahminidir. Bu testte H_0 hipotezi, yatay kesitler arasında bir ilişkinin yokluğunu ve $T \rightarrow \infty$ iken N sabit ise $N(N-1)$ 2 serbestlik derecesinde ki-kare asimptotik dağılıma sahip olduğunu ve verinin zaman boyutu T 'nin yatay kesit boyutu N 'den büyük olduğu zaman kullanılabileceğini ifade etmektedirler. (Güloğlu ve İvrendi, 2010: 384).

Çalışmamızda mevcut olan veriler için YKB varlığı araştırılmıştır. Testin sonucunda YKB'nin varlığına ulaşılmıştır. Bu sebeple, ikinci nesil birim kök testlerinden birinin kullanılmasına karar verilmiştir. Pesaran (2007), yatay-kesit genelleştirilmiş Dickey Fuller (CADF) regresyon modelindeki En Küçük Kareler tahminin t oranına dayalı olarak birim kök hipotezini test etmiştir. CADF regresyon modeli ise aşağıdaki gibidir;

$$y_{it} = \alpha_i + b_i y_{i,t-1} + c_i \bar{y}_{i,t-1} + d_i \Delta \bar{y}_t + e_{it}$$

t oranı $t(N, T)$ i, şeklinde gösterilmek için panelin her bir i . birimi için her bir CADF modelinden elde edilmektedir. IPS testinin yatay kesit genelleştirilmiş versiyonu (CIPS) şu şekildedir. (Pesaran, 2007).

$$CIPS(N, T) = N^{-1} \sum_{i=1}^N t_i(N, T)$$

Pesaran (2007) çalışmasında CIPS istatistiğinin kritik değerlerini vermiştir. Temel varsayım, panelde var olan tüm serilerin durağan olmadığına dayanmaktadır. Panellerin durağanlık seviyelerini belirledikten sonraki adım, panellerin uzun dönemde ilişkili olup olmadığını belirlemektir. Bu kapsamda Westerlund (2007) eşbütünlük testi kullanılmıştır. Bu test, bir Lagrange çarpanının (LM) istatistiksel testidir. Söz konusu yöntem yapısal kırılma ve YKB dikkate alınması açısından önemlidir. Bahsedilen yöntem, YKB'nin varlığı veya yokluğu ile ilgili sonuçları sunmaktadır. Test uygulaması için aşağıdaki model tahmin edilmektedir.

$$Z(M) = \frac{1}{N} \sum_{i=1}^N \sum_{j=1}^{M_i+1} \sum_{t=T_{ij-1}+1}^{T_{ij}} \left(\frac{S_{it}^2}{(T_{ij} - T_{ij-1})^2 \sigma_i^2} \right)$$

Çalışmada kullanılan son yöntem olan Dumitrescu-Hurlin panel Granger nedensellik testinde, temel hipoteze dayalı homojen bir Granger nedenselliğın yokluğu, en az bir yatay kesit için bu ilişkinin heterojen bir yapı içerisinde var olduğu alternatif hipotezine karşı test edilmiştir. Dumitrescu-Hurlin tarafından sunulan nedensellik testinde, X ve Y, N sayıda birim için T zaman aralığında gözlemlenen iki durağan süreç olarak aktarıldığında, t zamanında her bir birim (i) için ele alınan doğrusal heterojen model;

$$W_{N,T}^{Hnc} = \frac{1}{N} \sum_{i=1}^N W_{i,t}$$

$$Z_{N,T}^{HNC} = \frac{\sqrt{N} [W_{N,T}^{Hnc} - \sum_{i=1}^N E(W_{i,t})]}{\sqrt{\sum_{i=1}^N Var(W_{i,t})}}$$

4. AMPİRİK BULGULAR

Çalışmada yer alan veriler dikkate alındığında yatay kesit boyutu zaman boyutundan küçük olduğundan dolayı (T>N) Berusch-Pagan (1980) LM testi uygulanmıştır. Hem gelişmiş hem de gelişmekte olan ülkeler için olasılık değerleri 0,10'ten küçük olduğundan, H0 hipotezi reddedilmiş ve panellerde YKB olduğuna karar verilmiştir. Bu durumda paneli oluşturan ülkelerin yatay kesitsel verisi arasında bir ilişkinin olduğu tespit edilmiştir. Bu doğrultuda analizin sonraki evrelerinde yapılacak olan birim kök analizlerinde YKB'yi dikkate alan testler kullanılmıştır.

Tablo 4. Breusch, Pagan (1980) Yatay Kesit Bağımlılığı Test Sonuçları

		LM	Olasılık	LM _{ADJ}	Olasılık
Gelişmiş Ülkeler	DYY	435.267	0000	3.363	0000
	CO2	97.656	0000	5.348	0000
	YE	547.929	0000	6.691	0000
Gelişmekte Olan Ülkeler	DYY	217.045	0000	0.835	0.202
	CO2	293.985	0000	16.294	0.030
	YE	260.391	0000	-7.885	0.000

Her ülke için eğim katsayılarının homojenliği veya heterojenliği Pesaran ve Yamagata'ya (2008) ait delta testleri kullanılarak analiz edilmiştir. Gelişmiş ülkeler için homojenlik testinin sonuçları kontrol edildiğinde, delta ve düzeltilmiş delta testi istatistiğinin olasılık değeri 0.10'dan daha küçük olduğundan eğim katsayısının homojen olduğu H0 hipotezini reddedilmiştir. Gelişmekte olan ülkeler için elde edilen sonuçlar incelendiğinde ise eğim katsayılarının homojenlik/heterojenlik durumu hakkında karar vermek mümkün görülmemiştir. Zira delta testi heterojenliği, düzeltilmiş delta testi ise homojenliği tespit etmiştir.

Tablo 5. Homojenlik Test Sonuçları

		Δ	Olasılık	Δ_{adj}	Olasılık
Gelişmiş Ülkeler	DYY	6.511	0000	6.876	0000
	CO2	3.560	0000	3.759	0000
	YE	4.302	0000	4.543	0000
Gelişmekte olan Ülkeler	DYY	0.433	0000	0.438-	0.324
	CO2	-2.305	0.000	2.435	0.003
	YE	1.597	0.000	2.435	0.046

Paneller arasındaki YKB olması sebebiyle, panellerin durağanlığının analizinde ikinci nesil panel birim kök testi tercih edilmesi gerekmektedir (Gençoğlu vd., 2020) Bu nedenle ikinci nesil birim kök testlerinden biri olan ve Pesaran (2007) tarafından geliştirilen CADF birim kök testi bu aşamada tercih edilmiştir. Gelişmiş ülkelere bakıldığında bütün panellerin %95 güvenilirlik ile birinci farkında durağan olduğu anlaşılmaktadır. Gelişmekte olan ülkeler de ise CO2 paneli %95 güvenilirlik ile birinci farkta durağan, DYY ve YE panelleri ise %90 güvenilirlikle ile seviyesinde durağandır. Fakat %90 güvenilirliğin yazarlarca yeterli bulunmaması ve bütün panellere aynı testleri uygulayabilmek amacıyla bu paneller için de birinci farklar alınmış ve %99 güvenilirlik ile durağanlık tespit edilmiştir. Ulaşılan sonuçlara Tablo 6’te yer verilmiştir.

Tablo 6. CADF Panel Birim Kök Test Sonuçları

		Seviye	Birinci Fark
Gelişmiş Ülkeler	DYY	-2.75	-4.40**
	CO2	-2.96	-3.89**
	YE	-2.41	-4.04**
Gelişmekte Olan Ülkeler	DYY	-3.86*	-5.57***
	CO2	-2.73	-4.00**
	YE	-3.71*	-5.00***

***, **, * sırasıyla %99, %95 ve %90 güvenilirlik için anlamlılığı ifade etmektedir.

Paneller arasındaki uzun dönemli birlikte hareketin durumunu belirlemek için Westerlund (2007) panel eşbütünleşme testi uygulanmıştır. Tablo 7’te yer alan test istatistikleri ve bunların olasılık değerleri sunulmuştur. Tablo 7’teki analiz sonuçları, gelişmiş ve gelişmekte olan ülkelerde DYY, CO2 ve YE arasında uzun dönemli ve anlamlı bir ilişki olduğunu göstermektedir. Bu nedenle hem YKB varlığı hem de yapısal kırılmaların varlığı ile DYY ve çevre kirliliği arasında uzun dönemli karşılıklı bir ilişki olduğu varsayılmakta ve bu anlamda H0 hipotezi desteklenmektedir.

Tablo 7. Westerlund Panel Eşbütünleşme Test Sonuçları

		LMstat	Asimtotik Anlamlılık	Bootstap Olasılık
Gelişmiş Ülkeler	DYY-YE	103.534	0000	0.360
	DYY-CO2	156.783	0000	0.260
Gelişmekte Olan Ülkeler	DYY-YE	23.227	0000	0.450
	DYY-CO2	121.200	0000	0.390

Tablo 8’de yer alan sonuçlara bakıldığında seriler için hemen hemen benzer sonuçlar elde edildiği görülmektedir. Gelişmiş ülkelerin panelleri arasında herhangi bir nedensellik ilişkisine rastlanamamıştır. Gelişmekte olan ülkeler de ise DYY’den CO2’ye ve DYY’den YE’ye tek yönlü nedensellik gözlenmiştir.

Tablo. 8 Dumitrescu-Hurlin Nedensellik Testi Sonuçları

	Gelişmiş Ülkeler				Gelişmekte Olan Ülkeler			
	Zwald	Olasılık	Zwtilde	Olasılık	Zwald	Olasılık	Zwtilde	Olasılık
DYY → CO2	-1.397	1.838	-1.460	1.856	2.372	0.018	1.804	0.071
CO2 → DYY	1.151	0.250	0.746	0.455	-0.457	1.353	-0.646	1.482
YE → DYY	1.645	0.100	1.175	0.240	-0.334	1.264	-0.539	1.410
DYY → YE	1.789	0.074	1.299	0.194	2.169	0.030	1.658	0.103

5. SONUÇ VE TARTIŞMA

Dünya son yıllarda hızlı bir değişim sürecine girmiştir. Bu süreçte meydana gelen küreselleşme olgusunda DYY’lerin oranı oldukça yüksektir. Rekabetçi bir dünyada yatırımcılar, yatırım yapacağı yere karar verirken pazar büyüklüğü, işgücü maliyetleri, işgücü verimliliği, ticaret engelleri, fiyat istikrarı, dışa açıklık, döviz kurları, yabancılara uygun vergi politikası ve teşvikler, siyasi ve idari istikrar gibi kriterlere göre belirlenmektedir. Ancak, DYY’lerin yarattığı kirlilik göz ardı edilmektedir.

Bu çalışmada, DYY’lerin CO2 emisyonu ve YE ile ilişkisini incelemek amacıyla 48 gelişmiş ve gelişmekte olan ülke üzerinden 1990-2018 yılları arası baz alınarak Westerlund Panel Eşbütünleşme Testi ve Dumitrescu-Hurlin Nedensellik Testi kullanılarak analizler yapılmıştır. Bu amaç doğrultusunda değişkenlere öncelikle Breusch, Pagan (1980) YKB testi uygulanmış ve YKB’nin tespitiyle ikinci nesil birim kök testlerinden CADF panel birim kök testi gerçekleştirilmiştir. Birim kök testi sonuçlarına göre tüm değişkenlerin seviyesinde birim kök içerdiği ve birinci farkta durağan olduğu belirlenmiştir. Sonraki adımda Pesaran ve Yamagata’nın (2008) delta testleri ile uzun dönem katsayıları gözlemlenmiş ve gelişmiş ülke test istatistiği, delta ve düzeltilmiş delta test istatistiklerinin olasılık değerleri 0.10 anlamlılık düzeyinin altında olduğu için eğim katsayısının homojen olduğu yönündeki H0 hipotezini reddetmektedir fakat gelişmekte olan ülkelerdeki test istatistiğinde ise, eğim katsayısının heterojen olduğu yönündeki H1 hipotezini reddetmektedir. Değişkenlerin uzun dönemli ilişkileri Westerlund (2007) LM bootstrap panel eşbütünleşme testiyle incelenmiştir. Modelde uzun dönemli bir ilişki tespit edilmiştir. Analizlerin son adımında ise Dumitrescu-Hurlin (2012) nedensellik testi gerçekleştirilmiştir. Elde edilen sonuçlara göre gelişmiş ülkelerin panelleri arasında nedensellik ilişkisinin varlığına ulaşılmamıştır. Gelişmekte olan ülkeler de ise DYY’den CO2’ye ve DYY’den YE’ye tek yönlü nedensellik gözlenmiştir.

Yapılacak gelecek çalışmalarda bu çalışmada tespit edilen eşbütünleşme ilişkisinin yönü araştırılarak kirlilik hale hipotezinin mi yoksa kirlilik cenneti hipotezinin mi geçerli olduğu sonucuna ulaşılabilir. Bu durum nedensellik sonuçlarında olduğu gibi gelişmiş ve gelişmekte olan ülkeler için eşbütünleşme ilişkisinde de farklılık gösterebilmektedir. Bir ülkenin ekonomik büyümesi esas olarak endüstriyel üretime dayanıyorsa, daha fazla kirli atık ve CO2 emisyonu meydana gelecektir. Buna bağlı olarak, ülkeler özellikle endüstriyel üretim alanlarında kendi ekonomik büyümelerini görmekte; çevre dostu teknolojilerin kullanılması, fosil yakıt bazlı enerji tüketiminin azaltılması, daha az karbon içeren yakıtların kullanılması, YE kaynaklarının (güneş, rüzgar, hidroelektrik, elektrik vb.) kullanımını arttırması, gereksiz

enerji tüketiminin azaltılması, tüketicinin bilinçlenmesi, CO2 emisyonlarının azaltılması ve buna bağlı olarak çevre kirliliği gibi çeşitli sorunlara yönelik aksiyonlar alarak çevre kalitesini arttırmaya yönelik çalışmalar yapılmalıdır. Söz konusu panel eşbütünleşme tahminicisi ile elde edilecek sonuçlar bu tartışmalara son noktayı koyacaktır.

KAYNAKÇA

- Al-Mulali, U. (2012). Factors affecting CO2 emission in the Middle East: a panel data analysis. *Energy*, vol.44, issue 1, p.564-569. [DOI.org/10.1016/j.energy.2012.05.045](https://doi.org/10.1016/j.energy.2012.05.045)
- Akın, C. S. (2014), Yabancı Sermaye Yatırımlarının CO2 Emisyonu Üzerine Olan Etkisi: Dinamik Panel Veri Analiz, *Akademik Bakış Dergisi*, Sayı: 44 Temmuz – Ağustos
- Aydin, C. ve Esen, Ö. (2018) Reducing CO2 emissions in the EU member states: Do environmental taxes work?, *Journal of Environmental Planning and Management*, Taylor & Francis Journals, 61(13), 2396-2420, November.
- Arı, A. (2021). Yenilenebilir Enerji ve Doğrudan Yabancı Yatırımlar: Türkiye Örneği. *Karamanoğlu Mehmetbey Üniversitesi Sosyal Ve Ekonomik Araştırmalar Dergisi*, 23 (40) , 122-131.
- Aliyu, M. A. (2005) Foreign Direct Investment and the Environment: Pollution Haven Hypothesis Revisited. Paper prepared for the Eight Annual Conference on Global Economic Analysis, Lübeck, Germany, June 9-11.
- Apergis, N., Payne, J.E., Menyah, K. ve Wolde-Rufael, Y. (2010). On the causal dynamics between emissions, nuclear energy, renewable energy, and economic growth. *Ecological Economics*, 69, 2255-2260.
- Apergis, N. ve Payne, J. E., (2012) Renewable and non-renewable energy consumption-growth nexus: Evidence from a panel error correction model, *Energy Economics*, 34(3), 733-738.
- Apergis, N. (2015). Does Renewables Production Affect Income Inequality? Evidence from an International Panel of Countries. *Applied Economics Letters*, 22(11), 865-868.
- Apergis, N. ve Payne, J. (2015) Renewable Energy, Output, Carbon Dioxide Emissions, and Oil Prices: Evidence from South America. *Energy Sources*. 10.1080/15567249.2013.853713.
- Breusch, T. S. ve Pagan, A. R. (1980), The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics, *The Review of Economic Studies*, Vol:47, No:1, pp:239-253.
- Blanco, L., Gonzalez, F. ve Ruiz, I. (2011), "The Impact of FDI on CO2 Emissions in Latin America" *Pepperdine University, School of Public Policy Working Papers*. Paper 28.
- Bilgili, F., Koçak, E. ve Bulut, Ü. (2016) The Dynamic Impact of Renewable Energy Consumption on CO2 Emissions: A Revisited Environmental Kuznets Curve Approach, *Renewable and Sustainable Energy Reviews*, 54: 838-845.
- Bhattacharya, M., Churchill, S. A. ve Paramati, S. R. (2017) The dynamic impact of renewable energy and institutions on economic output and CO2 emissions across regions, *Renewable Energy*, 111, 157-167,
- Bento, C. J. P. ve Moutinho, V. (2016) CO2 emissions, non-renewable and renewable electricity production, economic growth, and international trade in Italy, *Renewable and Sustainable Energy Reviews*, 55(C), 142-155.
- Cole, M.A. ve Elliott, R.J.R. (2005) FDI and the Capital Intensity of Dirty Sectors: A Missing Piece of the Pollution Haven Puzzle. *Review of Development Economics*, 9, 530-548. <http://dx.doi.org/10.1111/j.1467-9361.2005.00292.x>

Çoban, O. ve Kılınç, N. Ş. (2015) Yenilenebilir Enerji Tüketimi ve Karbon Emisyonu İlişkisi: Tr Örneği, Sosyal Bilimler Enstitüsü Dergisi Sayı:38 Yıl: 2015/1, S. 195-208.

Dumitrescu, E. I. ve Hurlin, C. (2012) Testing for Granger Noncausality in Heterogeneous Panels. *Economic Modelling*, 29(4), 1450-1460.

Doytch, N. ve Narayan, S. (2016) Does FDI influence renewable energy consumption? An analysis of sectoral FDI impact on renewable and non-renewable industrial energy consumption, *Energy Economics*, 54, (C), 291-301

Er, B., Guneysu, Y. ve Ünal, H. (2018) Financing Renewable Energy Projects: An Empirical Analysis for Turkey. *International Journal of Energy Economics and Policy*, 8(6), 180–185. Retrieved from

Ergun, S. J., Owusu, P. A. ve Rivas, M. F. (2019) Determinants of Renewable Energy Consumption in Africa. *Environmental Science and Pollution Research*, 26, 15390–15405.

Güloğlu, B., ve İvrendi, M. (2010) Output fluctuations: transitory or permanent? the case of latin america, *Applied Economics Letters*, 17(4), 381-386.

Gençoğlu, P., Kuşkaya, S. ve Büyüknalbant, T. (2020) Seçilmiş OECD Ülkelerinde Sağlık Harcamalarının Sürdürülebilirliğinin Panel Birim Kök Testleri ile Değerlendirilmesi. *Ankara Üniversitesi SBF Dergisi*, 75 (4) , 1283-1297 . DOI: 10.33630/ausbf.498440

Hoffman, R., Lee, C-G., Ramasamy, B. ve Yeung, M. (2005) FDI and Pollution: A Granger Causality Test Using Panel Data, *Journal of International Development: The Journal of the Development Studies Association*, 17(3), 311-317.

Hassaballa, H. (2014) Testing for Granger causality between energy use and foreign direct investment Inflows in developing countries. *Renewable and Sustainable Energy Reviews*. 31. 417–426. 10.1016/j.rser.2013.12.011.

Hagert, M., Marton, C. (2017) The Effects of FDI on Renewable Energy Consumption: A Study of the Effects of Foreign Investments in Middle-Income Countries. Lund University, School of Economics and Management,

Kılıçarslan, Z. (2019) The Relationship between Foreign Direct Investment and Renewable Energy Production: Evidence from Brazil, Russia, India, China, South Africa and Turkey. *International Journal of Energy Economics and Policy*. 9. 291-297. 10.32479/ijeep.7879.

Kim, M. H. ve Adilov N. (2012) The lesser of two evils: an empirical investigation of foreign direct investment-pollution tradeoff, *Applied Economics*, 44:20, 2597-2606, DOI: 10.1080/00036846.2011.566187

Kiviyiro, P. ve Arminen, H. (2014) Carbon dioxide emissions, energy consumption, economic growth, and foreign direct investment: Causality analysis for Sub-Saharan Africa, *Energy*, 74, (C), 595-606

Kutan, A.M., Paramati, S.R., Ummalla, M. ve Zakari, A. (2017) Financing Renewable Energy Projects in Major Emerging Market Economies: Evidence in the Perspective of Sustainable Economic Development. *Emerging Markets Finance and Trade*, 54(8), 1-35.

Mert, M. ve Bölük, G. (2016) Do Foreign Direct Investment and Renewable Energy Consumption Affect the CO2 Emissions? New Evidence from a Panel ARDL Approach to Kyoto Annex Countries. *Environ Sci Pollut Res*. doi: 10.1007/s11356-016-7413-7.

Okumuş, İ. (2020) Türkiye’de Yenilenebilir Enerji Tüketimi, Tarım ve Co2 Emisyonu İlişkisi. *Uluslararası Ekonomi ve Yenilik Dergisi* 6(1), 21-34.

Pao, H.T. ve Tsai, C.M. (2011) Multivariate Granger Causality between CO2 Emissions, Energy Consumption, FDI (Foreign Direct Investment) and GDP (Gross Domestic Product): Evidence from a Panel of BRIC (Brazil, Russian Federation, India, and China) Countries. *Energy*, 36, 685-693.

Lee, H., Lee, J. ve Kim, H. H. (2011) Foreign Direct Investment, Technology Diffusion, and Host Country Productivity Growth. ADB Economics Working Paper Series, No. 272, Asia Development Bank. <https://www.adb.org/sites/default/files/publication/29120/economics-wp272.pdf>

Lee, J. W. (2013) The contribution of foreign direct investment to clean energy use, carbon emissions and economic growth, *Energy Policy*, vol. 55(C), 483-489.

Ridzuan, A., Noor A. H. M. ve Ahmed E. M. (2014) The Impact of Foreign Direct Investment towards Carbon Dioxide Level: Pollution Havens Model for ASEAN5 Countries. *Asian Journal of Agricultural Extension, Economics & Sociology*, 3(5): 392-404.

Pesaran, M. H. (2007) A Simple Panel Unit Root Test in The Presence of Cross- Section Dependence. *Journal of Applied Econometrics*, 22(2), 265-312.

Pesaran, M. H., ve Yamagata, T. (2008) Testing Slope Homogeneity in Large Panels. *Journal of Econometrics*, 142(1), 50-93.

Say, N. P., Yücel, M. (2006) Energy Consumption and CO2 Emission in Turkey: Emprical Analysis and Future Projection Based on Economic Growth. *Energy Policy* 34, 3870 - 3786.

Solarin S, Shahbaz, M. (2018) Trivariate causality between economic growth, urbanization and electricity consumption in Angola: cointegration and causality analysis. *Energy Policy*; 2013: 60, 876-84.

Şener, S. & Kılıç, C. (2008) Osmanlı'dan Günümüze Türkiye'de Yabancı Sermaye. *Bilgi Sosyal Bilimler Dergisi*, (1), 22-50.

Tamazian, A., Rao, B. (2010) Do economic, financial and institutional developments matter for environmental degradation? Evidence from transitional economies. *Energy Economics*. 32. 137-145. 10.1016/j.eneco.2009.04.004.

Topcu, M., Tugcu, T. C. (2020) The impact of renewable energy consumption on income inequality: Evidence from developed countries, *Renewable Energy*, vol. 151(C), 1134-1140.

Yıldırım, M., Destek, M. A., Özsoy, F. N. (2017) Doğrudan Yabancı Yatırımlar ve Kirlilik Sığınağı Hipotezi. *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi*

Westerlund, J. (2007) A Panel Bootstrap Cointegration Test. *Economics Letters*, 97(3). 185–190.

www.data.worldbank.org

<https://www.gazbir.org.tr/uploads/page/2018-Dogal-Gaz-Sektor-Raporu.pdf>

ÇOK DEĞİŞKENLİ GARCH MODELLERİ İLE DÖVİZ KURLARININ VOLATİLİTESİNİN MODELLENMESİ

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Özet

Türkiye ekonomisinde son dönemlerde döviz piyasalarında oldukça önemli fiyat hareketleri yaşanmıştır. Bu tür fiyat hareketleri hem Dolar-TL'nin hem de Euro-TL'nin volatilitésinin oldukça artması sonucunu doğurmuştur. Bu nedenle bu çalışmada 2 Ocak 2002 yılı ile 28 Şubat 2022 yılı arasındaki dönemini kapsayacak şekilde günlük veriler kullanılarak hem Dolar-TL'nin hem de Euro-TL'nin volatilitésini çok değişkenli GARCH modelleri kullanılarak modellenmiştir. Çalışmada karşılaştırma amacıyla tek değişkenli GARCH modellerine de yer verilmiştir. Çok değişkenli GARCH modelleri olarak AR(p)-DCC-FIAPARCH (1,d,1) modeli ile AR(p)-GO-GARCH-NLS modelinden, tek değişkenli GARCH modelleri olarak ise AR(p)-GARCH (1,1) modeli ile AR(p)-FIGARCH (1,d,1) modelinden yararlanılmıştır. Modellerin volatilité öngörü performanslarının analizinde MAE, MSE ve MAPE kriterlerinin yanı sıra Mincer-Zarnowitz (1969) regresyonundan da yararlanılmıştır. Çalışma bulguları Dolar-TL ile Euro-TL'nin volatilitésinin modellenmesinde en uygun modelin AR(p)-DCC-FIAPARCH (1,1) modeli olduğu sonucuna işaret etmektedir. Çalışma bulgularının portföy yönetimi, piyasa riski analizi ve hedging işlemleri açısından önemli bilgiler içerdiği ifade edilebilir.

Anahtar kelimeler: Döviz piyasaları, Volatilité, GARCH modelleri

FORECASTING THE VOLATILITY OF EXCHANGE RATES USING UNIVARIATE AND MULTIVARIATE GARCH MODELS: THE TURKISH CASE

Abstract

In the Turkish economy, there have been significant price movements in foreign exchange markets, especially in recent years. Such price movements have resulted in a significant increase in the volatility of both the US Dollar-Turkish Lira exchange rate and the Euro-Turkish Lira exchange rate. Therefore, this study models the volatility of both exchange rates by applying multivariate GARCH models, using daily data from January 2, 2002 to February 28, 2022. We also include univariate GARCH models for comparison purposes. As the multivariate GARCH-type models, we adopt the AR(p)-DCC-FIAPARCH (1,1) and AR(p)-GO-GARCH-NLS models; as the univariate GARCH-type models, we use the AR(p)-GARCH (1,1) and AR(p)-FIGARCH (1,1) models. We apply the MAE, MSE and MAPE criteria as well as Mincer-Zarnowitz (1969) regression to analyse the in-sample volatility forecasting performance of the models. The findings of the study indicate that the most appropriate model for modelling the volatility of the US Dollar-Turkish Lira and Euro-Turkish Lira exchange rates is the AR(p)-DCC-FIAPARCH (1,1) model. These findings offer important information for portfolio management, market risk analysis and financial hedging strategies.

Keywords: Foreign exchange markets, Volatility forecasting, GARCH models

GİRİŞ

Türkiye gibi gelişen piyasa ekonomilerinin döviz piyasalarında yaşanan sert fiyat hareketlerinin önemli makroekonomik ve finansal sonuçları olabilmektedir. Nitekim son dönemlerde hem yurt içi hem de yurt dışı gelişmelere bağlı olarak Türkiye ekonomisinde döviz kuru seviyesinin ve volatilitésinin oldukça yükseldiği bilinmektedir. Bu durum da gerek bireysel yatırımcılar gerekse de reel ve finansal kuruluşlar açısından döviz kuru riskinin yönetilmesini oldukça önemli bir konu haline getirmektedir. Fakat, döviz kuru piyasalarındaki fiyatlama davranışlarının ulaştığı boyutun döviz portföylerinin başarılı bir şekilde yönetimi, döviz kuru kaynaklı piyasa riskinin etkin bir şekilde ölçümü ve özellikle futures ve opsiyon sözleşmeleri gibi türev ürünleri kullanarak kur riskinin başarılı bir şekilde hedge edilebilmesini oldukça zorlaştırdığı ifade edilebilir.

Bu tür durumların da özellikle kurumsal bazda etkin bir risk yönetim sisteminin kurulmasını zorunlu hale getirdiği belirtilmelidir. Etkin risk yönetim sisteminin bir çok bileşeni bulunmakla birlikte; portföy yönetimi, piyasa riski analizi ve hedging işlemleri gibi finansal risk yönetimi açısından oldukça önemli olan aşamaların etkinliği açısından ilk aşamada doğru şekilde hesaplanmış bir volatilite parametresine ihtiyaç duyulduğu ifade edilebilir. Bu nedenle bu çalışmada tek ve çok değişkenli GARCH modelleri kullanılarak Türkiye ekonomisinin istikrarı açısından önemli değişkenler arasında yer alan Dolar-TL ve Euro-TL kurlarının volatilitési modellenmiştir.

Çalışmanın literatüre temel katkısı şu şekilde ifade edilebilir: Ulusal yazında döviz kurlarının volatilite serilerinin modellenmesine dönük çeşitli çalışmalar bulunmakla birlikte, bu çalışmalarda oldukça baskın bir şekilde tek değişkenli GARCH modellerinden yararlanıldığı görülmektedir. Bu çalışmada ise AR(p)-DCC-FIAPARCH (1,d,1) modeli ile AR(p)-GO-GARCH-NLS modelinden oluşan çok değişkenli GARCH modellerine yer verilmiş ve ayrıca bu çok değişkenli GARCH modellerinin performansları, birer tek değişkenli GARCH modeli olan AR(p)-GARCH (1,1) modeli ile AR(p)-FIGARCH (1,d,1) modelinin performansları ile de karşılaştırılmıştır.

VERİ VE METODOLOJİ

Bu çalışma 2 Ocak 2002 yılı ile 28 Şubat 2022 yılı arasındaki dönemi kapsamakta ve günlük verilerden oluşmaktadır. Türkiye ekonomisinin 2001 yılının Şubat ayında önemli bir finansal kriz yaşaması ve bu krizin hemen ardından önemli bir ekonomik dönüşüm sürecinden geçmiş olması nedeniyle çalışmanın başlangıç yılı 2002 yılı olarak belirlenmiştir. Çalışmada Dolar-TL kuru ile Euro-TL kuru esas alınmıştır. Tüm veriler TCMB'nin elektronik veri dağıtım sisteminden elde edilmiştir (<https://evds2.tcmb.gov.tr/>).

Analizlerde ilgili döviz kurlarının Denklem (1)'de gösterildiği gibi hesaplanan günlük logaritmik getiri serileri, (r_t) kullanılmıştır.

$$r_t = 100 * [\ln P_t - \ln P_{t-1}] \quad (1)$$

Burada P_t ilgili döviz kurlarının cari dönemdeki kapanış fiyatını; P_{t-1} ise ilgili döviz kurlarının bir gün önceki kapanış fiyatını ifade etmektedir.

Çalışmada tek değişkenli GARCH modelleri olarak Baillie vd. (1996) tarafından geliştirilen AR(1)-FIGARCH (1,d,1) modeli ile Bollerslev (1986) tarafından geliştirilen AR(1)-GARCH(1,1) modelinden yararlanılmıştır. Çok değişkenli GARCH modelleri olarak ise öncelikle van der Weide (2002) ile Boswijk ve van der Weide (2006) tarafından geliştirilen AR(1)-GOGARCH-NLS modeline yer verilmiş, ardından ise Engle (2002) tarafından

geliştirilen DCC-GARCH modeli ile Tse (1998) tarafından geliştirilen FIAPARCH modelinin birleştirilmesi ile elde edilen AR(1)-DCC-FIAPARCH (1, d,1) modelinden de yararlanılmıştır.

Çalışmadaki tüm modeller normal dağılım varsayımı altında tahmin edilmiştir. Bunun temel nedeni literatürde ve paket programlarda henüz GO-GARCH-NLS modeli için çoklu Student t dağılım varsayımı gibi dağılım varsayımlarının bulunmamasıdır (Örneğin bakınız: Boswijk ve van der Weide, 2006; Mohamed, 2018). Fakat ilgili kripto para birimlerinin logaritmik getiri serilerinin standart normal dağılım varsayımına uymamalarının yol açabileceği sorunların üstesinden gelebilmek amacıyla da model parametrelerinin tahmininde Bollerslev-Wooldridge (1992) tarafından geliştirilen sanki en çok olabilirlik (quasi-maximum likelihood, QMLE) yönteminden yararlanılmıştır.

Modellerin örneklem içi (in-sample) volatilité öngörü performanslarının analizinde sırasıyla Denklem (2), (3) ve (4)'te gösterilen MAE, MSE ve MAPE kriterleri ile Denklem (5)'te gösterilen Mincer-Zarnowitz (1969) regresyonundan yararlanılmıştır.

$$MAE = 1/T \sum_{k=1}^T |Varyans_{t,tahmin edilen} - varyans_{t,gerçekleşen}| \quad (2)$$

$$MSE = 1/T \sum_{k=1}^T (Varyans_{t,tahmin edilen} - Varyans_{t,gerçekleşen})^2 \quad (3)$$

$$MAPE = \frac{1}{T} \sum_{k=1}^T \frac{|Varyans_{t,tahmin edilen} - Varyans_{t,gerçekleşen}|}{|Varyans_{t,gerçekleşen}|} \quad (4)$$

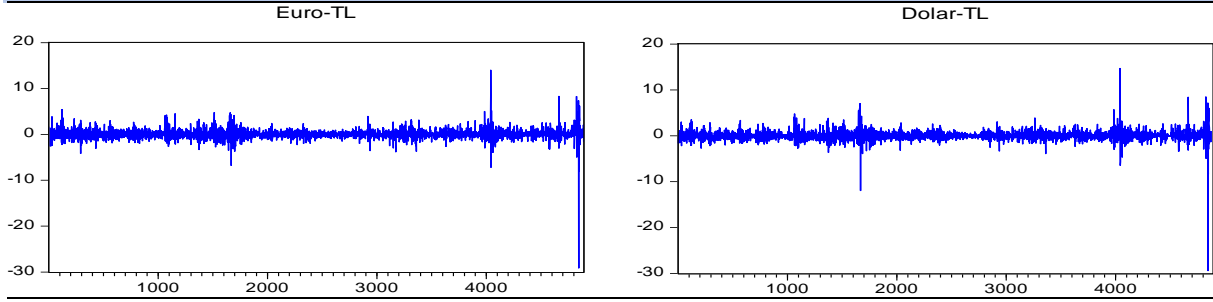
Burada $varyans_{t,tahmin edilen}$, ilgili tek ve çok değişkenli GARCH modelleri tarafından üretilen volatilité değerlerini; $varyans_{t,gerçekleşen}$, gerçekleşen volatilité değerlerini; T ise toplam gözlem sayısını ifade etmektedir. Çalışmada gerçekleşen volatilité değerlerini temsilen her bir döviz kurunun günlük logaritmik getiri serilerinin kareleri alınarak elde edilen seriler kullanılmıştır.

$$varyans_{t,gerçekleşen} = \mu + \beta * Varyans_{t,tahmin edilen} + \varepsilon_t \quad (5)$$

Çalışmada MAE, MSE ve MAPE kriterlerine ait bulgular yorumlanırken en düşük MAE, MSE ve MAPE değerine sahip olan modelin en iyi performansı sergileyen model olduğu sonucuna ulaşılmaktadır. Mincer-Zarnowitz (1969) regresyonuna ait bulgular yorumlanırken ise her bir GARCH modeli için Denklem (5) tahmin edildikten sonra elde edilen R^2 değerlerine bakılmakta, en yüksek R^2 değerine sahip olan modelin en iyi performansı sergileyen model olduğu sonucuna ulaşılmaktadır.

BULGULAR

Dolar-TL ve Euro-TL kurlarına ait logaritmik getiri serileri Şekil 1'de sunulmuştur. Genel olarak her iki döviz kurunun getiri serilerinin benzer bir seyir izlediği ifade edilebilir.



Şekil 1. Logaritmik Getiri Serileri

Bu getiri serilerine ait betimleyici istatistikler ile birim kök ve değişen varyans testi sonuçları Tablo 1’de gösterilmiştir. Bulgular, incelenen dönemde hem Dolar-TL hem de Euro-TL kurlarının pozitif ortalama getiri oranlarına sahip oldukları, standart sapma parametresi ile ölçülen risk düzeylerinin de sırasıyla yaklaşık %1.0428 ve %1.0276 olduğu sonucuna işaret etmektedir. Jargue-Bera testi sonuçları ilgili her iki döviz kuru getiri serisinin de %5 anlamlılık düzeyinde standart normal dağılım varsayımına uymadığını göstermektedir. Bu durum metodoloji bölümünde belirtildiği gibi ilgili tüm GARCH modellerinin Bollerslev-Wooldridge (1992) tarafından geliştirilen sanki en çok olabilirlik (quasi-maximum likelihood, QMLE) yöntemi ile tahmin edilmesinin önemini artırmaktadır. Birim kök testi sonuçlarına bakıldığında ise %5 anlamlılık düzeyinde her iki döviz kuru getiri serisinin de düzey değerlerinde durağan olduğu anlaşılmaktadır. Ljung-Box $Q^2(15)$ testi de değişen varyans sorununun her iki döviz kuru getiri serisi için geçerli olduğunu göstermektedir.

Tablo 1. Betimleyici İstatistikler, Birim Kök Ve Değişen Varyans Testi Sonuçları (%)

	Dolar-TL	Euro-TL
Ortalama	0.046485	0.051266
Standart sapma	1.042830	1.027690
Basıklık	-3.675148	-3.680578
Çarpıklık	150.8581	149.5555
Jarque-Bera	0.00000*	0.00000*
ADF	-41.7342*[0.0000]	-42.28264*[0.0000]
PP	-64.4267*[0.0000]	-64.00568*[0.0000]
$Q^2(15)$	199.58*[0.0000]	192.44*[0.0000]

*, %5 anlamlılık düzeyini ifade etmektedir. Jarque-Bera testi için verilen değerler olasılık değerleridir. ADF, PP ve $Q^2(15)$ testleri içinse olasılık değerleri köşeli parantez içerisinde gösterilmiştir.

Tek değişkenli AR(1)-GARCH(1,1) modeli ile AR(1)-FIGARCH (1,d,1) modeline ait parametre tahmin sonuçları Tablo 2’de, çok değişkenli AR(1)-GOGARCH-NLS modeli ile AR(1)-DCC-FIAPARCH (1,d,1) modeline ilişkin parametre tahmin sonuçları ise sırasıyla Tablo 3 ve 4’te sunulmuştur. Tablo 2’deki sonuçlar incelendiğinde Dolar-TL kuru için AR(1)-GARCH(1,1) modelinin ARCH ve GARCH parametrelerinin pozitif ve istatistiki olarak anlamlı oldukları, kovaryans durağanlık koşulunun sağlandığı ve değişen varyans sorununun giderildiği anlaşılmaktadır. AR(1)-FIGARCH (1,d,1) modeline ait sonuçlara bakıldığında da ARCH ve GARCH parametrelerine ilaveten uzun hafıza parametresinin (d-FIGARCH) de pozitif ve istatistiki olarak çıktığı ve değişen varyans sorununun giderildiği görülmektedir. Uzun hafıza parametresinin pozitif ve istatistiki olarak anlamlı çıkması Dolar-TL kurunun getiri serisinin volatilitésinin uzun hafıza özelliği sergilediği anlamına gelmektedir.

Euro-TL kuru için elde edilen sonuçlara bakıldığında AR(1)-GARCH(1,1) modelinin ARCH ve GARCH parametrelerinin yine pozitif ve istatistiki olarak anlamlı oldukları, kovaryans durağanlık koşulunun sağlandığı ve değişen varyans sorununun giderildiği anlaşılmaktadır. AR(1)-FIGARCH (1,d,1) modeline ait sonuçlara bakıldığında ise ARCH parametresinin

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pozitif bir değer almakla birlikte %10 anlamlılık düzeyinde istatistiki olarak anlamlı çıkmadığı, GARCH parametresi ile uzun hafıza parametresinin (d-FIGARCH) ise pozitif ve istatistiki olarak anlamlı değerler aldıkları ve değişen varyans sorununun giderildiği görülmektedir. Uzun hafıza parametresinin pozitif ve istatistiki olarak anlamlı çıkması Dolar-TL kurunda olduğu gibi Euro-TL kurunun getiri serisinin volatilitésinin de uzun hafıza özelliği sergilediği anlamına gelmektedir.

Tablo 2. AR(1)-FIGARCH(1,1) ile AR(1)-GARCH(1,1) Modellerine Ait Parametre Tahmin Sonuçları

FIGARCH / DOLAR-TL		FIGARCH / EURO-TL	
Getiri denklemi		Getiri denklemi	
Sabit terim	0.003814[0.7197]	Sabit terim	0.015545[0.1339]
AR(1)	0.054562*[0.0093]	AR(1)	0.060820*[0.0027]
Varyans denklemi		Varyans denklem	
Sabit terim	2.488603*[0.0127]	Sabit terim	0.051194*[0.0000]
ARCH	0.219645*[0.0008]	ARCH	0.09682[0.2838]
GARCH	0.563794*[0.0000]	GARCH	0.46834*[0.0006]
d-FIGARCH	0.551743*[0.0000]	d-FIGARCH	0.634958*[0.0000]
Log likelihood	-5627.365	Log likelihood	-5645.727
Değişen varyans testi sonuçları		Değişen varyans testi sonuçları	
Q ² (15)	9.04725[0.76936]	Q ² (15)	11.5708[0.56312]
GARCH / DOLAR-TL		GARCH / EURO-TL	
Getiri denklemi		Getiri denklemi	
Sabit terim	0.002994[0.7740]	Sabit terim	0.016674[0.1090]
AR(1)	0.056629*[0.0027]	AR(1)	0.059840*[0.0036]
Varyans denklemi		Varyans denklemi	
Sabit terim	0.022347*[0.0043]	Sabit terim	0.043475*[0.0000]
ARCH	0.196253*[0.0000]	ARCH	0.238360*[0.0000]
GARCH	0.797372*[0.0000]	GARCH	0.729102*[0.0000]
Log likelihood	-5631.721	Log likelihood	-5650.302
Değişen varyans testi sonuçları		Değişen varyans testi sonuçları	
Q ² (15)	13.7002[0.39529]	Q ² (15)	13.0146[0.446684]

*, %5 anlamlılık düzeyini ifade etmektedir. Köşeli parantez içerisindeki değerler olasılık değerleridir.

Çok değişkenli GARCH modellerine gelince, öncelikle AR(1)-GOGARCH-NLS modeline ilişkin sonuçlar incelendiğinde ARCH ve GARCH parametrelerinin pozitif ve istatistiki olarak anlamlı çıktığı görülmektedir.

Tablo 3. İki Değişkenli AR(1)-GO-GARCH-NLS Modeline Ait Parametre Tahmin Sonuçları

U matrisi		
	U_1	U_2
U_1	-0.33836	-0.94102
U_2	0.94102	-0.33836
A matrisi		
	A_1	A_2
A_1	-0.58780	0.80901
A_2	-0.061967	0.99808
GO-GARCH- NLS modelinin parametreleri		
	$Faktör_1$	$Faktör_2$
ARCH	0.045767*[0.0000]	0.224810*[0.0000]
GARCH	0.945392*[0.0000]	0.726399*[0.0000]
Sigma ²	0.008841	0.048791
ARCH +GARCH < 1	0.99116	0.95121
Log likelihood	-6498.360	-5649.334
Değişen varyans testi (Standardize edilmiş hata terimlerinin karelerine uygulanan)		
	Dolar-TL	Euro-TL
Q ² (15)	75.2005*[0.0000]	13.5295[0.561468]

*, %5 anlamlılık düzeyini ifade etmektedir. Köşeli parantez içerisindeki değerler olasılık değerleridir.

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Ayrıca faktör 1'in volatilité kalıcılığının, faktör 2'nin volatilité kalıcılığında daha yüksek olduđu ifade edilebilir. Değişen varyans testi sonuçlarına bakıldığında ise AR(1)-GOGARCH-NLS modelinin % 5 anlamlılık düzeyinde Euro-TL kuru için değişen varyans sorununu gidermede başarılı olduđu, Dolar-TL kuru içinse değişen varyans sorununu giderilemediği anlaşılmaktadır. Fakat bilindiği gibi volatilitenin modellenmesi gibi çalışmalarda model performansları analiz edilirken modellerin diagnostik test sonuçlarından ziyade doğrudan ilgili modellerin gerçekleşen volatilitéyi tahmin edebilme performansları dikkate alınmaktadır.

Tablo 4. İki Değişkenli AR(1)-DCC-FIAPARCH(1,d,1) Modeline Ait Parametre Tahmin Sonuçları

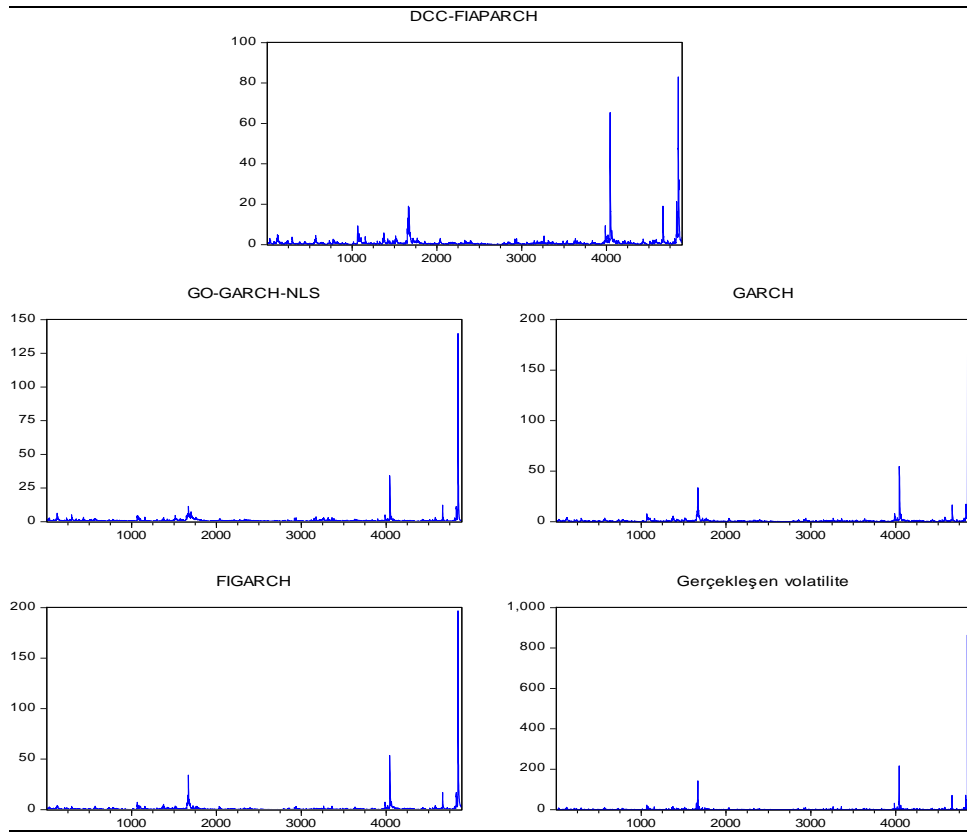
Parametreler	Katsayılar	Parametreler	Katsayılar
Her bir değişken için tekil FIAPARCH modeline ait tahmin sonuçları			
DOLAR-TL		EURO-TL	
Getiri denklemi		Getiri denklemi	
Sabit terim	0.027274*[0.0081]	Sabit terim	0.044474*[0.0000]
AR(1)	0.062741*[0.0011]	AR(1)	0.071385*[0.0004]
Varyans denklemi		Varyans denklem	
Sabit terim	0.036275*[0.0041]	Sabit terim	0.074451*[0.0003]
ARCH	0.244582*[0.0000]	ARCH	0.174234*[0.0685]
GARCH	0.623721*[0.0000]	GARCH	0.443629*[0.0005]
d-FIARCH	0.574821*[0.0000]	d-FIARCH	0.485539*[0.0000]
ASİMETRİ	-0.308742*[0.0003]	ASİMETRİ	-0.32255*[0.0001]
ÜS	1.618605*[0.0000]	ÜS	1.515111*[0.0000]
Log likelihood	-5572.088	Log likelihood	-5589.430
DCC modeli tahmin sonuçları			
Korelasyon	0.714709*[0.0000]		
θ_1 (Alfa)	0.049380*[0.0000]		
θ_2 (Beta)	0.945201*[0.0000]		
Loglikelihood	-9101.783		
Değişen varyans testi sonuçları			
Q ² (15) Dolar TL	20.2571[0.1622886]		
Q ² (15) Euro TL	17.9519[0.2652006]		

*, %10 anlamlılık düzeyini ifade etmektedir. Köşeli parantez içerisindeki değerler olasılık değerleridir.

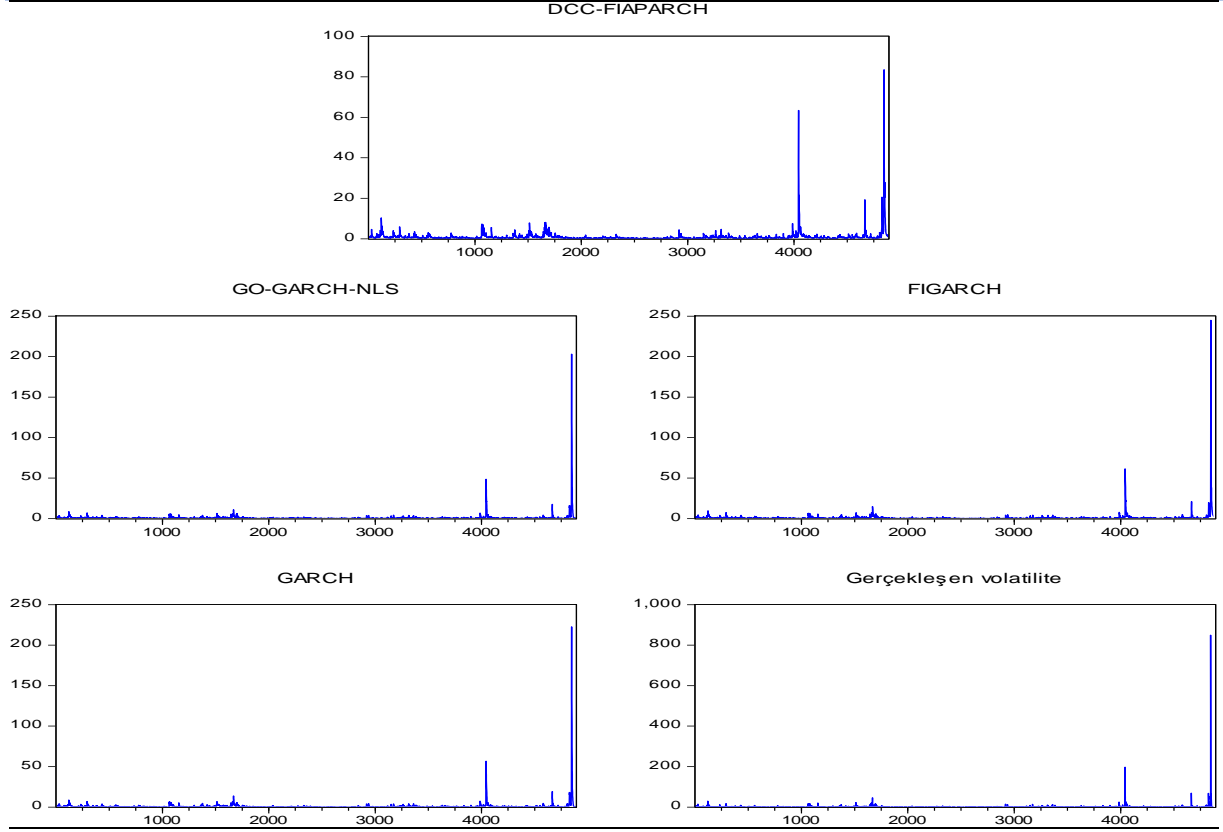
AR(1)-DCC-FIAPARCH(1,d,1) modeline ait sonuçlara gelince öncelikle hem Dolar-TL hem de Euro-TL için tekil AR(1)-FIAPARCH (1,d,1) modeline ait sonuçlar incelendiğinde %10 anlamlılık düzeyinde her iki döviz kuru için de ARCH, GARCH, d-FIARCH ve üs (power) parametrelerinin pozitif ve istatistiki olarak anlamlı değerler aldıkları görülmektedir. Asimetri parametreleri de negatif ve istatistiki olarak anlamlı çıkmaktadır. Bu bulgular her iki döviz kuru için de asimetrik tepkinin ve uzun hafıza özelliğinin geçerli olduğu ve üs parametresinin alternatif değerler alabileceği anlamına gelmektedir. DCC modeline ait sonuçlar incelendiğinde ise Dolar-TL kuru ile Euro-TL kuru arasındaki ortalama şartlı korelasyon değerinin yaklaşık 0.715 olduğu ve %5 anlamlılık düzeyinde istatistiki olarak anlamlı olduğu görülmektedir. Alfa (θ_1) ve beta (θ_2) parametrelerinin %5 anlamlılık düzeyinde istatistiki olarak anlamlı değerler aldıkları anlaşılmaktadır. Bu bulgu da literatürde Dolar-TL kuru ile Euro-TL kuru arasındaki şartlı korelasyon değerinin zamanla değiştiğinin bir göstergesi olarak yorumlanabilmektedir. Son olarak değişen varyans testi sonuçlarına bakıldığında AR(1)-DCC-FIAPARCH (1,d,1) modelinin her iki döviz kuru için de değişen varyans sorununu gidermede başarılı olduğu görülmektedir.

İlgili tek ve çok değişkenli GARCH modellerinin parametre tahmin sonuçlarına dönük bulgular değerlendirildikten sonra bu modellerin incelenen dönem için volatilité öngörü performanslarının analizine geçilmiştir. Bu kapsamda öncelikle ilgili tüm GARCH modellerinin volatilité öngörülerini gerçekleşen volatilité değerleri ile birlikte Şekil 2 ve 3'te gösterilmiştir. Ardından MAE, MSE ve MAPE kriterleri ile Mincer-Zarnowitz (1969) regresyonundan yararlanılarak ilgili modellerden hangisinin gerçekleşen volatilitéyi daha

başarılı bir şekilde öngördüğü analiz edilmiştir. Bu kapsamdaki bulgular sırasıyla Tablo 5 ve 6'da sunulmuştur. Bulgular incelendiğinde MAE ile MSE kriterlerinin Dolar-TL kuru için en uygun modelin AR(1)-DCC-FIAPARCH(1,d,1) modeli olduğu, MAPE kriterinin ise en uygun modelin AR(1)-GOGARCH-NLS modeli olduğu sonucuna işaret ettiği görülmektedir. Mincer-Zarnowitz (1969) regresyonuna ait sonuçlar incelendiğinde de bulguların belirgin bir şekilde Dolar-TL için en uygun modelin AR(1)-DCC-FIAPARCH(1,d,1) modeli olduğu sonucuna işaret ettiği anlaşılmaktadır. Tüm bu bulgular birlikte değerlendirildiğinde Dolar-TL kurunun volatilitésinin modellenmesinde en iyi performansı AR(1)-DCC-FIAPARCH(1,d,1) modelinin sergilediği anlaşılmaktadır. Euro-TL kuruna ait sonuçlar incelendiğinde MAE ile MSE kriterlerinin Euro-TL kuru için yine en uygun modelin AR(1)-DCC-FIAPARCH(1,d,1) modeli olduğu, MAPE kriterinin ise en uygun modelin AR(1)-GARCH(1,1) modeli olduğu sonucuna işaret ettiği görülmektedir. Mincer-Zarnowitz (1969) regresyonuna ait sonuçlar ise belirgin bir şekilde Euro-TL için en uygun modelin AR(1)-DCC-FIAPARCH(1,d,1) modeli olduğu sonucuna işaret etmektedir. Tüm bu bulgular birlikte değerlendirildiğinde Euro-TL kurunun volatilitésinin modellenmesinde de en iyi performansı AR(1)-DCC-FIAPARCH(1,d,1) modelinin sergilediği anlaşılmaktadır.



Şekil 2. Dolar-TL Volatilitésini



Şekil 3. Euro-TL Volatilitesi

Tablo 5. Alternatif Modellerin Volatilité Öngörü Performanslarının Analizi

	MAE	MSE	MAPE
Dolar-TL			
AR(1)-GARCH(1,1)	1,364	184,7	885,8
AR(1)-FIGARCH(1,d,1)	1,307	181,0	866,5
AR(1)-DCC-FIAPARCH(1,d,1)	1,214	167,6	967,8
AR(1)-GO-GARCH-NLS	1,294	176,3	766,3
Euro-TL			
AR(1)-GARCH(1,1)	1,284	173,9	1028
AR(1)-FIGARCH(1,d,1)	1,307	174,9	1146
AR(1)-DCC-FIAPARCH(1,d,1)	1,159	155,9	1060
AR(1)-GO-GARCH-NLS	1,260	171,3	1085

Tablo 6. Mincer-Zarnowitz (1969) Regresyonuna Ait Sonuçlar

	R ²
Dolar-TL	
AR(1)-GARCH(1,1)	0.023066
AR(1)-FIGARCH(1,1)	0.023222
AR(1)-DCC-FIAPARCH(1,1)	0.059553
AR(1)-GO-GARCH-NLS	0.021305
Euro-TL	
AR(1)-GARCH(1,1)	0.022587
AR(1)-FIGARCH(1,1)	0.022940
AR(1)-DCC-FIAPARCH(1,1)	0.066814
AR(1)-GO-GARCH-NLS	0.021260

SONUÇ

Son dönemlerde gerek yurtiçi gerekse yurtdışı gelişmelere bağlı olarak hem Dolar-TL hem de Euro-TL kurlarının volatilité değerlerinde önemli artışlar yaşanmıştır. Bu tür bir konjunktürde döviz kurlarına dönük olarak portföy yönetimi, piyasa riski analizi ve hedging işlemlerinin

önemi artmıştır. Fakat bu tür finansal analizlerden beklenen etkinliğin elde edilebilmesi için bu tür analizler için temel parametrelerden biri olan volatilité parametresinin dođru bir şekilde tahmin edilmesi gerekmektedir. Bu nedenle bu alıřmada gnlk veriler kullanılarak Dolar-TL ve Euro-TL kurlarının volatilitesi modellenmiřtir. Analizlerde hem AR(p)-GARCH (1,1) modeli ile AR(p)-FIGARCH (1,d,1) modelinden oluřan tek deđiřkenli GARCH modellerinden hem de AR(p)-DCC-FIAPARCH (1,d,1) modeli ile AR(p)-GO-GARCH-NLS modelinden oluřan ok deđiřkenli GARCH modellerinden yararlanılmıřtır. İlgili tek ve ok deđiřkenli GARCH modellerinin volatilité ngr performanslarının analizinde MAE, MSE ve MAPE kriterlerinin yanı sıra Mincer-Zarnowitz (1969) regresyonuna da yer verilmiřtir. alıřma bulguları hem Dolar-TL'nin hem de Euro-TL'nin volatilitésinin modellenmesinde en uygun modelin AR(p)-DCC-FIAPARCH (1,1) modeli olduđu sonucuna iřaret etmektedir. alıřma bulgularının reel ve finansal sektr ile bireysel ve kurumsal yatırımcılar aısından dviz kuru riskinin ynetilmesine dnk olarak nemli bilgiler ierdiđi ifade edilebilir.

KAYNAKLAR

- Baillie, R.T., Bollerslev, T. & Mikkelsen, H.O. (1996). Fractionally Integrated Generalized Autoregressive Conditional Heteroskedasticity. *Journal of Econometrics*, 74, 3–30.
- Bollerslev, T. & Wooldridge, J.M. (1992). Quasi-Maximum Likelihood Estimation and Inference in Dynamic Models with Time-Varying Covariances. *Econometric Reviews*, 11, 143-172.
- Bollerslev, T. (1986). Generalized Autoregressive Conditional Heteroskedasticity. *Journal of Econometrics*, 31, 307-327.
- Boswijk, H.P. & van der Weide, R. (2006). Wake Me up Before You GO-GARCH. Tinbergen Institute Discussion Paper, No. 06-079/4, Tinbergen Institute, Amsterdam and Rotterdam.
- Engle, R. (2002). Dynamic Conditional Correlation. A Simple Class of Multivariate Generalized Autoregressive Conditional Heteroskedasticity Models. *Journal of Business and Economic Statistics*, 20, 339–350.
- Mincer, J. & Zarnowitz, V. (1969). "The Evaluation of Economic Forecasts," in J. Mincer, ed., *Economic Forecasts and Expectations*, New York: National Bureau of Economic Research.
- Mohamed, R.A.H. (2018). Using GO-GARCH for Modeling the Volatility Dynamics Among Indices in Stock Markets. *International Journal of Research and Reviews in Applied Sciences*, 37 (1), 1-21.
- van der Weide, R. (2002). GO-GARCH: A Multivariate Generalized Orthogonal GARCH Model. *Journal of Applied Econometrics*, 17, 549-564.

**EFFECTS OF PEDESTRIAN TRAFFIC CHANGES DUE TO COVID-19 PANDEMIC:
A CASE STUDY IN ANTALYA, TURKEY**

Ece Alagok

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Abstract

The COVID-19 pandemic has affected our daily transportation in many aspects. One of the important changes was experienced in the density of pedestrian traffic on the streets. The fact is that the number of pedestrians in transportation is used in demand forecasts and is effective in investment decisions such as the decision to open a new store on the street in metropolises. This study proposes that the shops planned to be opened on the streets were significantly affected by the pandemic due to pedestrian traffic changes. In addition, the decisions by the government at various stages of the pandemic (e.g., declaring lockdown and curfews) that may alter pedestrian traffic provide a diversity of pedestrian traffic data in our observation. The accuracy of our proposed hypothesis has been determined in light of the collected pedestrian traffic data on a street in Antalya before and during the COVID-19 outbreak restrictions. The observations were in the morning and resulted in 2 different scenarios: 1-Before COVID-19 restrictions, 2-During COVID-19 restrictions (School closed, School closed & +65 age ban, School closed & +65 age ban & -20 age ban, curfew). Recordings are categorized into male, female, male with dog, female with dog and child. The observations were compared with the default walking speeds by conducting input data analysis. Moreover, the pedestrian library of AnyLogic is used for our simulations. According to the results, the changes in pedestrian traffic reflect the shift of the investment judgments on a busy street.

Keywords: Pedestrian traffic, simulation, transportation, COVID-19 outbreak.

INTRODUCTION

The COVID-19 pandemic has had a societal impact on all of us. These changes have also altered our social behavior. Curfews in the COVID-19 pandemic process are one of the most significant modifications during this time. Our walking and walking s have been affected during this period (Shamshiripour et al., 2020; Campisi et al., 2020; Hendrickson and Rilett, 2020; Hunter et al., 2021; Przybylowski et al., 2021). We used to be allowed to walk down the street without limits before COVID-19, but that changed with the bans (Campisi et al., 2020; Bucsky, 2020; Aloï et al., 2020; Combs and Pardo, 2021). When our walking hours on

the streets were restricted, it had a negative impact on shop owners and cafes on the street (Clifton et al., 2016; Chen and Zhou, 2016). The reason for that is that the number of pedestrians is used in demand forecasts and is influential in investment decisions such as opening a new store on the street in large cities (Guo and Loo, 2013; Ferrer et al., 2015; Su et al., 2019). Additionally, the decisions by the government at various stages of the pandemic (e.g., declaring lockdown and curfews) provide a diversity of pedestrian traffic data in our study (Elavarasan and Pugazhendhi, 2020; Zafri et al., 2021). This research was supported by creating a simulation on Anylogic software to visually show the effects of COVID-19 and changes in pedestrian behavior (Anylogic.com). Our concern is, due to pedestrian traffic changes, the pandemic significantly affected the shops planned to be opened on the streets of Antalya. Here, this kind of research has never been done for any Antalya street. In addition, our motivation is as follows: 1) to prove the pandemic effect on pedestrian traffic in Antalya, disabling the entrepreneurship initiatives, and 2) to demonstrate how the changes in pedestrian traffic reflect the shift of the investment judgments on a large street in a large city of Antalya.

In this research, observations were completed on Antalya's Bülent Ecevit street, and data has been collected. One of the reasons for choosing this street is because it is one of Antalya's busiest streets, and the city's most famous shopping mall is located nearby. Bülent Ecevit street was observed 10 days before COVID-19 and 10 days during the period of COVID-19 pandemic bans. Data was collected via a one-hour observation on the street between 8:00 a.m. and 9:00 a.m. Five different sorts of persons were shown while collecting data. Female, male, children, female with dog, and male with dog were all reported separately. Using Anylogic software, this observation was transferred to the simulation. Anylogic software was used to add the image of Bülent Ecevit street that was retrieved from a Yandex map (Yandex.com).

Anylogic was used to analyze real-life data. There have been 5 different pedestrian sources created. When the simulation is run, pedestrians can be seen walking on the image's sidewalks. The pedestrian activity was recorded from east to west and west to east. The pedestrian density and traffic on Bülent Ecevit Street are visually represented. 1 minute of real-life observation is followed by 1 minute of anylogic software. Female pedestrians are pink, male pedestrians are blue, child pedestrians are yellow, dog-walking women are orange, and dog-walking men are green in the simulation.

As can be seen in the simulation, pedestrian traffic has decreased significantly during COVID-19 period compared to the before COVID-19 period. Since certain sorts of people are subject to a curfew at certain times, street traffic and density have decreased significantly. The following sections of the research looked into the changes that occurred in this scenario in greater depth.

MATERIALS AND METHODS

The Anylogic software is used to simulate the street. The screenshot of the map is obtained from Yandex map and inserted to the Anylogic. Additionally, the data have been collected from a street in the morning between 8:00 a.m. and 9 a.m. for 1 hour in 2 directions (i.e. west to east and east to west) during a month.



Figure 1. Simulation Screen Shot of Anylogic Software

The number of pedestrians were recorded in 5 categories: female, male, child, female with dog and male with dog (Table 1, Table 2). In the simulation pedestrians were shown as follows; females in pink, males in blue, children in yellow, females with dog in orange, males with dog in green. Moreover, the total number of pedestrians before and during the COVID-19 pandemic in the street divided in categories and directions is shown below.

Table 1. Observations Recorded Before COVID-19 Pandemic.

Before Covid-19 Pandemic		
	West to East	East to West
Female	181	176
Male	167	147
Child	48	128
Female With Dog	16	6
Male With Dog	22	9
Total	434	466

Table 2. Observations Recorded During COVID-19 Pandemic.

During Covid-19 Pandemic		
	West to East	East to West
Female	95	101
Male	106	44
Child	2	3
Female With Dog	3	7
Male With Dog	6	6
Total	212	161

It can be clearly seen there has been a 30% to 50% decrease in the number of pedestrians in the street as a result of the lockdowns and curfews. Especially in the number of children there has been a significant drop. Furthermore, female pedestrians account for the majority of pedestrians before and during the pandemic. Before the pandemic, the least observed category was females with dog, while it has changed to children category during the pandemic. In this study, intensity is calculated as the number of pedestrians divided by the street length (in meters) and is measured in pedestrians/(hour*meter).

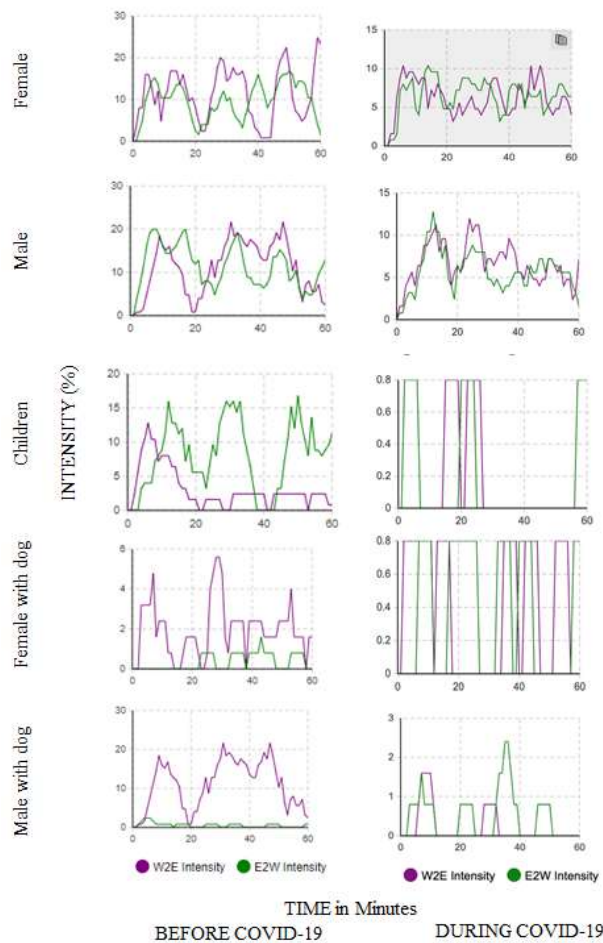


Figure 2. Pedestrian Flow Patterns by Categories Before COVID-19 and During COVID-19

In Figure 2, each category has different patterns before COVID-19 (on left part). In Figure 3, aggregated pedestrian traffic results with 3 significant peaks.

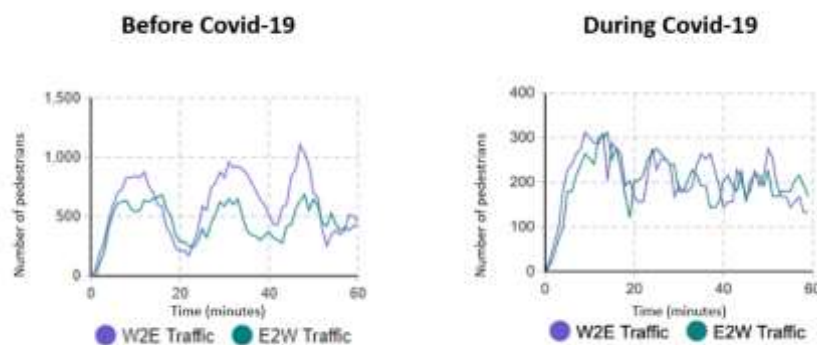


Figure 3. Number of Pedestrians Per Minute Before COVID-19 and During COVID-19

Time plots are drawn simultaneously as the simulation is animated. Looking closely at the numbers on the y-axis, it can be seen that before COVID-19 period, street pedestrian traffic is concentrated between 500 and 1000 pedestrians. Street pedestrian traffic drops to an average of 200 to 300 pedestrians during COVID-19 period. There is a pattern of pedestrian flow in the first graph. There are obviously 3 peaks may have resulted from the effect of commuters

that travels to work, childrens that travel to school and their mix. During COVID-19 significant peaks are absent instead there is an irregular pattern due to arbitrary ped traffic.

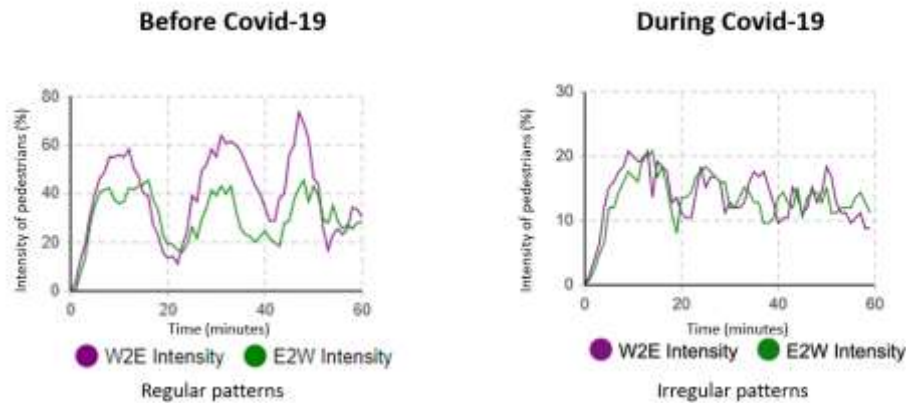


Figure 4. Pedestrian Flow Intensity (Pedestrians Per Minute Per Meter)

In the simulation built in Anylogic, creates a time plot of the average pedestrian intensity on a particular spot of the street, measured in pedestrians per minute per meter. While before the pandemic the intensity of the street is between 60-70% after the pandemic it is 15- 20% for both directions. The same conclusions can be extracted while considering intensity plots that could be more informative to decision makers since they give ideas about the percentage's changes in pedestrian traffic.

In the simulation, the density is shown in color scaled from 0 to 0.25. Before the restrictions (march 3rd – march 13th) the density of the street is between 0.15 to 0.20 while during restrictions (march18th – april 28th) it has dropped to 0.04 to 0.06.

Given below are the number of pedestrians in the traffic and the intensity in the 5 categories recorded.

CONCLUSION

In this research, On Antalya's Bülent Ecevit street, the pedestrian density and traffic are visualized. Real-life data was used to examine how pedestrian traffic changed as a result of the pandemic. Each category that has been recorded has different patterns before COVID-19 pandemic. There is a pattern of pedestrian flow in the before Covid-19 pedestrian traffic graph as it has been already mentioned. The effect of work and school opening time may have led to three peaks. Significant peaks are absent during Covid-19, creating an irregular pattern caused by arbitrary pedestrian traffic. Pedestrian traffic has reduced dramatically during the COVID-19 period compared to the pre-COVID-19 period, as seen in the simulation. Because some types of individuals are required to adhere to curfews at specific hours, street traffic and density have dramatically decreased. As a result, we can deduce that covid-19 has reduced street pedestrian traffic.

As future research, similar analyzes can be made with more scenarios in a larger region by expanding the dataset and looking at the anonymous Pandemic data.

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REFERENCES

- Aloi, A., Alonso, B., Benavente, J., Cordera, R., Echániz, E., González, F., ... & Sañudo, R. (2020). Effects of the COVID-19 lockdown on urban mobility: Empirical evidence from the city of Santander (Spain). *Sustainability*, 12(9), 3870.
- AnyLogic: Simulation Modeling Software Tools & Solutions for Business. (2022). Retrieved 5 April 2022, from
- Bucsky, P. (2020). Modal share changes due to COVID-19: The case of Budapest. *Transportation Research Interdisciplinary Perspectives*, 8, 100141.
- Campisi, T., Basbas, S., Skoufas, A., Akgün, N., Ticali, D., & Tesoriere, G. (2020). The impact of COVID-19 pandemic on the resilience of sustainable mobility in Sicily. *Sustainability*, 12(21), 8829.
- Chen, P., & Zhou, J. (2016). Effects of the built environment on automobile-involved pedestrian crash frequency and risk. *Journal of Transport & Health*, 3(4), 448-456.
- Clifton, K. J., Singleton, P. A., Muhs, C. D., & Schneider, R. J. (2016). Representing pedestrian activity in travel demand models: Framework and application. *Journal of transport geography*, 52, 111-122.
- Combs, T. S., & Pardo, C. F. (2021). Shifting streets COVID-19 mobility data: Findings from a global dataset and a research agenda for transport planning and policy. *Transportation Research Interdisciplinary Perspectives*, 9, 100322.
- Elavarasan, R. M., & Pugazhendhi, R. (2020). Restructured society and environment: A review on potential technological strategies to control the COVID-19 pandemic. *Science of The Total Environment*, 725, 138858.
- Ferrer, S., Ruiz, T., & Mars, L. (2015). A qualitative study on the role of the built environment for short walking trips. *Transportation research part F: traffic psychology and behaviour*, 33, 141-160.
- Guo, Z., & Loo, B. P. (2013). Pedestrian environment and route choice: evidence from New York City and Hong Kong. *Journal of transport geography*, 28, 124-136.
- Hendrickson, C., & Rilett, L. R. (2020). The COVID-19 pandemic and transportation engineering. *Journal of Transportation Engineering, Part A: Systems*, 146(7), 01820001.
- Hunter, R. F., Garcia, L., de Sa, T. H., Zapata-Diomedí, B., Millett, C., Woodcock, J., ... & Moro, E. (2021). Effect of COVID-19 response policies on walking behavior in US cities. *Nature communications*, 12(1), 1-9.
- Przybyłowski, A., Stelmak, S., & Suchanek, M. (2021). Mobility behaviour in view of the impact of the COVID-19 pandemic—Public transport users in Gdansk case study. *Sustainability*, 13(1), 364.
- Shamshiripour, A., Rahimi, E., Shabanpour, R., & Mohammadian, A. K. (2020). How is COVID-19 reshaping activity-travel behavior? Evidence from a comprehensive survey in Chicago. *Transportation Research Interdisciplinary Perspectives*, 7, 100216.
- Su, S., Zhou, H., Xu, M., Ru, H., Wang, W., & Weng, M. (2019). Auditing street walkability and associated social inequalities for planning implications. *Journal of transport geography*, 74, 62-76.

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Yandex Haritalar: tüm dünyanın ayrıntılı haritası. (2022). Retrieved 5 April 2022, from

Zafri, N. M., Afroj, S., Nafi, I. M., & Hasan, M. M. U. (2021). A content analysis of newspaper coverage of COVID-19 pandemic for developing a pandemic management framework. *Heliyon*, 7(3), e06544

PIPELINE FAILURE DETECTION AND MONITORING METHODES

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Abstract

Water is the most basic component required for the continuation of life on earth. Increasing of world population has brought about urban growth and industrialization, but all these developments have caused a great decrease in the water resources. In addition, the world has faced a water crisis with disasters such as global warming and climate change. For all these reasons, it is clearly seen that the limited water resources should be used in the most efficient ways. Annual volume of water loss worldwide is estimated at 126 billion cubic meters. Water losses are divided into two as real and apparent. Real losses are leaks in pipelines, reservoirs and transmission lines, and apparent losses are due to billing errors and water meter errors. The long-term use, disrepair and corrosion of transmission and distribution lines are factors that increase real water losses. In order to use the water in the most efficient way, locations of leaks in pipes should be determined and immediately repaired. Detecting of failure in pipelines could be performed as active or passive methods. In the passive method, it is determined according to the user complaints in the case of a loss or leakage in the water. In the active method, it is aimed to detect the leakage in the pipelines before the users. The active methods include many approaches such as acoustic methods, electromagnetic methods, physical methods, ultra-spectrum method, fiber optic methods, visual methods and multi-sensor methods. In this study, multi-sensor systems including smart ball, wireless sensor networks and wireless underground sensor networks applications, called smart pipeline monitoring, are investigated. These methods are real-time monitoring methods and not much water is lost at the moment of pipe leaks.

Keywords: Water Pipeline Monitoring; Wireless Sensor Networks; Wireless Underground Sensor Networks

A PRELIMINARY STATISTICAL ANALYSIS FOR DISCHARGE COEFFICIENT OF V-NOTCH WEIRS

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Abstract

The hydraulic properties of sharp-crested weirs, which are preferred in places that require sensitive discharge measurement, should be well known. The most important parameter for weirs is the calculation of the discharge coefficient, that is, the determination of the discharge capacity. The place where each type of weir can be used is different. For example, a sharp-crested weir can give optimum results where the discharge capacity is limited and the flow can be easily controlled. Streamlines are not uniform in flow over a V-notch weir. This is due to the narrowing of the weir nappe. Since the discharge of the V-notch weir is a complex phenomenon, the discharge coefficients determined by experimental studies should be well investigated. Thin-plate V-notch weirs are used in many water projects because they are simple and inexpensive water structures in practice. It is known that the discharge coefficient of the sharp-crested V-notch weir generally depends on the weir height and vertex angle. The aim of the present study is to develop an alternative statistical method compatible with the literature for the discharge coefficient of V-notch weirs. It is aimed to use the equation developed using the results of previous experimental studies to estimate the discharge coefficient with high precision. For this purpose, an optimum equation has been tried to be produced by using the SPSS software, which is an up-to-date statistical program, with detailed practices with nonlinear analysis. The accuracy of the equation developed with the relevant statistical analyzes is discussed in the present study. Thus, in order to determine the discharge capacity of the V-notch weir, it is recommended to use the equation developed in the present study, provided that the conditions are close, instead of making experimental measurements under laboratory conditions.

Keywords: V-notch weir, water structure, discharge coefficient, flow measurement, statistical analysis.

INTRODUCTION

Water structures that control water and enable it to be used for various purposes; they are used for purposes such as energy production, environmental regulation, water supply, flood control (Berkün, 2007). Weirs are hydraulic structures built to regulate the water level, control the flow and measure the flow in streams and open channels. Weirs have different geometric shapes. Sharp-edged weirs have rectangular, triangular and trapezoidal cross-section types (Emiroglu, 2010). Weirs are one of the oldest structures used to measure the flow of water in open channels. Weirs; In addition to flow measurement, they are hydraulic structures built to regulate the water level in open channels and streams, to control the flow and to safely discharge the flood waters in dams. Weirs; It is built perpendicular to the open canal axis and is generally used in aeration of water, storm water channels, sewage systems and irrigation systems (Emiroglu et al., 2014; Ghaznawi, 2019).

Generally; there are previous studies in the literature on sharp-edged weirs used in places where very sensitive discharge measurements are required, such as drainage systems, hydraulic laboratories, irrigation channels and sewer projects (Rajaratnam and Muralidhar, 1971; Bagheri and Heidarpour, 2010; Ferrari, 2010). Flow velocities from rectangular and triangular weirs were investigated theoretically and experimentally (Şeker, 2006). Hoseini (2013) experimentally investigated the flow over the triangular broad-topped weir. Triangular broad-topped weir with different geometry was used to determine the flow coefficient. A new type of weir, the sharp-edged V-notch weir, was investigated in 2018 by AgriDrain (Adair, Iowa). Thus, the advantages of the sharp-edged V-notch weir are discussed (Huffman et al., 2013; Shokrana and Ghane, 2021). It was concluded that the water jet leaving the weir top of the sharp-edged V-notch weir is advantageous since it flows without sticking on the downstream side of the weir. Thus, the accuracy of flow measurements increases (Walkowiak, 2006; Christianson et al., 2019). The discharge capacity of weirs is an important element in hydraulic engineering that can be determined by different measurement techniques.

It is assumed that all factors that need to be taken into account such as the flow coefficient (C_d) and viscous effects, surface tension, turbulence conditions, open channel geometry, weir and flow characteristics are taken into account (Aydin et al., 2011). Today, advances have been made with the development of computer science and mathematics. Most of the researchers conducted numerical studies for weir flow in open channels in the field of computational fluid dynamics (Bilhan et al., 2018; Aydin and Emiroglu, 2013). However, these numerical studies need to be supported by laboratory and field studies. Because the equations developed in previous studies are mostly empirical and vary according to the weir design and size.

In the present study, a new statistical method was developed using SPSS software for C_d values calculated using empirical equations developed in previous study (Saadatnejadgharahassanlou et al., 2017). By determining the accuracy of the equation developed in the present study, it is aimed to bring a comprehensive equation to the literature. Thus, it is aimed to easily calculate C_d for different values of parameters affecting the discharge coefficient of V-notch weirs.

MATERIALS AND METHODS

Sharp-edged weirs; the nappe is a vertical plate with a sharp crest on the top, placed perpendicular to the flow direction, and the nappe flows over the crest in a free jet. For the vertical component of the stream near the upstream face of the weir, the flow forms a lower surface and leaves the weir, forming a nappe. Some air collects under the nappe. If air collection is completely avoided, the resulting void causes pressure to build up on the structure. The schematic view of the sharp-edged triangular weirs is presented in Figure 1.

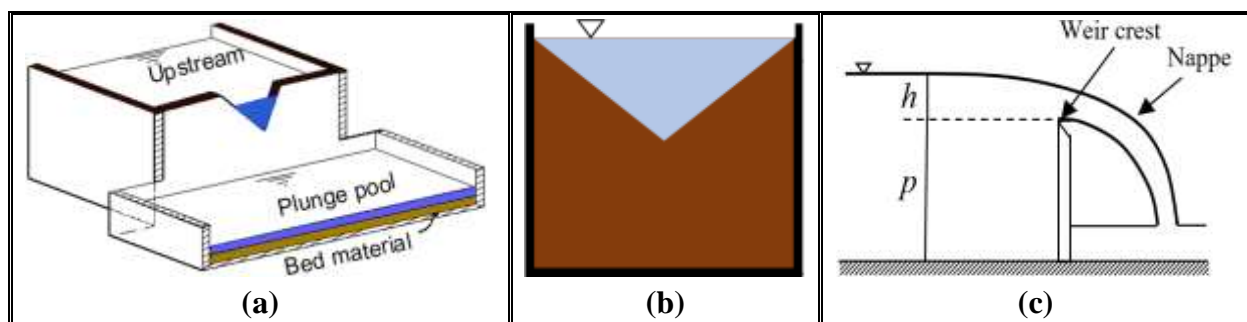


Figure 1. Schematic view of V-notch weir: a) sketch; b) frontal view; c) side view

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In the present study; a general and easy equation based on h/P was developed by using C_d values calculated using Eqs. (1-5), developed in the study of Saadatnejadgharahassanlou et al., (2017). This equation is more advantageous when compared to the equations developed in the previous study, since it is valid for all P/B values. Here; h =nappe height, P =crest height, B =channel width.

$$C_d=0.8038-0.3264\left(\frac{h}{P}\right) \text{ for } \frac{P}{B}=0.25$$

$$C_d=0.8134-0.3830\left(\frac{h}{P}\right) \text{ for } \frac{P}{B}=0.30$$

$$C_d=0.7781-0.3174\left(\frac{h}{P}\right) \text{ for } \frac{P}{B}=0.35$$

$$C_d=0.7783-0.3487\left(\frac{h}{P}\right) \text{ for } \frac{P}{B}=0.40$$

$$C_d=\left[107.2\left(\frac{P}{B}\right)^3-105.46\left(\frac{P}{B}\right)^2+33.8\left(\frac{P}{B}\right)-2.73\right]+\left[-292.13\left(\frac{P}{B}\right)^3+287.36\left(\frac{P}{B}\right)^2-92.72\left(\frac{P}{B}\right)+9.45\right]\left(\frac{h}{P}\right)$$

The C_d values in Table 1 were calculated using the Eqs. (1-5) developed in the study of Saadatnejadgharahassanlou et al., (2017). Thus, it was determined that C_d values changed depending on P/B and h/P values. It is seen that the C_d values vary between approximately 0.64 and 0.80.

Table 1. C_d values calculated using the equations developed in the study Saadatnejadgharahassanlou et al., (2017)

h	P	B	h/P	P/B	C_d for Eq. (1-4)	C_d for Eq. (5)
0.04	0.1	0.40	0.400	0.25	0.67324	0.66994
0.04	0.15	0.60	0.267	0.25	0.71676	0.71454
0.04	0.20	0.80	0.200	0.25	0.73852	0.73684
0.04	0.25	1.00	0.160	0.25	0.75157	0.75022
0.04	0.30	1.20	0.133	0.25	0.76028	0.75914
0.04	0.35	1.40	0.114	0.25	0.76649	0.76552
0.04	0.40	1.60	0.100	0.25	0.77116	0.77029
0.04	0.45	1.80	0.089	0.25	0.77478	0.77401
0.04	0.50	2.00	0.080	0.25	0.77768	0.77698
0.04	0.55	2.20	0.073	0.25	0.78006	0.77942
0.04	0.60	2.40	0.067	0.25	0.78204	0.78144
0.04	0.65	2.60	0.062	0.25	0.78371	0.78316
0.04	0.70	2.80	0.057	0.25	0.78514	0.78463
0.04	0.75	3.00	0.053	0.25	0.78639	0.78590
0.04	0.80	3.20	0.050	0.25	0.78748	0.78702
0.04	0.85	3.40	0.047	0.25	0.78844	0.78800
0.04	0.90	3.60	0.044	0.25	0.78929	0.78888
0.04	0.95	3.80	0.042	0.25	0.79005	0.78966
0.04	1.00	4.00	0.040	0.25	0.79074	0.79036
0.04	0.10	0.33	0.400	0.3	0.66020	0.65655
0.04	0.15	0.50	0.267	0.3	0.71126	0.70870
0.04	0.20	0.67	0.200	0.3	0.73680	0.73477
0.04	0.25	0.83	0.160	0.3	0.75212	0.75042
0.04	0.30	1.00	0.133	0.3	0.76233	0.76085
0.04	0.35	1.17	0.114	0.3	0.76962	0.76830
0.04	0.40	1.33	0.100	0.3	0.77510	0.77388
0.04	0.45	1.50	0.089	0.3	0.77935	0.77823

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0.04	0.50	1.67	0.080	0.3	0.78276	0.78171
0.04	0.55	1.83	0.072	0.3	0.78554	0.78455
0.04	0.60	2.00	0.067	0.3	0.78786	0.78692
0.04	0.65	2.17	0.062	0.3	0.78983	0.78893
0.04	0.70	2.33	0.057	0.3	0.79151	0.79065
0.04	0.75	2.50	0.053	0.3	0.79297	0.79214
0.04	0.80	2.67	0.050	0.3	0.79425	0.79344
0.04	0.85	2.83	0.047	0.3	0.79537	0.79459
0.04	0.90	3.00	0.044	0.3	0.79637	0.79561
0.04	0.95	3.17	0.042	0.3	0.79727	0.79653
0.04	1.00	3.33	0.040	0.3	0.79808	0.79735
0.04	0.10	0.29	0.400	0.35	0.65114	0.64716
0.04	0.15	0.43	0.267	0.35	0.69346	0.69055
0.04	0.20	0.57	0.200	0.35	0.71462	0.71225
0.04	0.25	0.71	0.160	0.35	0.72732	0.72527
0.04	0.30	0.86	0.133	0.35	0.73578	0.73395
0.04	0.35	1.00	0.114	0.35	0.74182	0.74015
0.04	0.40	1.14	0.100	0.35	0.74636	0.74480
0.04	0.45	1.29	0.089	0.35	0.74988	0.74841
0.04	0.50	1.43	0.080	0.35	0.75271	0.75131
0.04	0.55	1.57	0.072	0.35	0.75501	0.75367
0.04	0.60	1.71	0.067	0.35	0.75694	0.75565
0.04	0.65	1.86	0.062	0.35	0.75857	0.75732
0.04	0.70	2.00	0.057	0.35	0.75996	0.75875
0.04	0.75	2.14	0.053	0.35	0.76117	0.75999
0.04	0.80	2.29	0.050	0.35	0.76223	0.76107
0.04	0.85	2.43	0.047	0.35	0.76316	0.76203
0.04	0.90	2.57	0.044	0.35	0.76399	0.76288
0.04	0.95	2.71	0.042	0.35	0.76473	0.76364
0.04	1.00	2.86	0.040	0.35	0.76540	0.76433
0.04	0.10	0.25	0.400	0.4	0.63882	0.63451
0.04	0.15	0.38	0.267	0.4	0.68531	0.68207
0.04	0.20	0.50	0.200	0.4	0.70856	0.70585
0.04	0.25	0.63	0.160	0.4	0.72251	0.72012
0.04	0.30	0.75	0.133	0.4	0.73180	0.72963
0.04	0.35	0.88	0.114	0.4	0.73844	0.73643
0.04	0.40	1.00	0.100	0.4	0.74343	0.74152
0.04	0.45	1.13	0.089	0.4	0.74730	0.74549
0.04	0.50	1.25	0.080	0.4	0.75040	0.74866
0.04	0.55	1.38	0.073	0.4	0.75294	0.75125
0.04	0.60	1.50	0.067	0.4	0.75505	0.75341
0.04	0.65	1.63	0.062	0.4	0.75684	0.75524
0.04	0.70	1.75	0.057	0.4	0.75837	0.75681
0.04	0.75	1.88	0.053	0.4	0.75970	0.75817
0.04	0.80	2.00	0.050	0.4	0.76086	0.75936
0.04	0.85	2.13	0.047	0.4	0.76189	0.76041
0.04	0.90	2.25	0.044	0.4	0.76280	0.76134
0.04	0.95	2.38	0.042	0.4	0.76362	0.76218
0.04	1.00	2.50	0.040	0.4	0.76435	0.76293

In the present study, a general formula for h/P was developed using the values in Table 1. In this context, analysis was performed with Nonlinear Regression using IBM SPSS Statistics software (Figure 2). A large number of analyzes were made and it was decided that the optimum equation would be $x_1+x_2 \times (h/P)$. Here; x_1 and x_2 are coefficients.



Figure 2. Establishment of the equation developed with IBM SPSS Statistics software

STATISTICAL RESULTS

In the present study, Eq. (6) was developed by using the Eqs. (1-5) developed in the study Saadatnejadgharahassanlou et al., (2017). The x1 and x2 coefficients of Eq. (6) were determined using SPSS software (Fig. 3a). The difference of Eq. (6) from Eqs. (1-5) is that *P/B* is neglected and the variable parameter is only *h/P*. The ANOVA results of Eq. (6) are presented in Fig. (3b).

$$C_d = 0.793 - 0.344 \left(\frac{h}{P} \right) \tag{6}$$

Parameter Estimates					ANOVA ^a			
Parameter	Estimate	Std. Error	95% Confidence Interval		Source	Sum of Squares	df	Mean Squares
			Lower Bound	Upper Bound				
x1	,793	,003	,788	,799	Regression	43,485	2	21,743
x2	-,344	,018	-,381	-,307	Residual	,016	74	,000
					Uncorrected Total	43,501	76	
					Corrected Total	,088	75	

(a)
(b)

Figure 3. SPSS software findings: a) estimated parameters; b) ANOVA findings

Figure (4a) presents the *C_d* values calculated for Eqs. (1-4) of the previous study (Saadatnejadgharahassanlou et al., 2017) and Eq. (6) developed in the present study. Figure (4b) presents the *C_d* values calculated for Eq. (5) of the previous study (Saadatnejadgharahassanlou et al., 2017) and Eq. (6) developed in the present study. In Figure (4a), *C_d* values for Eq. (1) vary between 0.6732 and 0.7907, while *C_d* values for Eq. (6) vary between 0.6554 and 0.7792. In Figure (4a), *C_d* values for Eq. (2) vary between 0.6602 and 0.7981, while *C_d* values for Eq. (6) vary between 0.6554 and 0.7792. In Figure (4a), *C_d* values for Eq. (3) vary between 0.6511 and 0.7654, while *C_d* values for Eq. (6) vary between 0.6554 and 0.7792. In Figure (4a), *C_d* values for Eq. (4) vary between 0.6388 and 0.7644, while *C_d* values for Eq. (6) vary between 0.6554 and 0.7792. In Figure (4b), *C_d* values for Eq. (5) vary between 0.6345 and 0.7974, while *C_d* values for Eq. (6) vary between 0.6554 and 0.7792.

DISCUSSION

Figure 5 shows that there is a good agreement between Eqs. (1-5) and Equation (6) developed from the present study, with the correlation coefficient (*R*²) being close to 1. Accordingly, it was concluded that Eq. (6), which was developed with only the *h/P* parameter without the *P/B* parameter in Eqs. (1-5), can be used safely. However, Eq. (6) is suggested to be supported by laboratory experiments.

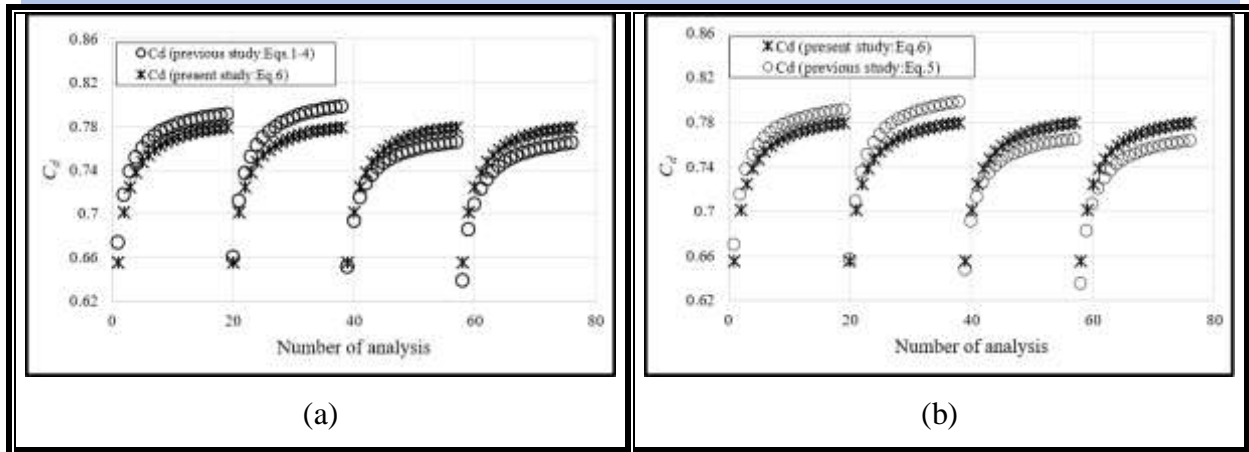


Figure 4. Calculated C_d values: a) Eqs. (1-4) with Eq. (6); b) Eqs. (5) with Eq. (6)

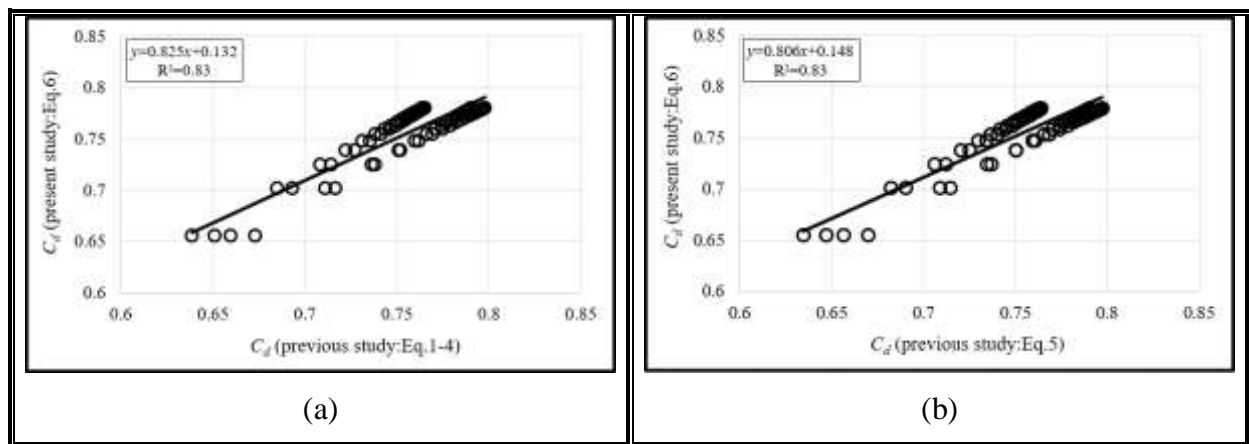


Figure 5. a) Variation of C_d values calculated from Eqs. (1-4) and C_d values calculated from Eq. (6); b) Variation of C_d values calculated from Eq. (5) and C_d values calculated from Eq. (6).

CONCLUSION

Within the scope of the present study, a statistical study was carried out to determine the discharge capacities of sharp-edged V-notch weirs. In this context, a new equation (Eq. 6) was developed to calculate the discharge coefficient (C_d) by evaluating the empirical formulas developed in the previous study. The conclusions drawn from the present study are summarized below:

- With the developed equation, results with good accuracy were obtained.
- It has been understood that the discharge coefficient depends on the ratio of nappe height to crest height.
- C_d values ranging from 0.6554 to 0.7792 were calculated for values ranging from 0.04 to 0.4 in the ratio of nappe height to crest height.
- With the developed statistical formula, it was concluded that the discharge coefficient for V-notch weirs can be calculated easily and with high accuracy.
- Considering the present study findings, parabolic, logarithmic etc. formulas need to be developed and statistical methods need to be improved in this regard.

REFERENCES

- Aydin, I., Altan-Sakarya, A.B., Sisman, C. (2011). Discharge formula for rectangular sharpcrested weirs, *Flow Meas. Instrum.* 22 (2011) 144–151.
- Aydin, M. C., & Emiroglu, M. E. (2013). Determination of capacity of labyrinth side weir by CFD. *Flow Measurement and Instrumentation*, 29, 1-8.
- Bagheri, S., Heidarpour, M. (2010). Flow over rectangular sharp-crested weir, *Irrig. Sci.* 28, 173–179.
- Berkün, M. 2007. Su yapıları. Birsen yayınevi, İstanbul, 667 s.
- Bilhan, O., Aydin, M. C., Emiroglu, M. E., & Miller, C. J. (2018). Experimental and CFD analysis of circular labyrinth weirs. *Journal of Irrigation and Drainage Engineering*, 144(6), 04018007.
- Christianson, L. E., Christianson, R. D., Lipka, A. E., Bailey, S., Chandrasoma, J., McCoy, C.,... Cooke, R. A. (2019). Calibration of stainless steel-edged v-notch weir stop logs for water level control structures. *Appl. Eng. Agric.*, 35(5), 745-749.
- Emin Emiroglu, M., Cihan Aydin, M., & Kaya, N. (2014). Discharge characteristics of a trapezoidal labyrinth side weir with one and two cycles in subcritical flow. *Journal of Irrigation and Drainage Engineering*, 140(5), 04014007.
- Emiroglu, M. (2010). Estimating flow characteristics of different weir types and optimum dimensions of downstream receiving pool. *Journal of Hydrology and Hydromechanics*, 58(4), 245.
- Ferrari, A. (2010). SPH simulation of free surface flow over a sharp-crested weir, *Adv, Water Resour.* 33, 270–276.
- Ghaznawi, N. A. (2019). Geniş tepeli savak üzerinden geçen akımın sayısal ve deneysel modeli (Doctoral dissertation, Bursa Uludag University (Turkey)).
- Hoseini, S. H. 2014. Experimental investigation of flow over a triangular broad-crested weir. *ISH Journal of Hydraulic Engineering*, Vol. 20, No. 2, 230–237.
- Huffman, R. L., Fangmeier, D. D., Elliot, W. J., Workman, S. R., Schwab, G. O. (2013). Soil and water conservation engineering. American Society of Agricultural and Biological Engineers St. Joseph.
- Rajaratnam, N., Muralidhar D. (1971). Pressure and velocity distribution for sharp- crested weirs, *J. Hydraul. Res.* 9, 241–248.
- Saadatnejadgharahassanlou, H., Gharehbaghi, A., Mehdizadeh, S., Kaya, B., & Behmanesh, J. (2017). Experimental investigation of discharge coefficient over novel kind of sharp-crested V-notch weir. *Flow measurement and instrumentation*, 54, 236-242.
- Shokrana, M. S. B., & Ghane, E. (2021). An empirical V-notch weir equation and standard procedure to accurately estimate drainage discharge. *Applied Engineering in Agriculture*, 37(6), 1097-1105.
- Şeker, T. 2006. Kontrol yapıları arkasındaki açık kanal akımlarının sayısal ve deneysel analizi. Yüksek Lisans Tezi, ÇÜ Fen Bilimleri Enstitüsü, İnşaat Mühendisliği Anabilim Dalı, Adana.
- Walkowiak, D. K. (2006). ISCO open channel flow measurement handbook.

STATISTICAL STUDY ON DISCHARGE CAPACITY OF SHARP CRESTED RECTANGULAR WEIRS

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Abstract

Weir is a hydraulic structure that is widely used in practice. The flow characteristics of each weir type are different from each other. The jet width, jet thickness, jet impact velocity and angle, penetration depth, ventilation performances, jet trajectories etc. created by the free-falling jet in the downstream channel under the same flow conditions are different from each other. Thus, the discharge capacity will be different according to the type of weir. The discharge capacity of any weir depends on the discharge coefficient. Knowing the discharge coefficient in advance is very important in order to design the weir that will meet the necessary needs. The aim of the present study is to evaluate the previous studies on the discharge capacity of rectangular weirs, which are frequently used in open channels. Thus, it is planned to introduce a new statistical formula to the literature by evaluating the discharge coefficients obtained with the empirical formulas previously produced. In this context, an equation that can predict the discharge coefficient has been developed, taking into account the previous study findings in the literature. With this equation, which was developed using SPSS software, which is an up-to-date statistical program, it is ensured that the discharge coefficient of rectangular weirs can be estimated with high accuracy. The accuracy of the developed equation was determined by statistical methods and discussed. Thus, it is thought that useful findings are provided for engineers in practice. It is considered to contribute labor, time, economy, etc. of the present study in practice.

Keywords: Rectangular weir, open channel, hydraulic structure, discharge capacity, statistical study.

INTRODUCTION

Flow measurement in open channels plays an important role in terms of water usage conditions. It is very important to discharge the right amount of water depending on the measured flow. Flow measurement in open channels is usually done with weirs. Commonly used methods for determining discharge in an open channel; it is divided into two as direct and indirect determinations. Methods such as field velocity method, dilution techniques, electromagnetic and ultrasonic can be used for direct determination. Hydraulic structures such as weirs, channels, and gated structures can be used for indirect determination (Pandey et al., 2016).

Weirs are commonly used hydraulic structures to measure the discharge capacity in open channels. Weirs are widely used in irrigation channels, laboratories, open channels, dams, etc., where there are rapidly changing flows. The reason for the widespread use of weirs for this purpose is; their ease of construction, durability and more accurate measurement results. The weir has been used for flow measurement in open channels for many years (Aydin and

Emiroglu, 2013). Weir is a hydraulic structure that provides discharge by rising behind the flow and passing over it. By measuring the water height (nappe height) on the weir, the discharge capacity can be easily determined with an accurate method (Emiroglu et al., 2014). Excessive discharge may also cause scour in the downstream and damage the weir (Emiroglu et al., 2017; Tunc, et al., 2022). Some weir types used in practice; sharp crested rectangular weir, broad crested weir, V-notch weir, labyrinth weir, compound weir and minimum energy loss weir. (Pandey et al., 2016).

RECTANGULAR WEIR

A sharp crested rectangular weir is a hydraulic structure consisting of a thin vertical plate built perpendicular to the open channel to determine the discharge capacity. Sharp crested rectangular weir is sloped downstream to minimize contact with discharged water. The sluice plate thickness is taken to be approximately 5 times the plate thickness at the crest. The total plate thickness is taken as 2 mm. The slope on the downstream side is taken between approximately 45° and 60° . While determining the flow velocity, the nappe height measured from the distance between the weir and at least 3 to 4 times behind the nappe load is taken into account (Aydin et al., 2002; Pandey et al., 2016; Li and Han, 2022). Figure 1 presents the schematic view, front view and side view of the rectangular weir.

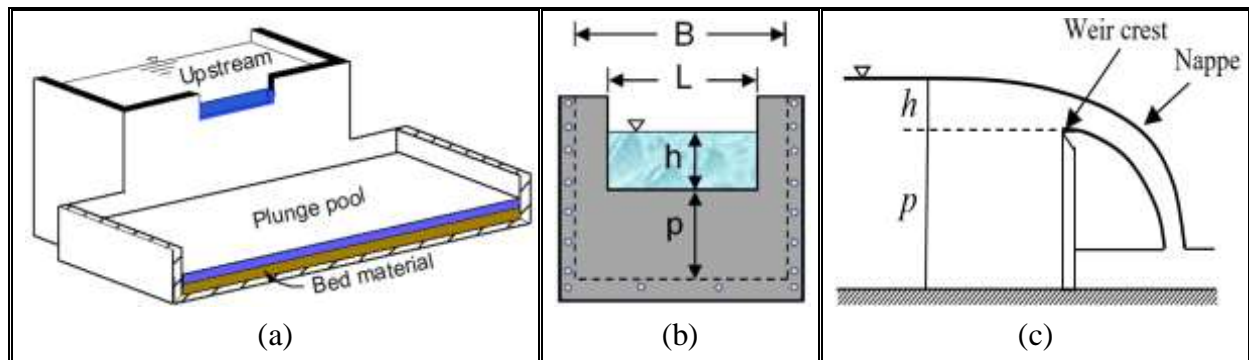


Figure 1. Schematic view of rectangular weir: a) sketch; b) frontal view; c) side view

here; B =open channel width, L =weir opening length, h =nappe height, and p =crest height.

The flow pattern on the sharp crested rectangular weir is complex and difficult to analyze. Because there are many factors affecting this flow, such as non-hydrostatic pressure distribution, turbulence, friction effects and approach flow conditions. For low head heights, viscosity and surface tension must also be taken into account. For this reason, it is suggested that the analytical relationship between the discharge (Q) and the height of drop (H) be obtained after appropriately changing it with the experimentally determined discharge coefficient (C_d). Contracted rectangular weir is a rectangular weir defined when the weir opening length is less than the channel width by a certain amount (Pandey et al., 2016).

THEORETICAL CONSIDERATION

For the estimation of the discharge coefficient (C_d) of rectangular weirs, empirical formulas have been developed by some researchers from past to present. The related equations for determining the discharge coefficient in rectangular weir flow belonging to previous studies in the literature are presented in Table 1. In this context, Rehbock (1929) conducted one of the first experimental studies and determined that the discharge coefficient (C_d) of suppressed

sharp crested rectangular weirs depends on the crest height (P) and nappe height (h) (Franzini and Finnemore, 1997). The proposed empirical formula is a function of the dimensionless parameter " h/P ". The equation proposed by Rehbock (1929) is given by Eq. (1).

$$\begin{aligned}
 C_d &= 0.611 \\
 &+ 0.08 \\
 &\times \left(\frac{h}{p}\right)
 \end{aligned} \tag{1}$$

Eq. (1) was stated to be valid for $P=0.1-1.0$ m, $h=0.025-0.6$ m and $h/P < 1.0$, and it was suggested to be used for values in this range (Rehbock, 1929).

Kindsvater and Carter (1957) developed a formula that calculates the discharge coefficient depending on the dimensionless parameters " h/p " and " L/B " by making slight corrections in order to ignore the effects such as viscosity and surface tension and to neglect the effects of Re number and We number (Sturm, 2001). With the developed Eq. (2), it is aimed to calculate the C_d coefficient for suppressed sharp crested rectangular weirs.

$$\begin{aligned}
 C_d &= 0.602 \\
 &+ 0.075 \\
 &\times \left(\frac{h}{p}\right)
 \end{aligned} \tag{2}$$

Eq. (2) was stated to be valid for $P < 9$ cm, $h/P < 2$, and it was suggested to be used for values in this range (Rehbock, 1929).

Swamee (1988) suggested Eq. (3) for suppressed sharp crested rectangular weirs (Naderi et al., 2014). It has been stated that the proposed equation can be used for sharp-crested, narrow-crested, broad-crested and long-crested weirs (Gharahjeh, 2012).

$$\begin{aligned}
 C_d &= 0.611 \\
 &+ 0.075 \\
 &\times \left(\frac{h}{p}\right)
 \end{aligned} \tag{3}$$

Bagheri and Heidarpour (2010) have developed a polynomial formula that calculates C_d by conducting experimental research for sharp crested rectangular weir in free falls. They stated that the most appropriate approximation of C_d with Eq. (4) developed for suppressed sharp crested rectangular weir ($L=B$) is valid for $0 < h/P < 9$ range. (Gharahjeh, 2012).

$$C_d = 0.829 \times \ln \left(1 + \frac{0.73 \frac{h}{p} + 3.64}{6.11} \right) \quad (4)$$

Table 1. Discharge coefficient equations by the researchers. (Naderi et al., 2014).

<i>The researchers of previous studies</i>	<i>Equation</i>
Rehbock (1929)	$C_d = 0.611 + 0.08 \times \left(\frac{h}{p}\right)$
Kindsvater and Carter (1957)	$C_d = 0.602 + 0.075 \times \left(\frac{h}{p}\right)$
Swamee (1988)	$C_d = 0.611 + 0.075 \times \left(\frac{h}{p}\right)$
Bagheri and Heidarpour (2010)	$C_d = 0.829 \times \ln \left(1 + \frac{0.73 \frac{h}{p} + 3.64}{6.11} \right)$

STATISTICAL METHOD

In the present study, a statistical method was developed using IBM SPSS Statistics 22 software. In this context, data from previous studies were used to determine the discharge coefficient of rectangular weirs. While Rehbock, Kindsvater and Carter, Swamee developed similar empirical linear formulas, Bagheri and Heidarpour developed a logarithmic formula in their study. When the developed equations are examined, it is seen that the discharge coefficient in the rectangular weir flow depends on the nappe height (h) and crest height (p). Since the weir width is equal to the channel width, that is, it is not taken into account. The average of the discharge coefficient values obtained from the previous empirical formulas was taken for the fixed nappe height $h=0.05$ m and the crest height varying from 0.1 m to 1.0 m ($p=0.1-1.0$ m). The relevant values are presented in Table 2. Within the scope of the present study; a new formula was developed by analyzing average discharge coefficient values, nappe height values and crest height values.

The derivation of the formula developed within the scope of the present study from the SPSS software is as follows. First of all, the relevant data is defined and entered into the program from the "data view" tab. By selecting the "nonlinear regression" tab from the program, the discharge coefficient value C_d is defined as output, nappe height (h) and crest height (p) as input to the program. The formula to analyze the event is determined from the "model expression" section, and optimum results are obtained. After the analysis is completed, the iteration results are ordered and the optimum values of the coefficients in the equation are determined by the program. By determining the correlation coefficient of this equation in R^2 , the sensitivity of the equation is revealed. Screenshots of the SPSS program are presented in Figure 2.

Table 2. Discharge coefficient values and averages obtained from the relevant empirical formulas

The parameters			Rehbock (1929)	Kindsvater and Carter (1957)	Swamee (1988)	Bagheri and Heidarpour (2010)	Average C_d values
h (m)	p (m)	h/p	C_d	C_d	C_d	C_d	C_d
0.05	0.10	0.5000	0.6510	0.6395	0.6485	0.4179	0.5892
0.05	0.15	0.3333	0.6377	0.6270	0.6360	0.4079	0.5771
0.05	0.20	0.2500	0.6310	0.6208	0.6298	0.4028	0.5711
0.05	0.25	0.2000	0.6270	0.6170	0.6260	0.3997	0.5674
0.05	0.30	0.1667	0.6243	0.6145	0.6235	0.3977	0.5650
0.05	0.35	0.1429	0.6224	0.6127	0.6217	0.3962	0.5633
0.05	0.40	0.1250	0.6210	0.6114	0.6204	0.3951	0.5620
0.05	0.45	0.1111	0.6199	0.6103	0.6193	0.3943	0.5610
0.05	0.50	0.1000	0.6190	0.6095	0.6185	0.3936	0.5602
0.05	0.55	0.0909	0.6183	0.6088	0.6178	0.3930	0.5595
0.05	0.60	0.0833	0.6177	0.6083	0.6173	0.3926	0.5589
0.05	0.65	0.0769	0.6172	0.6078	0.6168	0.3922	0.5585
0.05	0.70	0.0714	0.6167	0.6074	0.6164	0.3918	0.5581
0.05	0.75	0.0667	0.6163	0.6070	0.6160	0.3916	0.5577
0.05	0.80	0.0625	0.6160	0.6067	0.6157	0.3913	0.5574
0.05	0.85	0.0588	0.6157	0.6064	0.6154	0.3911	0.5571
0.05	0.90	0.0556	0.6154	0.6062	0.6152	0.3909	0.5569
0.05	0.95	0.0526	0.6152	0.6059	0.6149	0.3907	0.5567
0.05	1.00	0.0500	0.6150	0.6058	0.6148	0.3905	0.5565

STATISTICAL RESULTS

The Eq. (5) was developed within the scope of the present study by using the C_d values obtained from the empirical formulas developed to determine the discharge coefficient of rectangular weirs in previous studies. This equation was developed with the SPSS program and the nappe height was taken as a constant value of $h=0.05$ m. According to the literature, $h>0.03$ m is sufficient (Novák and Čábelka, 1981). The crest height (p) was developed taking into account values ranging from 0.1 m to 1.0 m. It is seen that the obtained equation is similar to the equations obtained from previous studies (Rehbock, 1929; Kindsvater and Carter, 1957; Swamee, 1988), but the related dimensionless parameter (h/p) and the constant coefficient are different.

$$C_d = 0.553 + 0.073 \times \left(\frac{h}{p}\right) \quad (5)$$

The average of the C_d values obtained by Eq. (5) developed within the scope of the present study and the C_d values obtained from the equations developed in previous studies (Rehbock, 1929; Kindsvater and Carter, 1957; Swamee, 1988; Bagheri and Heidarpour, 2010) are shown in the same graph in Figure 3. It can be seen that all C_d values almost overlap. This shows that Eq. (5) developed in the present study is quite compatible with the previously determined C_d values evaluated in this study.

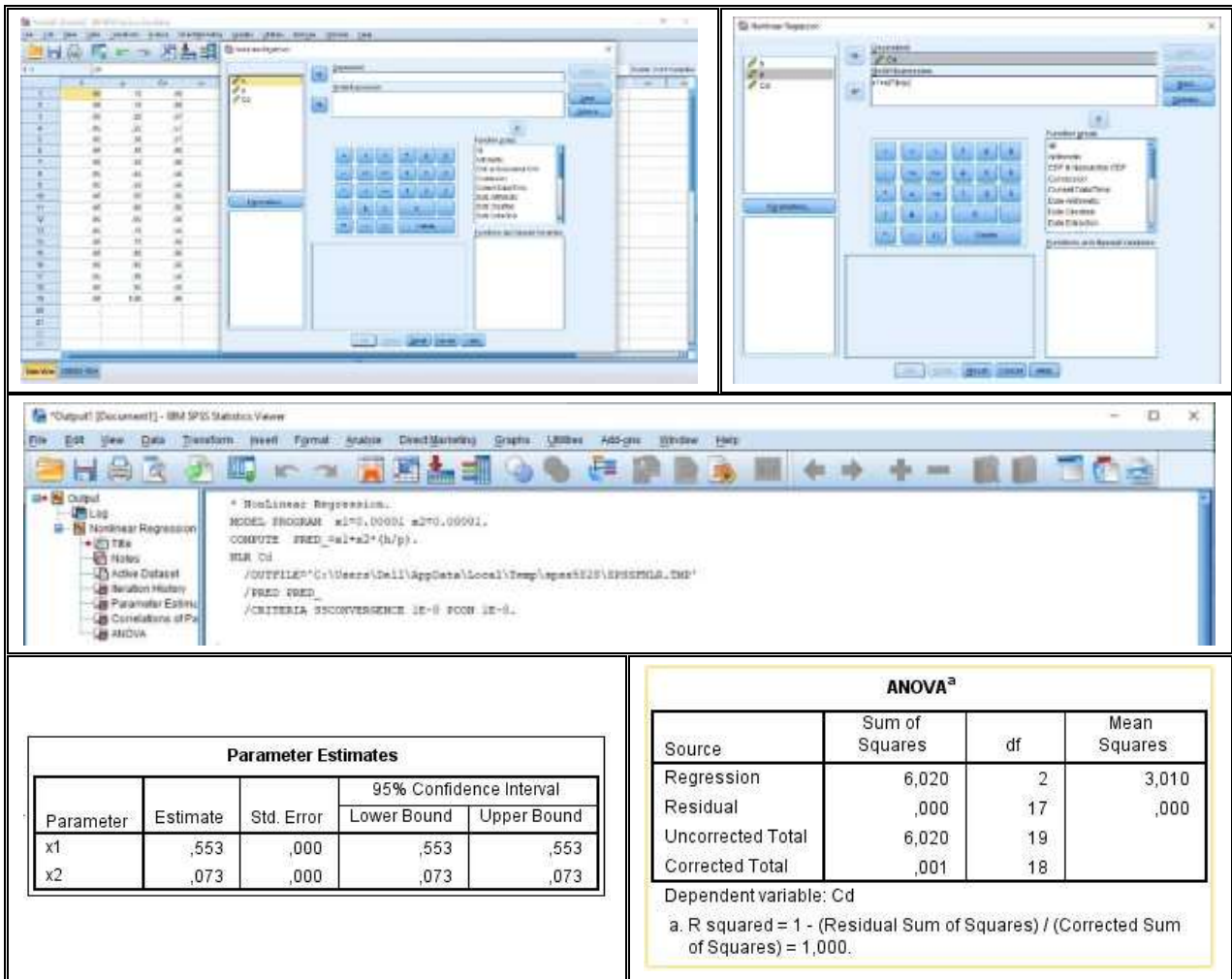


Figure 2. Screenshots of the SPSS program obtained while developing the present statistical method

In Figure 4, the C_d values obtained from the present study by Eq. (5); The variation with the average of empirical C_d values from previous studies is presented. Accordingly, the correlation coefficient was calculated as $R^2=0.999$. This shows that Eq. (5), developed within the scope of the present study, will give near-perfect results, taking into account the previous empirical formulas evaluated in the present study.

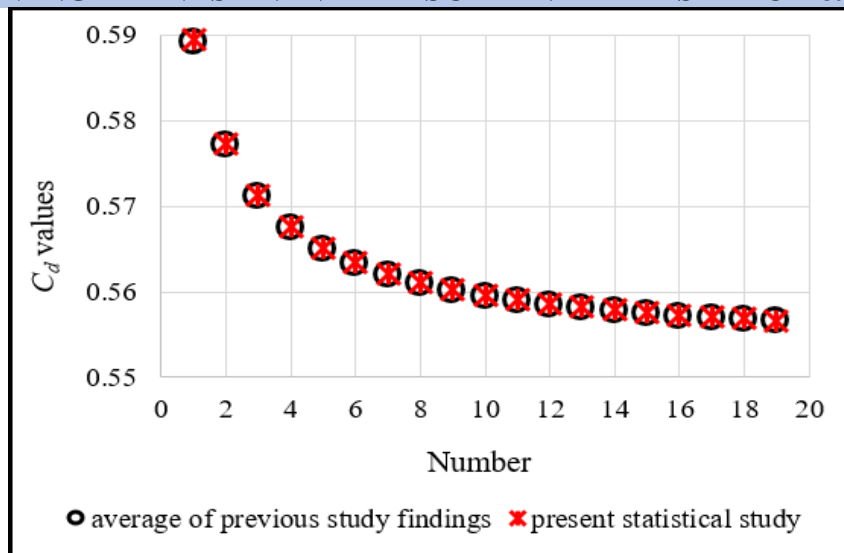


Figure 3. The relevant C_d values

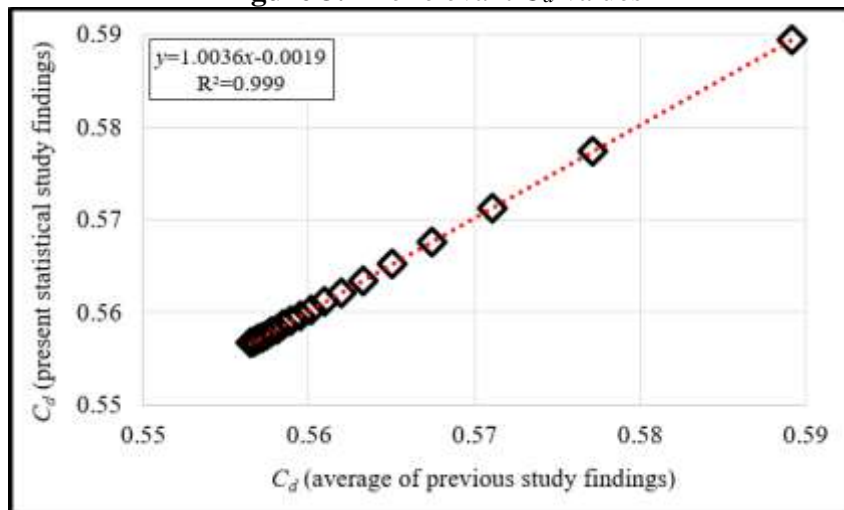


Figure 4. Variation of C_d values obtained by Eq. (5) and average of previous empirical C_d values

DISCUSSION

In Figure 5, C_d values from the present study and C_d values from previous studies evaluated in the present study are presented in the same graph. According to this; except for the C_d values taken from Bagheri nad Heidarpour (2010), it is observed that the others are quite close to each other. From Figure 5, it is observed that the C_d values increase linearly with the increase of the h/p value. Based on the previous study findings, it has been observed that the C_d values obtained from the linear equations vary between approximately 0.60 and 0.65, while the C_d values obtained from the logarithmic equation vary between 0.39 and 0.42. In the present study, it was observed that C_d values ranged from 0.56 to 0.59, since statistical analysis was performed by taking the average of all evaluated previous C_d values.

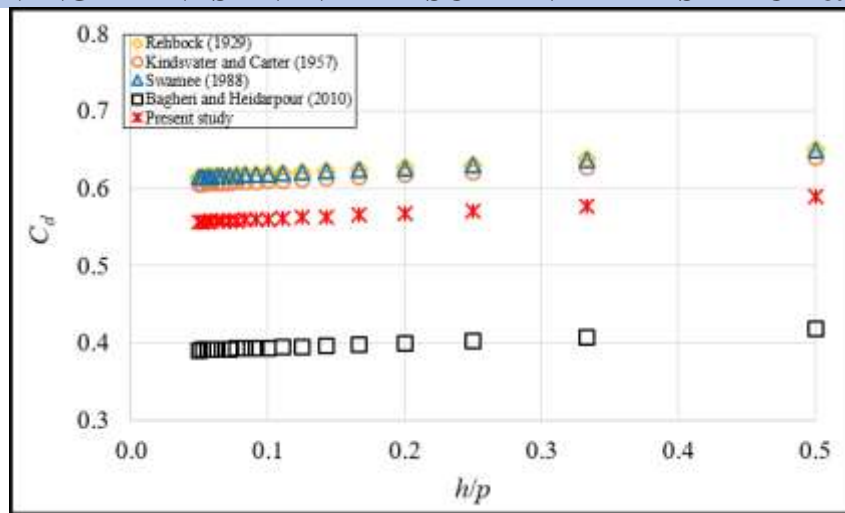


Figure 5. Comparison of C_d values from the present study and from the previous studies

CONCLUSION

Within the scope of the present study, a statistical study was carried out to determine the discharge capacities of rectangular weirs with opposite shrinkage and sharp edges placed in open channels. In this context, a new equation has been developed to calculate the discharge coefficient (C_d) by evaluating the empirical formulas developed in previous studies. The conclusions drawn from the present study are summarized below:

- ❖ With the developed equation, results in accordance with the literature were obtained.
- ❖ It has been understood that the discharge coefficient depends on the nappe height and crest height.
- ❖ For the values of “ h/p ” ranging from 0.05 to 0.5, “ C_d ” values ranging from approximately 0.56 to 0.59 were calculated.
- ❖ With the developed statistical formula, it was concluded that the discharge coefficient for rectangular weirs can be calculated easily and with high accuracy.
- ❖ Considering the present study findings, parabolic, logarithmic, etc. formulas need to be developed and statistical methods need to be improved in this regard.

REFERENCES

- Aydin I., Ger A.M., Hincal O. (2002). “Measurement of small discharges in open channels by slit weir”, *Journal of Hydraulics Engineering*, ASCE; Vol.128 (2):234–237.
- Aydin, M. C., & Emiroglu, M. E. (2013). Determination of capacity of labyrinth side weir by CFD. *Flow Measurement and Instrumentation*, 29, 1-8.
- Emin Emiroglu, M., Cihan Aydin, M., & Kaya, N. (2014). Discharge characteristics of a trapezoidal labyrinth side weir with one and two cycles in subcritical flow. *Journal of Irrigation and Drainage Engineering*, 140(5), 04014007.
- Emiroglu, M. E., Gogus, M., Tunc, M., & Islamoglu, K. (2017). Effects of antivortex structures installed on trapezoidal labyrinth side weirs on discharge capacity and scouring. *Journal of Irrigation and Drainage Engineering*, 143(6), 04017006.
- Franzini, J. B. and Finnemore, E. J. (1997). “Fluid Mechanics with Engineering Applications.” McGraw-Hill Company Inc.

- Gharahjeh, S. (2012). Experimental investigation on sharp-crested rectangular weirs (Master's thesis, Middle East Technical University).
- Kinsdvaer, C. E. and Cater, R. W. (1957). "Discharge Characteristics of Rectangular Thin-Plate Weirs." *Journal of Hydraulics Division*, Vol. 83, No. 6, December, 1-36.
- Li, J., & Han, J. (2022). Experimental study of discharge formulas for rectangular sharp-crested weirs under free flow condition. *Flow Measurement and Instrumentation*, 102115.
- Naderi, V., Nasrabadi, M. S., & Arvanaghi, H. (2014). Effect of height of sharp-crested weir on discharge coefficient. *International Journal of Basic Sciences & Applied Research*, 3(6), 325-330.
- Novák, P., Čábelka, J. (1981). *Models in hydraulic engineering*. Pitman Publishing, London, UK.
- Pandey, R., Mittal, S. K., & Choudhary, M. K. (2016). Flow characteristics of sharp crested rectangular weir: a review. *International Journal of Innovation, Science, Engineering and Technology*, 3(3), 171-178.
- Rehbock, T. (1929). "Discussion of precise weir measurement" by E.W. Schoder and K.B. Turner. ASCE, Vol. 93, 1143-1162.
- Sturm, T. W. (2001). "Open Channel Hydraulics". McGraw-Hill Book Company Inc., New York.
- Swamee, P. K. (1988). "Generalized Rectangular Weir Equations." *Journal of Hydraulic Engineering*, Vol.114, No. 8, 945-949.
- Tunc, M., Emiroglu, M. E., & Gogus, M. (2022). Local Scour at Triangular Labyrinth Side Weirs Located on an Alluvial Channel. *Journal of Irrigation and Drainage Engineering*, 148(5), 04022008.

INVESTIGATION OF THE MECHANICAL PROPERTIES AND FATIGUE
BEHAVIOR OF COMPOSITE MATERIALS WITH ISOPHTHALIC POLYESTER
MATRIX MANUFACTURED BY GLASS FIBER REINFORCEMENT

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Abstract

Isophthalic polyester composite materials (GRP), produced by reinforcing glass fiber, are widely used in the automotive, aviation, space and defense industries with the developing technology and increasing competition. These materials, which are called today's modern composites, come to the fore with their high strength and rigidity compared to their weight. In this study, the mechanical properties and fatigue behavior of isophthalic polyester composite materials produced by glass fiber reinforcement were investigated. Tensile and bending tests were performed to determine the mechanical properties of the composite material. These tests were carried out in a tensile compression device with a capacity of 20 tons. The determination of the fatigue behavior was carried out at 10 Hz frequency and room temperature (25°C). The glass fiber ratio of the isophthalic polyester composite material produced by reinforcing glass fiber is 15% and the glass fiber is homogeneously contained in the matrix. While the tensile strength of this composite material shows 687.11 MPa; The bending strength is 483.75 MPa and the % elongation values were found to be below 8%. As a result of the fatigue tests, the S-N curve of the composite material reaching the maximum stress cycle number was drawn and it was observed that it broke at 67MPa stress value at 1×10^7 cycles. The ratio of the fatigue strength limit of the isophthalic polyester composite material produced by reinforcing glass fiber to the maximum bending strength was calculated as 0.14. As a result of the fatigue test of the composite material, it was observed that the cracked surface was stripped from the fiber matrix and the isophthalic polyester resin was poured from the region between the fibers and was discharged from the matrix.

Keywords: Glass Fiber Reinforced Isophthalic Polyester, Composite Material, Tensile Strength, Bending Strength, Fatigue Strength

INTRODUCTION

Today, the demand for material diversity and superior properties in technological/advanced technological applications is increasing rapidly. Composite materials in this material class are formed by coming together along two or more interfaces that differ from each other in macro scale to form new materials, and the components that make up the composite material mostly preserve their properties (Kaya, 2016). In the 21st century, composite materials have found wide use and therefore there has been an increase in expectations from these materials. In order to meet the increasing expectations of composite materials as lighter, stronger, corrosion resistant, improved mechanical properties, high fatigue strength, working at high temperatures, components to meet the above properties were needed for composite production (Peters, 1998). In the production of composite materials, the reinforcing phase / reinforcement phase is the load carrier. Reinforcement phases carry 70-80% of this load and make composite materials more durable. As it is known, this strength depends on the integration of the reinforced phase and the matrix phase with each other and the bond strength. Among the reinforced phases, which can be in the form of particles or fibers, glass is the most used and has a low cost (Smith, t.y.). Glass fiber reinforced plastics (GRP) are the first modern polymer-based materials that are formed by reinforcing polyester resin with glass fiber and are widely used today. Basically, it consists of continuous or discontinuous glass fibers dispersed in the resin acting as a mold. Polyester resin, which is widely reinforced with with glass fiber, is a type of resin that is economical, resistant to chemical and environmental effects, and has a high wetting ability due to its low viscosity (Baker vd., 2004). Glass fiber, which is the ideal reinforcing element in polymer matrix composites, has high tensile strength, good chemical resistance, electrical insulation and economy (N/A, 1981). While the reinforced glass fibers increase the mechanical properties, the resin prevents crack formation during deformation and keeps the reinforcement elements together. Today, approximately 85% of the composite materials produced are glass fiber reinforced composites, and they are used in sectors such as construction, automotive, electrical-electronics, aviation, and maritime (Aricasoy, 2006; T. P. vd., 2014). Another important element in GRP composites is the filler material, which is an additional material. Filling materials directly affect the performance of the composite material, reducing the processing cost and producing ideal solutions. Filling materials are added to composite materials, increasing the flame resistance of the material, increasing the mechanical properties of the resin material, and creating a suitable interface in the load transfer mechanisms between the resin and the reinforced material. For these reasons, one of the filling materials used in GRP composites and the organic filling material is isophthalic polyester resin. Isophthalic polyester resins are resistant to chemicals and temperature, and have high mechanical strength (Ahmed vd., 2007).

The number of studies on glass fiber reinforced isophthalic polyester matrix composite materials is almost scarce in the literature. In addition, it is of great importance in terms of production, design and use to predict the damage of these composite materials, which have different areas of use, against violence and variable stresses. For this reason, this study, which examines the mechanical properties and fatigue behaviors together, comes to the fore with a great contribution to the literature.

MATERIAL AND METHOD

Firstly, tensile and bending tests were carried out to determine the mechanical properties of GRP composite materials. As a result of the tensile and bending test, maximum strength and yield and % elongation values were obtained. For the fatigue test, the thickness of the composite materials was 3 mm and the width of the thin section was 7 mm. Fatigue device using ANSYS and Simufact finite element programs, in which stress analyses are made, was

used in the calculations of fatigue life. The fatigue test was carried out at varying displacement values such as 0.2, 0.6, 3, 5.50 mm at a frequency of 10 Hz and at room temperature (25°C). Samples with broken or infinite number of cycles were obtained. Afterwards, the images of the broken samples were examined in detail with the SEM device.

EXPERIMENTAL RESULTS

The mechanical properties of the GRP composite is shown in Table 1. GRP composites did not show any yielding. While the tensile strength of the GRP composite is 697.11 MPa, its bending strength value is 484 MPa on average. The % elongation values of GRP composites are below 8%. While the maximum tensile strength of the GRP composite was high, the maximum bending strength showed the opposite behavior (Aydınlı, 2021).

Table 1. Tensile and Bending Test Results

Mechanical Properties			
Test Type	Yield Strength (MPa)	Maximum Strength (MPa)	Elongation (%)
Tensile Test	-	697,11	3,58
Bending Test	-	483,75	7

The displacement values determined in the curved plate fatigue test are converted to the applied deformation values with the help of Equation 1. Stress values were calculated by using the applied deformation values with the help of Hooke's law (Equation 2), since it is located in the elastic region since the long-life fatigue test was carried out.

$$\varepsilon = \frac{3dh}{2L^2} v \quad \text{Equation 1.}$$

$$\sigma = E\varepsilon \quad \text{Equation 2.}$$

As the fatigue parameter, the average stress is zero and the stress value calculated with the help of Equation 2 is called the maximum stress and corresponds to the horizontal axis in the S-N curve. As can be seen in Figure 2, the fatigue life of the specimens that have reached certain stress values and that have reached a certain number of cycles, with and without fracture, are shown. The GRP composite at a stretch of about 67 Mpa at a number of 1×10^7 cycles.

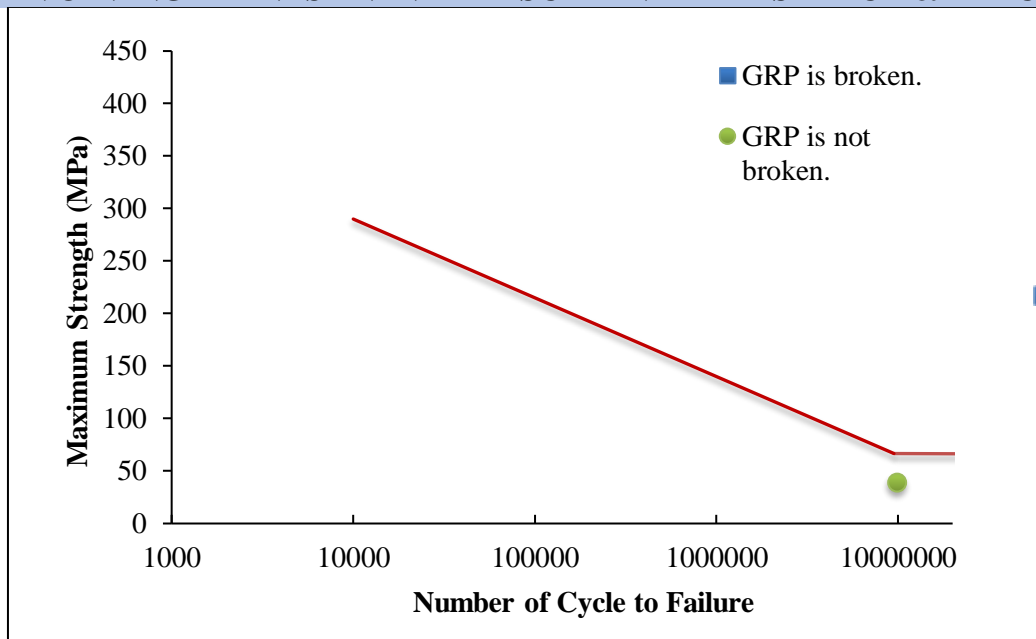


Figure 2. S-N curve (Maximum Stress-Number of Cycles) (Aydınlı, 2021).

The ratio of the fatigue strength limit of the isophthalic polyester composite material produced by reinforcing glass fiber to the maximum bending strength was calculated as 0.14.

The fractured surfaces appearance of the GRP reinforced composite after the fatigue tests are given in Figure 3. It has been observed that the reinforcement element of the GRP composite with a low fatigue strength limit is more tightly bonded to the resin.

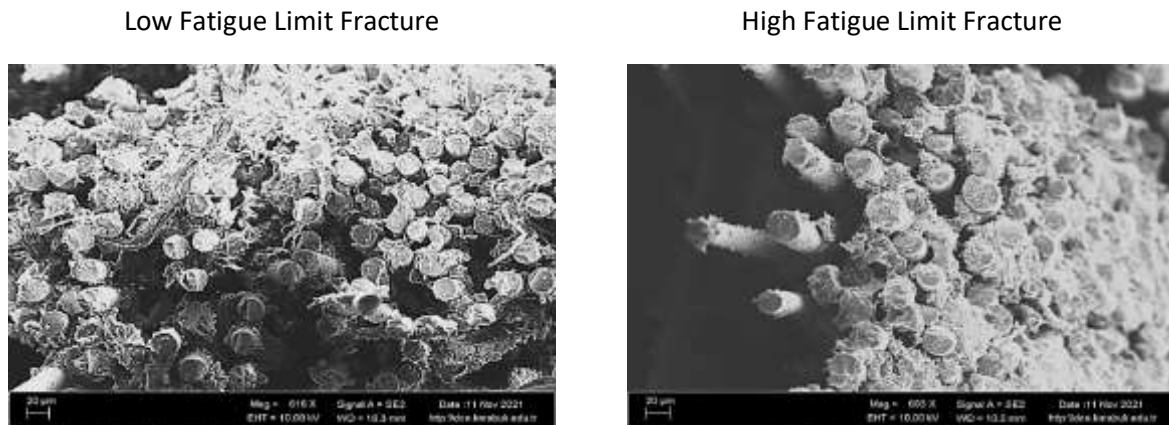


Figure 3. Broken Surface SEM Images of the GRP Reinforced Composite (Aydınlı, 2021).

At fractured at high stresses, the surface of the GRP composite exhibited a surface appearance where the glass fibers were broken by peeling off the resin matrix (Figure 3).

CONCLUSION

In this study, the mechanical properties and fatigue behavior of the isophthalic polyester composite materials reinforced with glass fiber reinforcement were investigated. The obtained conclusions are as follows:

- The glass fiber ratio of GRP composite profiles is 15% and it is homogeneously contained in the matrix.
- As a result of the tensile test, the maximum strength of the GRP composite was measured as 687.11 MPa. In the bending test, the maximum strength of the GRP

composite was measured as 483.75 MPa. GRP composites did not show yielding and the % elongation values were below 8%.

- After fatigue tests, GRP composite showed fatigue up to 10^7 cycle life. The fatigue strength of GRP composites was determined as 67 MPa.
- In the fatigue strength characteristics of GRP composite materials, it was observed that the fibers were stripped from the matrix and the isophthalic polyester resin was poured from the area between the fibers and was discharged from the matrix.
- The ratio of the fatigue strength limit of the isophthalic polyester composite material produced by reinforcing glass fiber to the maximum bending strength was calculated as 0.14.

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REFERENCES

- Ahmed, K., Vijayarangan, S., & Naidu, A. C. B. (2007). Elastic properties, notched strength and fracture criterion in untreated woven jute–glass fabric reinforced polyester hybrid composites. *Materials & Design*, 28, 2287-2294. <https://doi.org/10.1016/j.matdes.2006.08.002>
- Aricasoy, O. (2006). *Kompozit Sektör Raporu*. İstanbul Ticaret Odası.
- Aydınlı, E. A. (2021). *S355JR Kalite Çelik Profiller ile CTP Profillerin Mekanik Özellikleri ve Yorulma Davranışlarının Karşılaştırılması*. Karabük Üniversitesi.
- Baker, A., Dutton, S., & Kelly, D. (2004). *Composite Materials for Aircraft Structures* (2nd Edition). AIAA Education Series.
- Kaya, A. (2016). *Kompozit Malzemeler ve Özellikleri*.
- N/A. (1981). *Engineering Design Handbook-Discontinuous Fiberglass Reinforced Thermoplastics:(DARCOM-P 706-314)*. U.S. Army Materiel Command.
- Peters, S. T. (1998). *Handbook of Composites* (2th edition, ss. 24-25). Chapman & Hall.
- Smith, W. F. (t.y.). *Material Science and Engineering* (N. G. Kımkoğlu, Çev.). McGraw-Hill.
- T. P., S., Satheeshkumar, S., & Jesuarockiam, N. (2014). Glass fiber-reinforced polymer composites—A review. *Journal of Reinforced Plastics and Composites*, 33, 1258-1275. <https://doi.org/10.1177/0731684414530790>

A PREPARATORY STUDY ON THE STATISTICAL PREDICTION OF SILICA FUME CONCRETE STRENGTH

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Abstract

Mix design and fresh/hardened concrete properties of concretes containing silica fume are different from normal concretes. By using silica fume in concrete, many properties of concrete can be improved. Silica fume concretes are mostly; they are used for purposes such as high-strength concrete, concrete with high abrasion resistance, concrete resistant to harmful chemicals, high-strength lightweight concrete, repair and reinforcement of concrete elements. So, the basic properties of silica fume concrete are; high strength, impermeability, etc. Silica fume concretes do not have a specific mixing calculation method. It is recommended to make trial mixes by taking into account the mix recipes tried in previous experimental studies. The aim of the present study; to examine the effect of silica fume on concrete properties and to develop a statistical method by evaluating previous experimental study findings. For this purpose, nonlinear analysis was carried out with SPSS software, which is a current program, using the concrete compressive strength values of previous studies. Thus, the mixing ratios of silica fume concretes that do not have a specific mixture recipe can be easily determined with the formula developed in this study and the desired concrete properties will be achieved. Since 28-day compressive strength is the basic parameter in concrete design, 28-day concrete strengths are also taken into account in this study. Since the ratio of silica fume to be used in concrete is very important, it is planned to make accurate estimations with a sensitive equation developed in this study. With this study, the ratio of the basic materials that make up the concrete and the silica fume will be determined for the desired compressive strength in the concrete without making any experiments in the laboratory environment. Thus, it is thought that contribution will be made in practice.

Keywords: Silica fume concrete, compressive strength, mix design, statistical method, SPSS software.

INTRODUCTION

The fact that our country Turkey is located in an earthquake zone, that the building floors are problematic and that the building area will be exposed to natural events shows that the concrete to be produced should include strength and durability properties together. This will only be possible with the production of high performance concretes. Researchers have stated that mineral and chemical additives should be used to produce concrete with desired properties (Zhang, 1991; Sümer and Söyler, 2002; Bilgiç, 2009). With the use of these additives for concrete production in the construction sector, it has been possible to reduce the water-cement ratio without adversely affecting the workability and compressive strength of concrete (Demirboğa 1999; Kılıç et al., 2003).

Using mineral binder additives such as silica fume (SF), pulverized fly ash (FA) and ground grain blast furnace slag (BFS) in concrete mixes is the most effective way to produce high

strength concrete. These mineral additives, which provide environmental and economic benefits with their use, also improve the strength, durability and fresh concrete properties of concrete (Yazıcı et al., 2009; Bogas et al., 2014).

Silica fume has been the most widely used mineral additive in the production of high-strength concrete from past to present (Yücel et al., 2007; Kim et al., 2009). Demirboğa and Gül (2002) investigated the effect of using 10%, 20%, 30% by weight silica fume and fly ash instead of cement in concrete. Yazıcıoğlu and Bozkurt (2006) produced lightweight concrete by using CEM I 42.5 N as cement, silica fume and fly ash as mineral additives in their study. In high-strength concretes, binders obtained from a mixture of high-strength cement and sometimes mineral additives with high pozzolanic activity are used as binders. The most recommended as pozzolanic material is silica fume and fly ash (Aitcin 1998). Many researchers have suggested the use of silica fume between 7% and 10% of the total binder (Kayali, 2005; Chandra and Berntsson, 2002; Wilson and Malhotra, 1998). The use of silica fume increases the compressive strength and cohesiveness of concrete and decreases its permeability (Wilson and Malhotra, 1998). Demirel and Gönen (2008) investigated the effect of silica fume on the mechanical properties of carbon fiber reinforced lightweight concrete produced under high temperature. Similarly, Coşkun et al., (2008) experimentally and statistically investigated the effect of silica fume use on the strength properties of concrete produced at high temperatures. In Mortazavi et al., (2013), the compressive strengths of structural lightweight concretes containing 0%, 5%, 10%, 15%, 20% and 25% silica fume were determined by subjecting them to different curing times (7, 14, 28 and 42 days). Bogas et al., (2014) aimed to produce silica fume reinforced lightweight concretes with higher thermal insulation properties in order to reduce energy consumption and heat transfer of buildings. Yehia et al., (2015) investigated the effects of fly ash, silica fume and ground blast furnace slag used in high strength lightweight self-compacting concrete on concrete properties. Tuğrul Tunç et al., (2020), who developed a statistical method for determining the compressive strength of lightweight concretes produced using pumice aggregate and chemical additives, examined the tensile strength of lightweight concretes, taking into account the studies in the literature. Ahmad et al., (2019) conducted an experimental study to investigate the effect of silica fume on lightweight concrete properties. Moshtaghi Jafarabad et al., (2019) observed a positive change in the compressive strength of lightweight concretes with silica fume added.

In the present study, a new statistical method has been developed to calculate the mix design of the concrete whose strength properties increase with the use of silica fume, the silica fume ratio to be used and the concrete compressive strength. For this purpose, SPSS software, which is a current statistical program, and related data from previous studies were used. Thus, it is aimed to provide labor, time and economic gain. It is aimed to provide useful findings and a practical formula to the literature and application engineers.

STATISTICAL METHOD

In the present study, a new statistical method has been developed for the usability of silica fume (SF), which is one of the mineral admixtures, in concrete, and for the estimation of the mixture design and compressive strength (f_c) value. Silica Fume (SF) used in concrete production in Turkey is mostly supplied from Antalya Eti Elektro Metalurji A.Ş. Accordingly, the physical and chemical properties of SF are presented in Table 1. SF has the pozzolan feature, its positive effects on strength and durability appear after a long time. Their effects on machinability are functions of their fineness and grain geometry, not dependent on their pozzolanic activity (Yücel et al., 2007). SF is an important component of high-performance concrete and mortars and increases the workability, increases the adherence between cement paste and aggregate particles by reacting with calcium hydroxide, resulting in increased

strength and durability of concrete. The amount of SF is generally determined as 10% of the cement dosage (Altun, 2005). In this context, in the present study, the effect of using SF in certain proportions instead of cement to contribute to the amount of fine powder material on the concrete properties was investigated. In addition, it is thought that the use of such additives in concrete will contribute to the environment health by including recycling practices (Alyamaç and Tuğrul, 2014; Tuğrul Tunç, 2019).

Table 1. Chemical composition and physical properties of silica fume (Tuğrul Tunç, 2020)

Component name	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	Na ₂ O	K ₂ O	SO ₃	Cl ⁻
%	91.92	0.42	0.20	2.06	3.69	0.55	2.58	0.83	0.0301
Loss of ignition =% 1.68			Specific weight=2.50 g/cm ³			Blaine surface=296000 cm ² /g			

SPSS software was used for the numerical method developed in the present study. In the current study, the findings of previous studies in the literature (Hussain and Sastry, 2014; Parida, 2015; Benli et al., 2017) were analyzed for the statistical method developed. In Table 2, the mixture design and 28-day compressive strength values of previous studies are presented. According to this; Portland cement (PC) content varies between 403 kg/m³ and 630 kg/m³. The silica fume (SF) content ranges from 0 to 78 kg/m³. Aggregate (A) content varies between 1240 kg/m³ and 1934.72 kg/m³. Chemical additive (SP) content varies between 0 and 8 kg/m³. The water (W) content varies between 145.08 kg/m³ and 260.32 kg/m³. On the other hand, the 28-day compressive strength (f_c) value varies between 28.78 MPa and 68.00 MPa. These findings of previous studies were obtained by experimental measurements and tests.

Table 2. Mix design and f_c values from the previous studies

The previous studies	PC (kg/m ³)	SF (kg/m ³)	A (kg/m ³)	SP (kg/m ³)	W (kg/m ³)	f_c (28-day) (MPa)
Benli et al. (2017)	630.0	0.0	1306.24	7	245.70	62.00
	592.2	39.0	1324.00	8	233.54	68.00
	567.0	58.5	1282.00	8	250.20	58.00
	541.8	78.0	1240.00	8	260.32	59.00
Satyajit Parida (2015)	433.0	0.0	1806.00	0	186.00	36.62
	433.0	0.0	1806.00	0	186.00	36.62
	433.0	0.0	1806.00	0	186.00	32.70
	433.0	1.30	1806.00	0	186.00	28.78
	433.0	1.30	1806.00	0	186.00	38.37
	433.0	1.30	1806.00	0	186.00	38.37
	433.0	2.60	1806.00	0	186.00	36.19
	433.0	2.60	1806.00	0	186.00	34.88
	433.0	2.60	1806.00	0	186.00	38.37
	433.0	4.33	1806.00	0	186.00	38.37
	433.0	4.33	1806.00	0	186.00	40.55
Hussain and Sastry (2014)	433.0	4.33	1806.00	0	186.00	40.55
	403.0	0.0	1934.72	0	145.08	49.56
	403.0	20.15	1934.72	0	145.08	57.19
	403.0	40.30	1934.72	0	145.08	48.74
	403.0	60.45	1934.72	0	145.08	46.22

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403.0	4.03	1934.72	0	145.08	54.11
403.0	6.05	1934.72	0	145.08	55.25
403.0	8.06	1934.72	0	145.08	59.61
403.0	10.08	1934.72	0	145.08	47.00
439.64	0.0	1902.77	0	145.08	57.04
439.64	43.96	1902.77	0	145.08	44.58
439.64	4.40	1902.77	0	145.08	54.11
439.64	6.60	1902.77	0	145.08	55.25
439.64	8.80	1902.77	0	145.08	59.61
439.64	11.00	1902.77	0	145.08	47.00

With Equation (1) developed using SPSS software, results compatible with previous studies (Hussain and Sastry, 2014; Parida, 2015; Benli et al., 2017) were obtained. While Equation (1) was being developed, an appropriate formula was created in SPSS software as in Figure 1 and the coefficients were named as x1, x2, x3... Thanks to the program, these coefficients were determined and Equation (1) was developed.

$$f_c = 0.0000045 \times (PC^{2.4}) - 0.237 \times (SF^{0.4}) + 0.0000066 \times (A^{2.16}) + 6.53 \times (SP^{1.1}) - 0.84 \times (W^{0.75}) \quad (1)$$

RESULTS

The values, standard deviation and related values of the relevant coefficients of the developed Eq. (1) are presented in Figure (2). Accordingly, it is seen that the coefficients obtained from the SPSS program as the multiplier of each parameter in Equation (1) have quite different values.



Şekil 1. SPSS çıktısı: Denklem (1)'in oluşturulması

Parameter	Estimate	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
x1	4,452E-6	3,425	-7,144	7,144
x2	2,404	148535,643	-309837,518	309842,326
x3	-,237	1,353	-3,059	2,585
x4	,404	,636	-,922	1,731
x5	6,578E-6	34,937	-72,877	72,877
x6	2,157	665901,595	-1389044,229	1389048,543
x7	6,528	3116138,051	-6500143,543	6500156,599
x8	1,095	204748,584	-427096,968	427099,157
x9	-,842	1053328,992	-2197206,618	2197204,933
x10	,750	174354,648	-363696,672	363698,171

Figure 2. The values of related coefficients and the program outputs

The correlation string of the coefficients calculated in Eq. (1) is presented in Figure 3. The information in Figure (3) was obtained from the SPSS program.

	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10
x1	1,000	-1,000	-,033	-,127	1,000	-1,000	1,000	-1,000	-1,000	-1,000
x2	-1,000	1,000	,033	,127	-1,000	1,000	-1,000	1,000	1,000	1,000
x3	-,033	,033	1,000	,989	-,033	,033	-,033	,033	,033	,033
x4	-,127	,127	,989	1,000	-,127	,127	-,127	,127	,127	,127
x5	1,000	-1,000	-,033	-,127	1,000	-1,000	1,000	-1,000	-1,000	-1,000
x6	-1,000	1,000	,033	,127	-1,000	1,000	-1,000	1,000	1,000	1,000
x7	1,000	-1,000	-,033	-,127	1,000	-1,000	1,000	-1,000	-1,000	-1,000
x8	-1,000	1,000	,033	,127	-1,000	1,000	-1,000	1,000	1,000	1,000
x9	-1,000	1,000	,033	,127	-1,000	1,000	-1,000	1,000	1,000	1,000
x10	-1,000	1,000	,033	,127	-1,000	1,000	-1,000	1,000	1,000	1,000

Figure 3. Correlations of Parameter Estimates

Figure (4) shows the ANOVA outputs of the SPSS program. According to this; it is seen that the coefficient of prominence was calculated as $R^2=0.86$. The fact that R^2 is close to 1 indicates that the developed equation has the sensitivity to give high accuracy results.

In Figure 5, the f_c values of previous studies (Hussain and Sastry, 2014; Parida, 2015; Benli et al., 2017) and the f_c values obtained from Eq. (1) developed in the present study are presented in the same graph.

Source	Sum of Squares	df	Mean Squares
Regression	70112,064	10	7011,206
Residual	449,843	20	22,492
Uncorrected Total	70561,907	30	
Corrected Total	3098,422	29	

Dependent variable: f_c

a. R squared = $1 - (\text{Residual Sum of Squares}) / (\text{Corrected Sum of Squares}) = ,855$.

Figure 4. ANOVA outputs of the SPSS program

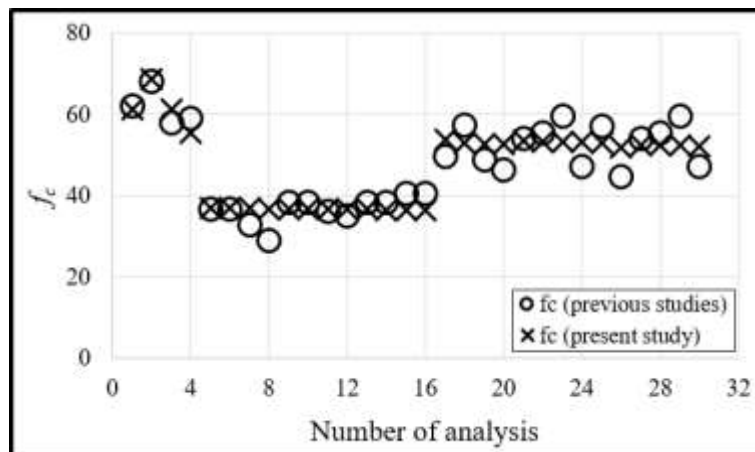


Figure 5. f_c values obtained from previous studies and Eq. (1) of the present study

It was concluded that there is a near-perfect agreement between the f_c values measured in previous studies and the f_c values calculated by Eq. (1) in the present study (Figure 6).

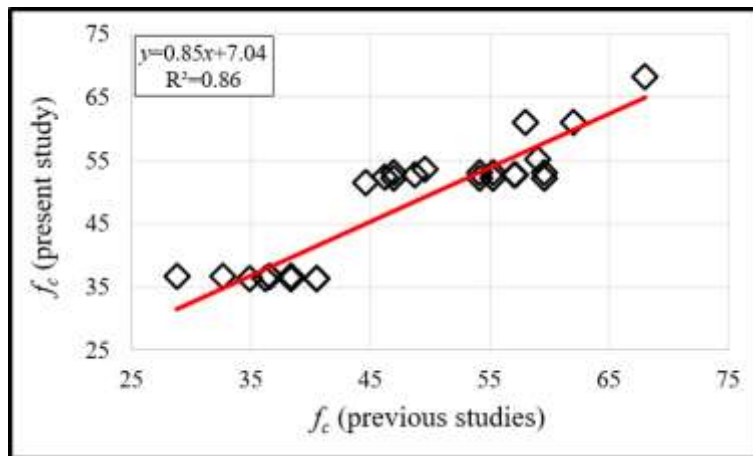


Figure 6. Comparison of f_c values measured from the previous studies and f_c values calculated from Eq. (1)

DISCUSSION

It is seen that the absolute relative deviation values of the f_c values calculated by Eq. (1) mostly vary between -0.2 and +0.2 (Figure 7). Thus, the fact that ARD values are close to 0 indicates that the accuracy of Eq. (1) developed in the present study will be high. This shows that Eq. (1) can be used safely. However, it is recommended to compare the present statistical study findings with the experimental results by conducting an experimental study with the same parameters tested. However, different statistical/numerical methods should be developed by performing similar analyzes with different software.

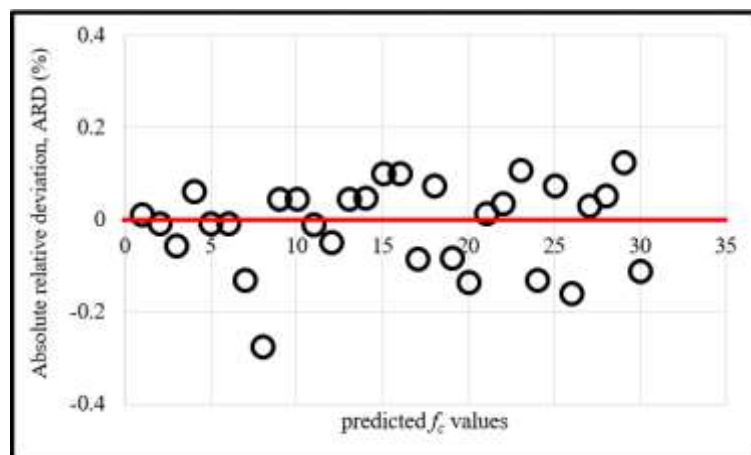


Figure 7. Absolute relative deviation (ARD) values of f_c values calculated by Eq. (1)

CONCLUSION

The conclusions of the present statistical study are summarized.

- In this study, it is thought that the compressive strength results of concrete can be calculated easily and accurately with the developed equation by nonlinear statistical analysis.
- A statistical model has been developed which can be useful for literature and application engineers.
- It is seen that it is possible to design both the preliminary concrete mixture design and the compressive strength of silica fume concrete without any testing.
- It is expected to provide labor, time savings and economic gains with this study.
- The statistical results from this study were found to be consistent with the previous experimental results.

REFERENCES

- Ahmad, M. R., Chen, B. and Shah, S. F. A. (2019). Investigate the influence of expanded clay aggregate and silica fume on the properties of lightweight concrete. *Construction and Building Materials*, 220, 253-266.
- Aitcin, P.C., 1998. *High-Performance Concrete*. E and FN SPON, 650p, London and Newyork.
- Altun, F. and Aktaş, B. (2013). Investigation of reinforced concrete beams behavior of steel fiber added lightweight concrete. *Construction and Building Materials*, 38, 575-581.
- Alyamaç, K. E., & Tuğrul, E. (2014, October). A durable, eco-friendly and aesthetic concrete work: marble concrete. In *11th International Congress on Advances in Civil Engineering (ACE 2014)* (Vol. 50, pp. 21-25).
- Benli, A., Karataş, M., & Bakir, Y. (2017). An experimental study of different curing regimes on the mechanical properties and sorptivity of self-compacting mortars with fly ash and silica fume. *Construction and Building Materials*, 144, 552-562.
- Bilgiç, M. (2009): "Investion of Properties of Prefabricated High Performance Lightweight Concrete." MSc Thesis, Suleyman Demirel University, Isparta/Turkey.
- Bogas, J. A., Nogueira, R. and Almeida, N. G. (2014). Influence of mineral additions and different compositional parameters on the shrinkage of structural expanded clay lightweight concrete. *Materials & Design* (1980-2015), 56, 1039-1048.
- Chandra, S. and Berntsson, L., (2002). "Lightweight Aggregate Concrete", Noyes Publications, USA, 1-430.
- Coşkun, A., Tanyıldızı, H. ve Yazıcıoğlu, S., 2007, Mineral Katkılı Betonun Aderans Dayanımına 800 °C' nin Etkisi, Pamukkale Üniversitesi Mühendislik Fakültesi Mühendislik Dergisi, 13, 3, Denizli, 347-351s.
- Demirboğa R ve Gül R 2002. The Effects of Expanded Perlite Agregate, Silica Fume and Fly Ash on the Thermal Conductivity of Lightweight Concrete. Civil Engineering Department Engineering Faculty, Ataturk University, Erzurum.
- Demirboğa R 1999. Silis dumanı ve uçucu külün perlit ve pomza ile üretilen hafif betonların özellikleri üzerindeki etkilerinin incelenmesi, Doktora tezi, Atatürk Üniversitesi, Fen Bilimleri Enstitüsü.
- Demirel, B. ve Gönen, T., 2008, Yüksek Sıcaklığın Karbon Lif Takviyeli Hafif Betonda Basınç Dayanımı ve Poroziteye Etkisi, Pamukkale Üniversitesi Mühendislik Fakültesi Mühendislik Bilimleri Dergisi, 14, 2, Denizli, 223228s.

- Hussain, S. T., & Sastry, K. V. S. G. K. (2014). Study of strength properties of concrete by using micro silica and nano silica. *International journal of research in Engineering and technology*, 3(10), 103-108.
- Kayali, O., 2005. Flashag New Lightweight Aggregate for High Strength and Durable Concrete. Submitted for Consideration in the 2005 World of Coal Ash, 1-19, Lexington.
- Kılıç, A., Atış, C.D., Yaşar, E., Özcan, F. 2003. "High-strength lightweight concrete made with scoria aggregate containing mineral admixtures", *Cement and Concrete Research*, 33, 1595-1599.
- Kim, G.Y., Kim, Y.S. ve Lee, T.G., (2009). " Mechanical Properties of High Strength Concrete Subjected to High Temperature by Stress Test" Transactions of Nonferrous Metals Society of China, 19: 128-133.
- Mortazavi, M. and Majlessi, M. (2013). Evaluation of silica fume effect on compressive strength of structural Lightweight Concrete containing LECA as lightweight aggregate. In *Advanced Materials Research* (Vol. 626, pp. 344-349). Trans Tech Publications Ltd.
- Moshtaghi Jafarabad, A., Madhkan, M. and Sharifi, N. P. (2019). Thermal and mechanical properties of PCM-incorporated normal and lightweight concretes containing silica fume. *Canadian Journal of Civil Engineering*, 46(7), 643-656.
- Parida, S. (2015). Effect of nano silica on the compressive strength of concrete (Doctoral dissertation).
- Sümer, M. ve Söyler, B., (2002). Yüksek Dayanımlı Beton Üretiminde Çimento ve Süperakışkanlaştırıcı Beton Katkı Maddelerinin Etkinliği. *Sakarya Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 6(3), 3-15.
- Tuğrul Tuñç, Esra. (2020). Yüksek Performanslı Hafif Betonlarda Aderans Özelliklerinin Belirlenmesi. PhD Thesis, Fırat University, Turkey.
- Tugrul Tunc, E. (2019). Recycling of marble waste: A review based on strength of concrete containing marble waste. *Journal of environmental management*, 231, 86-97.
- Tugrul Tunc, E., Alyamaç, K. E., & Ulucan, Z. (2020). A Numerical Approach to Estimate the Tensile Strength of Structural Lightweight Concrete. *El-Cezeri Journal of Science and Engineering*, 7(2), 690-699.
- Wilson, H.S. and Malhotra, V.M., 1998. Development of High Strength Lightweight Concrete for Structural Applications. *International Journal of Cement Composites and Lightweight Concrete*, 10,2, 79-90.
- Yazıcı, H., Yiğiter, H., Aydın, S. ve Yardımcı M.Y. (2009). Yüksek oranda çelik lif içeren yüksek performanslı kompozit malzeme geliştirilmesi. TÜBİTAK Proje No: 106M283 Raporu.
- Yazıcıoğlu, S. and Bozkurt, N., (2006). The investigation of the mechanical properties of structural lightweight concrete produced with pumice and mineral admixtures. *Journal of the Faculty of Engineering and Architecture of Gazi University*, 21(4), 675-680.
- Yehia, S., Farrag, S., Helal, K. and El-Kalie, S. (2015). Effects of Fly Ash, Silica Fume, and Ground-Granulated Blast Slag on Properties of Self-Compacting High Strength Lightweight Concrete. *GSTF Journal of Engineering Technology*, 3(3).
- Yücel, K.T., Özel, C., Küçüksille, E.U., Taşdelen, Erten, K., Somer, A., İzci, M., 2007. Katkılı Pompa Betonlarda, Beton Bileşenlerinin Taze Betonun Reolojik Performansına Ve Mekanik Özelliklerine Etkisinin Araştırılması, 104M568 sayılı TÜBİTAK hızlı destek projesi, 56s., Ankara.

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Zhang, M.H and Gjorff, O.E., 1991. Mechanical Properties of High Strength Lightweight Concrete. ACI Materials Journal-88(3), 700, 240-247.

A PRELIMINARY STATISTICAL STUDY FOR ESTIMATION OF FLY ASH CONCRETE STRENGTH

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Abstract

With the development of technology, energy use is increasing. For this reason, increasing industrial wastes are becoming an important threat to the environment. Fly ash, one of these wastes, occurs in large quantities in thermal power plants. Since it is not economical to destroy fly ash, it should be evaluated. The usability of fly ash in concrete has been investigated by many researchers. The usability of fly ash in concrete at rates of 20% to 50% has been determined. It has been observed that fly ash improves the properties of fresh and hardened concrete. Therefore, fly ash; It has been accepted as a mineral additive used in concrete in order to improve concrete properties, for economic contribution and to prevent environmental pollution. Thus, it is aimed to produce environmentally friendly concrete. Further research is needed on the utilization rate of fly ash, which significantly improves concrete durability. It is essential to determine the optimum ratio by performing detailed tests and analyzes for the fly ash usage ratio in concrete. In the present study, a numerical method has been developed to optimize the effect of fly ash utilization rate on concrete compressive strength by utilizing previous experimental study findings. In this study, it was tried to determine the required fly ash ratio to obtain the optimum compressive strength value with the equation developed using SPSS software. As a result, materials to be used to improve the compressive strength of fly ash concrete and fly ash were easily determined statistically by the equation developed in this study. With the statistical analysis, the validity and correctness of the equation were discussed and results that would contribute to the literature and practice were obtained.

Keywords: Concrete strength, eco-friendly concrete, fly ash, mix ratio, statistical study, SPSS software.

INTRODUCTION

The main purpose in the production of structural lightweight concrete is to keep the unit weight at the desired level by using lightweight aggregate (Taşdemir, 2003). Since aggregates make up approximately 70-80% of the concrete, it is a fact that the lightweight aggregates used have a significant effect on the fresh and hardened concrete properties of the produced lightweight concrete, and this has been studied by many researchers (Yang et al., 1996, Neville, 2002). In the literature, lightweight aggregates and high proportion of fly ash were added to cement to produce structural lightweight concretes (Chang and Shieh, 1996; Gesoğlu et al., 2004). Materials such as fly ash, blast furnace slag, expanded clay, and expanded perlite are materials that are produced artificially and used as lightweight aggregates (Aslam et al., 2016).

In Kabay et al., (2015) partial use of pumice powder and fly ash instead of cement in the mechanical properties of concrete mixtures was investigated. Using mineral binder additives such as silica fume (SF), pulverized fly ash (FA) and ground grain blast furnace slag (BFS) in

concrete mixes is the most effective way to produce high performance concrete. These mineral additives, which provide environmental and economic benefits with their use, also improve the strength, durability and fresh concrete properties of concrete (Bogas et al., 2014; Tugrul Tunc, 2019a). Demirboğa and Gül (2002) investigated the effect of using 10%, 20%, 30% by weight silica fume and fly ash instead of cement in lightweight concretes containing expanded perlite and pumice. A large amount of binder must be used to produce structural lightweight concrete (Weber and Reinhardt, 1997). In these concretes, binders obtained from a mixture of high-strength cement and sometimes mineral additives with high pozzolanic activity were used as binders. The most recommended as pozzolanic material is silica fume and fly ash (Aitcin 1998).

Mineral additives such as fly ash and silica fume can be beneficial in improving concrete-reinforcement adherence. These additives strengthen the transition zone between concrete and reinforcement and prevent the formation of micro cracks in this transition zone (Ersoy and Özcebe, 2001). Yeih et al., (2004) used different ratios of fly ash in concrete production to reduce the adherence loss of epoxy coated reinforcements. In a previous study (Tanyıldızı and Yazıoğlu, 2006), the use of mineral additives in concrete production was investigated by adding 15% fly ash and 10% silica fume by weight to cement in order to examine the effect of mineral additives on concrete-reinforcement adherence.

Most researchers recommend the use of a binder between 400 kg/m³ and 650 kg/m³. Especially in high strength lightweight concretes, it is recommended to use silica fume or fly ash together with cement to strengthen the cement matrix. The purpose of use of these pozzolanic materials; to increase ultimate strength and workability. Therefore; silica fume, fly ash, chemical additives, etc. are used to produce the required concrete type. The use of materials can be preferred by the producer. However; cement, aggregate and water content can also vary depending on the desired concrete type. Strength to be obtained from concrete according to the type and amount of material used, etc. test results may differ. Considering all these parameters, many input and output parameters appear in concrete production. By determining the function consisting of these parameters with statistical methods, information can be obtained about the type of concrete to be produced without spending too much workload (Tugrul Tunc, 2019b; Demirel et al. 2019; Tugrul Tunc et. al, 2021).

In the present study, the positive effects of using fly ash in concrete production to benefit the environment and economy are discussed. A statistical method has been developed with the SPSS program, which is an up-to-date software, in order to determine the concrete mix design that changes with the use of fly ash and the optimum fly ash ratio to be used. For this statistical method developed, the statistical study of Qadir et al. (2019) was used. An alternative equation was developed using the data and findings of Qadir et al (2019). Thanks to the equation developed in the present study, it is aimed to easily calculate the required mixture design and the amount of fly ash in order to reach the desired compressive strength value in concrete.

MATERIALS AND METHODS

For the statistical method developed using SPSS software in the present study, the statistical method and data developed in the study of Qadir et al. (2019) were used. In the study of Qadir et al. (2019), Eq. (1) was developed to calculate the compressive strength. According to the regression analysis performed by choosing a nonlinear model; an exponential equation is obtained. According to Eq. (1), the parameters on which the compressive strength depends are; water to cement ratio (w/c), curing time (t) and fly ash ratio (FA).

$$f_c = 7.8 \left(\frac{w}{c}\right)^{-0.75} (t)^{0.21} + 0.46 \left(\frac{w}{c}\right)^{-1.01} (t)^{0.25} (FA)^{0.3} \quad (1)$$

In the present study, Eq. (2) has been developed as an alternative to this equation. Eq. (2) is not exponential compared to Eq. (1). Eq. (2) consists of the sum of both the product of these parameters and the product of the coefficients obtained as output from the SPSS program, depending on the FA , w/c and t parameters.

$$f_c = 2.34 \times FA + 63.23 \times \frac{w}{c} + 0.78 \times t - 4.5 \times FA \times \frac{w}{c} - 0.002 \times FA \times t - 1.44 \times \frac{w}{c} \times t \quad (2)$$

While developing the statistical method, the draft of the optimum equation created after entering the data in the SPSS program is shown in Fig. (1). In Fig. 1, the outputs of the program; nonlinear regression, iteration history, parameter estimates, correlations of parameter estimates and ANOVA.



Figure 1. SPSS program outputs for Eq. (2) developed in the present study

In Fig. 2, parameter estimates and ANOVA findings from the SPSS program outputs are presented. According to this; the relevant coefficients of Eq. (2) are; it was calculated as $x1 \cong 2.34$, $x2 \cong 63.23$, $x3 \cong 0.78$, $x4 \cong -4.5$, $x5 \cong -0.002$, $x6 \cong -1.44$ (Fig. 2a). When the ANOVA outputs are examined; The sum of squares, df and mean squares values for regression, residual, uncorrected total and corrected total are shown in Fig. 2b.

Parameter Estimates					ANOVA ^a			
Parameter	Estimate	Std. Error	95% Confidence Interval		Source	Sum of Squares	df	Mean Squares
			Lower Bound	Upper Bound				
x1	2,335	,533	1,235	3,435	Regression	54990,752	6	9165,125
x2	63,225	7,693	47,348	79,103	Residual	534,582	24	22,274
x3	,781	,095	,585	,978	Uncorrected Total	55525,335	30	
x4	-4,496	1,268	-7,114	-1,879	Corrected Total	2555,763	29	
x5	-,002	,004	-,010	,006	Dependent variable: fc			
x6	-1,435	,240	-1,930	-,940	a. R squared = 1 - (Residual Sum of Squares) / (Corrected Sum of Squares) = ,791.			
(a)					(b)			

Figure 2. SPSS program outputs: a) the related values of estimated coefficients, b) ANOVA output

STATISTICAL RESULTS

The variation of f_c values calculated with Eq. (2) developed in the present study with f_c values calculated with Eq. (1) developed in the previous study (Qadir et al. 2019) is presented in Fig. 3. The graph in Fig. 3 was created with the Excel program. Thus, a linear equation of the form $y=0.94x+2.39$ is obtained. In addition, the correlation coefficient was determined as $R^2=0.81$. Therefore, it was concluded that the agreement between the f_c values is quite good.

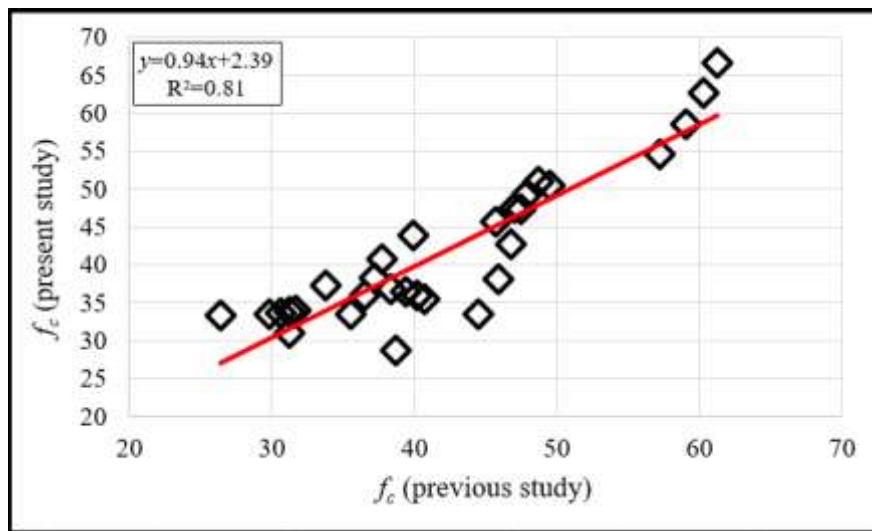


Figure 3. Variation of f_c values calculated with Eq. (2) from the present study with f_c values calculated with Eq. (1) from the previous study (Qadir et al., 2019)

In Figure 4, absolute relative deviation (ARD) values of f_c values estimated by Eq. (2) are presented. Accordingly, ARD values ranging from -0.3 to 0.3, f_c values calculated with Eq. (2) developed in the present study, and Qadir et al. (2019) shows that the deviation values calculated from the f_c values calculated with the statistical method developed in his study are quite small. This proves that the developed Eq. (2) has good accuracy.

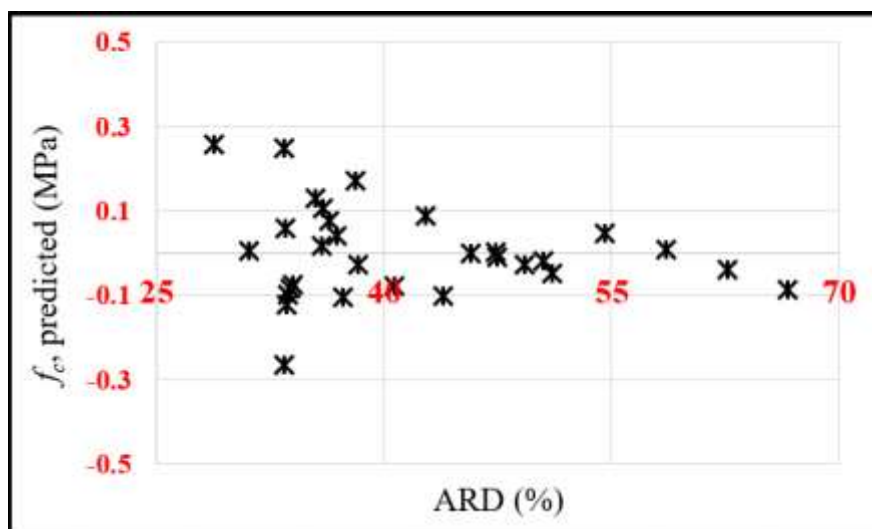


Figure 4. ARD values of f_c estimated by Eq. (2)

DISCUSSION

In Figure 5, Eq. (2) from the present study and the f_c values calculated from the previous study (Qadir et al., 2019) are presented in the same graph. It can be seen that the values almost coincide with each other. This is the statistical method developed in the present study by Qadir et al. (2019) shows its compatibility with the statistical method developed in his study. However, it is recommended to improve this study by analyzing it with experimental measurements.

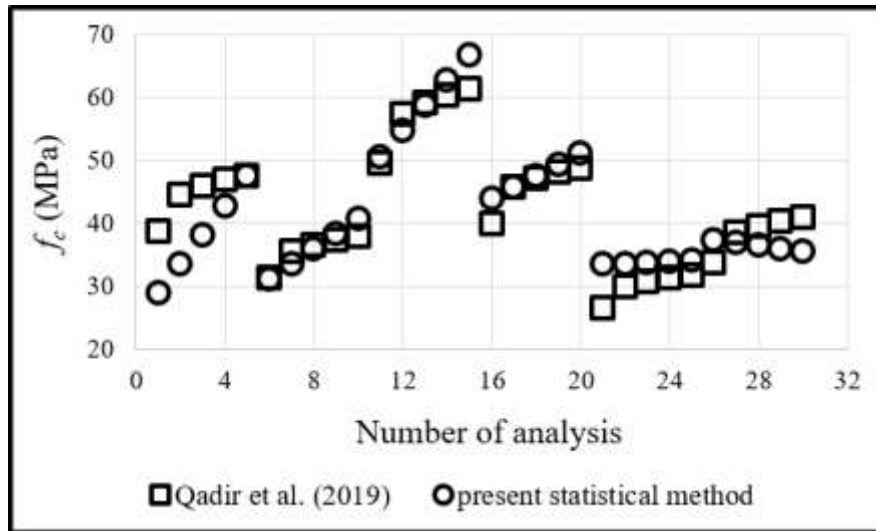


Figure 5. Compatibility of f_c values calculated with Eq. (1) and Eq. (2)

CONCLUSIONS

- In the present study, a useful statistical method has been developed for the practical calculation of compressive strength values (f_c) of fly ash concretes.
- With Eq. (2) developed in the present study, both the mix design will be easily determined and the optimum fly ash ratio that should be used to reach the desired compressive strength will be easily determined.
- The correlation coefficient for the developed Eq. (2) was determined as $R^2=0.81$.
- It has been determined that the ARD values of the developed statistical method vary between -0.3 and +0.3.
- The findings consistent with previous statistical study findings were obtained.
- As a result; a suitable equation has been developed that can be easily used in practice and will be used in the preliminary design of fly ash concrete production.

REFERENCES

- Aitcin, P.C., 1998. High-Performance Concrete. E and FN SPON, 650p, London and Newyork.
- Aslam, M., Shafiq, P. and Jumaat, M. Z. (2016). Oil-palm by-products as lightweight aggregate in concrete mixture: a review. Journal of cleaner production, 126, 56-73.

- Bogas, J. A., Nogueira, R. and Almeida, N. G. (2014). Influence of mineral additions and different compositional parameters on the shrinkage of structural expanded clay lightweight concrete. *Materials & Design* (1980-2015), 56, 1039-1048.
- Chang, T.P. ve Shieh, M.M., (1996) "Fracture Properties of Lightweight Concrete", *Cement and Concrete Research*, Cilt 26, No 2, 181-188, 1996.
- Demirboğa R ve Gül R 2002. The Effects of Expanded Perlite Agregate, Silica Fume and Fly Ash on the Thermal Conductivity of Lightweight Concrete. *Civil Engineering Department Engineering Faculty, Ataturk University, Erzurum.*
- Demirel, B., Gultekin, E., Alyamac, K. E. (2019). Performance of Structural Lightweight Concrete containing Metakaolin after Elevated Temperature, *KSCE Journal of Civil Engineering*, 1-8.
- Ersoy, U. ve Özcebe, G., 2001. Betonarme: temel ilkeler, TS-500-200 ve Türk deprem yönetmeliğine (1998) göre hesap. Evrim yayınevi, No:2, 816s. İstanbul.
- Gesoğlu, M., Özturan, T. ve Güneyisi, E., (2004) "Shrinkage Cracking of Lightweight Concrete Made with Cold-Bonded Fly Ash Aggregates", *Cement and Concrete Research*, Cilt 34, No 7, 1121-1130, 2004.
- Kabay, N., Tufekci, M. M., Kizilkanat, A. B. and Oktay, D. (2015). Properties of concrete with pumice powder and fly ash as cement replacement materials. *Construction and Building Materials*, 85, 1-8.
- Nevile, A, M, 2002; *Properties of Concrete, Fourth and Final Edition Standards*, Pearson, Prentice Hall, 18-119, 670-674.
- Qadir, W., Ghafor, K., Mohammed, A. (2019). Characterizing and modeling the mechanical properties of the cement mortar modified with fly ash for various water-to-cement ratios and curing times. *Advances in Civil Engineering*.
- Tanyıldızı, H., Yazıcıoğlu, S. (2006). Effect of mineral admixtures on bond strength of concrete and reinforcement. *Science and Engineering Journal of Firat University*, 18(3), 351-357.
- Taşdemir, C. (2003). Hafif betonların ısı yalıtım ve taşıyıcılık özellikleri. *TMMOB İnşaat Mühendisleri Odası Türkiye Mühendislik Haberleri Dergisi*, (427), 57-61.
- Tugrul Tunc, E. (2019a). Recycling of marble waste: A review based on strength of concrete containing marble waste. *Journal of environmental management*, 231, 86-97.
- Tugrul Tunc, E. (2019b). An Experimental Study Based on the Strength Properties of Concrete Containing Chemical Admixture. *Avrupa Bilim ve Teknoloji Dergisi*, (17), 901-908.
- Tugrul Tunc, E., Alyamaç, K. E., İnce, R., & Ulucan, Z. Ç. (2021). Relationship between Reinforcement Diameter and Bond Stress in High Performance Lightweight Concrete. *European Journal of Science and Technology*, (23), 851-860.
- Weber, S. and Reinhardt, H. W., (1997). A new generation of high performance concrete: concrete with autogenous curing. *Advanced Cement Based Materials*, 6(2), 59-68.
- Yang, C.C. ve Huang, R, 1996. "A Two-Phase Model for Predicting the Compressive Strength of Concrete", *Cement And Concrete Research*, 26,10, 1567- 1577.
- Yeih W., Chang J.J. ve Tsai C.L. (2004). Enhancement of the Bond Strength of Epoxy Coated Steel by the Addition of Fly Ash, *Cement & Concrete Composites*, 26, 315-321.

**DENEYSSEL ÇALIŞMA: SU BAZLI SONDAJ SIVILARININ REOLOJİK VE
FİLTASYON ÖZELLİKLERİNİ ARTTIRMAK İÇİN GRAFEN OKSİT
KULLANIMI**

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Özet

Günümüzde bir ülkenin kalkınması, yeraltı kaynaklarının en iyi şekilde kullanılmasıyla doğrudan ilişkilidir. Ülkeler, artan enerji talebini göz önünde bulundurarak yer altı kaynaklarından maksimum fayda sağlama ve yeni kaynaklar edinmek için sondaj sektörüne yoğunlaşmışlardır.

Sondaj sektöründe devamlılık önemlidir. Bunun için de; sondaj işleminin maliyeti, verimi ve başarısı kritik bir öneme sahiptir. Sirkülasyon işlemlerinde uygun sondaj çamuru hazırlanmasıyla; pH, vizkozite, hidrostatik basınç ile formasyon basıncı dengelenir, geçirimsiz kek oluşturulur, kuyu kesintilerden temizlenir, matkap takımının soğumasına ve korozyona karşı korunmasına yardımcı olunur ve dolayısıyla da verim artırılmış olur.

Bu kapsamda yapılan deneysel çalışmada, Hummers metoduyla sentezlenen grafen oksit ($C_{140}H_{42}O_{20}$), Sodyum-bentonit su bazlı sondaj çamuruna değişen oranlarda (0,0005-0,001-0,005-0,01 % k/h) eklenmiş ve çamur numunelerine olası etkileri Amerikan Petrol Enstitüsü (API) standartlarına uygun olarak incelenmiştir.

Laboratuvar ortamında gerçekleştirilen bu çalışma sonucunda; plastik viskozite (PV), görünür viskozite (AV), kopma noktası (YP), jel mukavemeti (10 saniye ve 10 dakika), sıvı (filtrasyon) kaybı analiz sonuçları sırasıyla; 3-5 cP, 8-11,5 cP, 10-13 lb/100ft², 9-12lb/100ft², 14-20lb/100ft², 21-19 mL aralığında bulunmuştur.

Sonuç olarak grafen oksit eklenmiş su bazlı sondaj çamuru ile katkısız (spud) su bazlı sondaj çamuru karşılaştırıldığında; PV değerinin % 67, AV değerinin % 44, YP değerinin % 30, 10 saniye ve 10 dakika değerlerinin % 33 ve % 43 oranlarında arttığı, sıvı (filtrasyon) kaybı değerinin % 9,52 oranında azaldığı tespit edilmiştir. Tüm grafen oksit ekleme oranları da kendi içlerinde karşılaştırıldığında en iyi ekleme oranının % 0,001 olduğu görülmüştür.

Anahtar Kelimeler:Na-bentonit Su bazlı sondaj çamuru, Grafen oksit, API standartları.

**EXPERIMENTAL STUDY: USING OF GRAPHENE OXIDE TO
ENHANCING RHEOLOGICAL AND FILTRATION PROPERTIES OF
WATER-BASED DRILLING FLUIDS**

Abstract

Today, the development of a country is directly related to the best use of underground resources. Considering the increasing energy demand, countries have concentrated on the drilling sector to obtain maximum benefit from underground resources and to acquire new resources.

Continuity is important in the drilling industry. For this too; the cost efficiency and success of the drilling process are of critical importance. With the preparation of suitable drilling mud in circulation processes; The pH, viscosity, hydrostatic pressure and formation pressure are balanced, impermeable cake is formed, the well is cleaned from cuts, it helps to cool the drill set and protect it against corrosion, and thus the efficiency is increased.

In this experimental study, graphene oxide (C₁₄₀H₄₂O₂₀), synthesized by Hummers method, was added to sodium-bentonite water-based drilling mud at varying rates (0.0005-0.001-0.005-0.01% k/v) and the possible effects on sludge samples were studied in accordance with the standards of the American Petroleum Institute (API).

As a result of this study carried out in a laboratory environment; plastic viscosity (PV), apparent viscosity (AV), breaking point (YP), gel strength (10 seconds and 10 minutes), fluid (filtration) loss and drilling mud cake thickness analysis results, respectively; It was found in the range of 3-5 cP, 8-11.5 cP, 10-13 lb/100ft², 9-12 lb/100ft², 14-20 lb/100ft², 21-19 mL.

As a result, when water-based drilling mud with added graphene oxide is compared with spud water-based drilling mud; it was determined that the PV value increased by 67%, the AV value by 44%, the YP value by 30%, the 10 second and 10 minute values increased by 33% and 43%, and the liquid (filtration) loss value decreased by 9.52%. When all graphene oxide addition rates were compared among themselves, it was seen that the best addition rate was 0.001%.

Keywords: Na-bentonite, Water-based drilling mud, Graphene oxide, API standards.

1. GİRİŞ

Sondaj operasyonunun (işlemi) amacı, sismik verilerle belirlenen yeraltı rezervlerinin jeolojik yapısını ve boyutunu doğru bir şekilde analiz etmektir. **Petrol, doğalgaz, su, jeotermal, taş ve maden ocakları, karot çıkarma, su veya gaz aktarma, baraj zemini etütlerinde sondaj işlemi yapılmaktadır.**

Sondaj çalışmaları 3500-5000 yıldır süre gelen eski bir sektördür. M.Ö. 2000 yılında 100 metre uzunluğa kadar tuzlu su kuyularının açıldığı ve bir kısmından doğalgaz çıkarıldığı görülmüştür (Ersoy, 2008).

1831'de Amerika Birleşik Devletleri'ndeki Billy Morris, bir darbeli matkap ve sondaj motoru kullanarak ilk modern sondajı gerçekleştirmiştir. Teknolojinin gelişmesi ile ülkeler, artan

enerji talebini göz önünde bulundurarak yer altı kaynaklarından maksimum fayda sağlamak ve yeni kaynaklar edinmek için sondaj sektörünü zamanla geliştirmişlerdir. (Ersoy, 2008).

Sondaj sektörüne girişte ilk önce farklı çaplarda ve tiplerde matkap uçları kullanılmıştır. Döner ekskavatör ile yapılan bu işlemlerde PDC(Polycrystalline Diamond Compact) uçları ve karot matkapları gibi kendi eksenini etrafında dönen aplikatörler kullanılmaktadır. Bu delme ve kırma işlemleri esnasında sondaj çamuru kullanılmaktadır. Sondaj çamurunun başlıca görevi kuyudaki sert oluşumu yumuşatmak ve biriken kırıntıları yüzeye çıkarmaya yardımcı olmaktır. Sondaj çamurunun zamanla kuyu ilerleme hızına olumlu etkisi olduğu gözlemlenmiştir (Özüdoğru ve Babür, 2001).

Teknolojinin gelişmesiyle derin sondaj kuyuları açılmış ve eski yöntemler sondaj sektöründe beklentiyi karşılayamaz hale gelmiştir. Bunların başında çamur problemleri gelmektedir. Sondaj çamurlarının zaman içinde farklı oranlarda farklı malzemeler eklenerek kimyasal ve fiziksel özellikleri iyileştirilmeye çalışılmıştır. Son zamanlarda benzersiz fiziksel ve kimyasal özellikleri sayesinde nanomalzemeler, yüksek basınç ve yüksek sıcaklık şartlarında sondaj akışkanının filtrasyonunu ve reolojik özelliklerini ayarlamak için kullanılan önemli katkı maddeleri haline gelmeye başlamıştır (Amanullah ve Yu, 2005). Dolayısıyla; nano ve mikro boyutlu maddeler eklenerek sondaj çamurlarının özelliklerinin iyileştirilmiş olduğu gözlemlenmiştir (Özkan ve Özkan, 2019; Singh ve Ramadan, 2010; Özkan ve Kaplan., 2019; Bicerano, 2009; Özkan, ve ark., 2018a; Bageri ve ark., 2018; Özkan, ve ark., 2018b; Özkan, ve ark., 2017a; Özkan, ve ark., 2017b;).

Özkan ve arkadaşları (2021), çinko oksit nano partikül madde ile fonksiyonelleştirilmiş çok duvarlı karbon nano tüpün su bazlı sondaj çamurlarına etkisini araştırdıklarında çalışmalarında, ZnONP/ÇDKNT ilavesiyle sondaj çamurunun; plastik viskozite değerinin % 42,8, görünür viskozite değerinin % 31,6, kopma noktası değerinin % 28, 10 saniye ve 10 dakika değerlerinin sırasıyla % 22 ve % 25, kek kalınlığı değerinin % 38,9 oranlarında arttığı, sıvı (filtrasyon) kaybı değerinin de % 13,8 oranında azaldığını belirtmişlerdir.

Özkan ve arkadaşları (2020), Al₂O₃NP/ÇDKNT'ün su bazlı sondaj çamuruna etkilerini araştırmışlardır. Çalışma sonucunda; PV değerinin %85,7, AV değerinin %41,8, YP değerinin %20, 10 saniye ve 10 dakika değerlerinin sırasıyla %16,6 ve %11 oranında arttığı, filtrasyon kaybı değerinin %13,8 oranında azaldığını, aynı zamanda kek kalınlığı değerinin de %18,5 oranında arttığını gözlemlemişlerdir.

Elochukwu ve diğerleri (2018), su bazlı sondaj sıvılarının reolojik ve filtrasyon özelliklerini incelemek için çamura, nanopolistiren ve yüzey aktif madde metil sülfonat katkılarını yapmışlardır. Su bazlı sondaj sıvılarının reolojik özelliklerinin Bingham ve Power'ın Moore Yasası kullanılarak iyileştiğini tespit etmişler. Ayrıca, düşük basınç ve düşük sıcaklık koşullarında filtrasyon (sıvı) kayıplarını %50,7, yüksek basınç ve yüksek sıcaklık koşulları (HPHT) altında ise %61,1 oranında azalttığını bulmuşlardır. Çalışmalarında, taramalı elektron mikroskopu sayesinde filtre kekinin geçirgenliğini izleyerek filtrasyon (sıvı) kayıplarının azaldığını gözlemlemişlerdir.

2.MATERYAL VE YÖNTEM

2.1. Materyal

Çalışmada kullanılan sodyum bazlı bentonit ve barit Türkiye Petrolleri Anonim Ortaklığından (TPAO) temin edilmiştir.

Bozulmamış grafen levhaların oksijen fonksiyonlarına tabi tutulmasıyla elde edilen iki boyutlu (2D) bir malzeme olan ve C₁₄₀H₄₂O₂₀ kimyasal formülüne sahip grafen oksit (M.L. Yola, N. Atar, 2014, Dimiev A. M. & Eigler S. 2017); birçok yönteme göre daha güvenli,

daha hızlı ve daha verimli bir yöntem olan Hummers yöntemine (Hummers and Offeman, 1958) göre sentezlenmiştir.

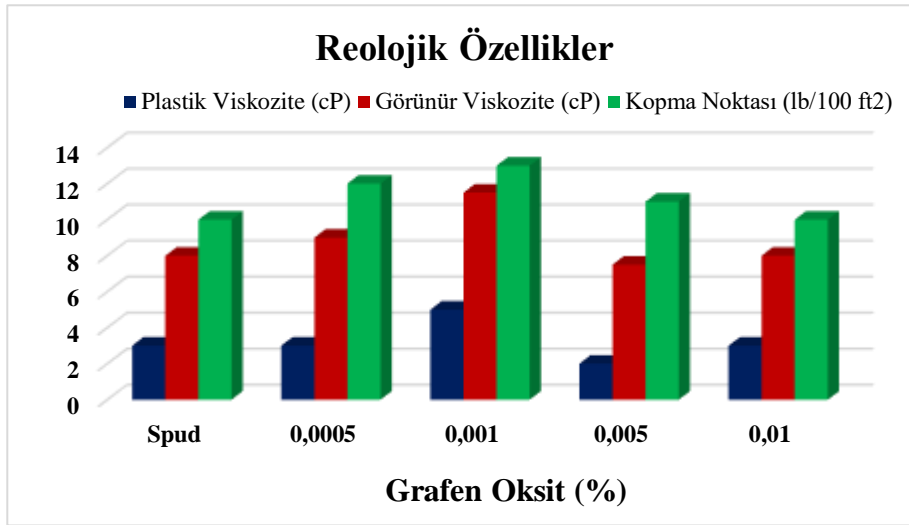
2.2. Su Bazlı Sondaj Çamuru

Su bazlı çamurları hazırlanırken 500 g su, 31.25 g Na-bentonit ve 14.25 g barit 15 dakika boyunca karıştırıcı yardımı ile karıştırıldı. 0,0005-0,001-0,005-0,01 % (k/h) oranlarındagrafen oksit ayrı ayrı çamur numunelerine eklendi ve karıştırmaya devam edildi. 16 saat yaşlanmaya bırakılan çamur Amerikan Petrol Enstitüsü (API) standartlarına uygun olarak; plastik viskozite (PV), görünür viskozite (AV), kopma noktası (YP), jel mukavemeti (10 saniye ve 10 dakika) gibi reolojik analizler ve sıvı (filtrasyon) kaybı özeklerianaliz edildi(API 13B-1, 2009; API 13 A, 2010).

3.BULGULAR VE TARTIŞMA

3.1. Grafen Oksit Eklenen Su Bazlı Sondaj Çamurunun Reolojik Özellikleri

Sondaj çamurlarında viskozite çoğunlukla akışkanın viskozitesine ve çamurun içerisindeki katı partikül konsantrasyonuna bağlıdır. Çamurların kayma gerinme hız değerlerine karşılık gelen kayma gerilmeleri, viskometre cihazı ile ölçülür. 300 rpm ve 600 rpm kadran okumaları not edilerek görünür viskozite (AV), plastik viskozite (PV) ve akma sınır (kopma noktası) (YP) değerleri hesaplanır. Reolojik özelliklere grafen oksidin etkisi Şekil 1’de gösterilmiştir.

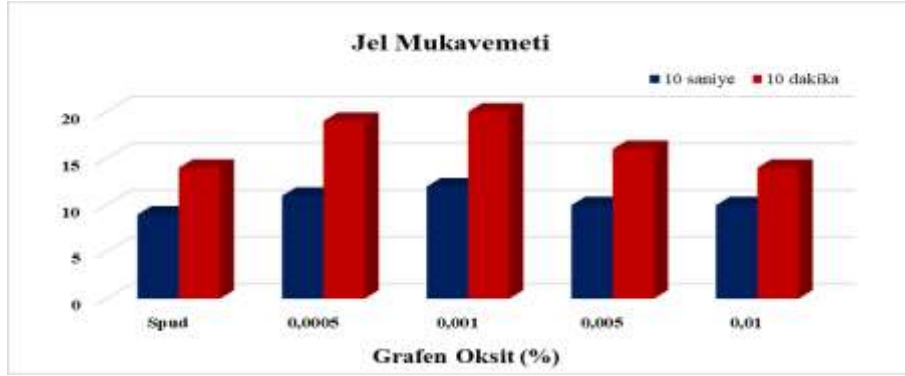


Şekil 3.1. Grafen Oksit Katkılı Su Bazlı Sondaj Çamurunun Reolojik Özellikleri

Şekil 3.1. incelendiğinde sondaj çamuruna farklı oranlarda katılan grafen oksit ile, PV değerinin % 67, AV değerinin % 44, YP değerinin % 30 arttığı görülmektedir. Aynı zamanda en fazla katkılama oranının da %0.001 olduğu tespit edilmiştir.

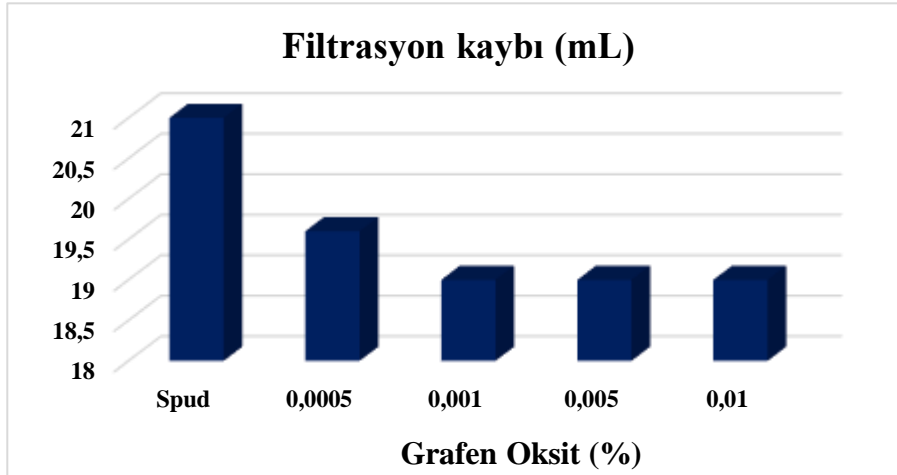
Sondaj akışkanında viskozitenin çok yüksek olması çamur pompalarında aşırı basınç yaptığından tercih edilmezken, düşük olması da düşük hidrostatik basınca sebebiyet verdiği için istenmez (Bayat, A.E. and Shams, R. 2019). Bundan dolayıdır ki sondaj çamurunun, hidrostatik basıncı kontrol altında tutabilmek için, en uygun viskozite değerine sahip olması istenmektedir (Ismail, A.S.I. 2012). İyi temizlenmeyen kuyuda; yüksek tork, kuyu stabilizasyonunun olmayışı, sirkülasyon kaybı ve formasyon hasarığı gibi problemleri meydana getirir. Sondaj operasyonu esnasında oluşan bu problemlerin ortadan kaldırılması için yüksek bir jel mukavemeti istenir (Kasiralvalad, 2014). Farklı yüzdelerde grafen oksit

katkılı sondaj çamurlarının jel mukavemetlerindeki değişim aşağıdaki (Şekil 3.2) şekilde verilmiştir.



Şekil 3.2. Grafen Oksit Katkılı Su Bazlı Sondaj Çamurunun Jel Mukavemet Değerleri

Şekil 3.2 de de görüldüğü gibi jel mukavemeti (10 saniye ve 10 dakika) analiz sonuçları incelendiğinde; en yüksek 10 s ve 10 dk değerlerinin %0,001 grafen oksit katkılmasıyla elde edilmiştir. Daha sonra jel mukavemet değerlerinde bir azalma gözlemlenmiştir. Yüksek jel mukavemeti değerleri, yüksek pompa basınçları gerektirdiğinden hem kuyu güvenliği hemde maliyetlerde artışa sebep olacağından istenmeyen bir özelliktir. Aynı zamanda yüksek basınç dalgalanmaları sonucunda formasyon çatlamasına sebep olur. Sonuç olarak 10 saniye ve 10 dakika değerlerinin spud (katkısız) çamura kıyasla sırasıyla % 33 ve % 43 oranlarında arttığı tespit edilmiştir.



Şekil 3.3. Grafen Oksit Katkılı Su Bazlı Sondaj Çamurunun Filtrasyon (sıvı) Kaybı Değerleri

Sondaj çamurları için sıvı (filtrasyon) kaybı değerinin çok yüksek olması; sondaj operasyonlarında zaman ve maliyeti olumsuz yönde etkilemektedir. Sıvı (filtrasyon) kaybiformasyonda zarara, sondaj aparatlarının kuyu içinde sıkışmasına ve kuyuda kararsızlığa neden olmasından dolayı istenen bir durum değildir. Sondaj çamurlarına farklı oranlarda grafen oksidin eklenmesine ait sıvı kaybı değerleri Şekil 3.3 'de verilmiştir. Grafen oksitin su bazlı sondaj çamurlarında sıvı (filtrasyon) kaybı değerini % 9,52 oranında azalttığı yapılan bu çalışmayla tespit edilmiştir.

4.SONUÇ

Laboratuvar ortamında gerçekleştirilen bu çalışma sonucunda; plastik viskozite (PV), görünür viskozite (AV), kopma noktası (YP), jel mukavemeti (10 saniye ve 10 dakika), sıvı (filtrasyon) kaybı analiz edilmiş ve analiz sonuçları sırasıyla; 3-5 cP, 8-11,5 cP, 10-13 lb/100ft², 9-12lb/100ft², 14-20lb/100ft², 21-19 mL aralığında bulunmuştur.

Sonuç olarak grafen oksit eklenmiş su bazlı sondaj çamuru ile katkısız (spud) su bazlı sondaj çamuru karşılaştırıldığında;

- ✓ Plastik Viskozite değerinin % 67,
- ✓ Görünür Viskozite değerinin % 44,
- ✓ Kopma Noktası değerinin % 30,
- ✓ 10 saniye değerinin % 33,
- ✓ 10 dakika değerlerinin % 43 oranlarında arttığı,
- ✓ sıvı (filtrasyon) kaybı değerinin % 9,52 oranında azaldığı tespit edilmiştir.

Tüm grafen oksit ekleme oranları da kendi içlerinde karşılaştırıldığında en iyi ekleme oranının % 0,001 olduğu görülmüştür. Ayrıca su bazlı sondaj çamurlarında grafen oksitin gerek reolojik gerekse de filtrasyon kaybı özelliklerinin iyileştirilmesine yönelik kullanılmasının yarar sağlayacağı kanaatine varılmıştır.

KAYNAKLAR

Aftab, A., Ismail, A. R., Khokhar, S. and Ibupoto, Z. H. (2016). Novel zinc oxide nanoparticles deposited acrylamide composite used for enhancing the performance of water-based drilling fluids at elevated temperature conditions. *Journal of Petroleum Science and Engineering*, 146, 1142-1157.

Amanullah, Md. and Yu, L. (2005). Environment friendly fluid loss additives to protect the marine environment from the detrimental effect of mud additives. *J. Pet. Sci. Eng.*, 48, 199-208.

API RP 13B-1, 2009. Recommended Practice for Field Testing Water-based Drilling Fluids. 4th Edition: API.

Bayat, A.E. and Shams, R. (2019). Appraising the impacts of SiO₂, ZnO and TiO₂ nanoparticles on rheological properties and shale inhibition of water-based drilling muds. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 581, 123792.

Dimiev A. M. & Eigler S. (2017). *Graphene Oxide Fundamentals and Applications*. United Kingdom: Wiley

Ersoy, A. "Sondaj Teknikleri ve Uygulamaları". Nobel Kitabevi, Ankara. ISBN: 978 605 397 014 9, 2008.

Elochukwu, H., Sia, L.K.S.L., Gholami, R. and Hamid, M.A. (2018). Data on experimental investigation of Methyl Ester Sulphonate and nanopolystyrene for rheology improvement and filtration loss control of water-based drilling fluid. *Data in Brief*, 21, 972-979.

Hummers Jr, W. S., & Offeman, R. E. (1958). Preparation of graphitic oxide. *Journal of the American Chemical Society*, 80(6), 1339-1339.

Piroozian, A., Ismail, I., Yaacob, Z., Babakhani, P. and Ismail, A.S.I. (2012). Impact of drilling fluid viscosity, velocity and hole inclination on cuttings transport in horizontal and

highly deviated wells. *Journal of Petroleum Exploration and Production Technology*, 2(3), 149-156.

Özkan A, Özkan V, 2019. Effect of Clinoptilolite-Rich Zeolite on the Properties of Water Based Drilling Fluid, *Fresenius Environmental Bulletin*, 28(3), 2232-2237.

Özkan A, Kaplan B.M, 2019. Investigation of the Effects on Rheological and Filtration Properties of Water-Based Drilling Mud of Boron Minerals: An Experimental Study. *Pamukkale University Journal of Engineering Sciences*. DOI: 10.5505/pajes.2019.89990.

Özkan A, Kaplan BM, Özkan V, Turan S.E, 2018a. Effect of Micro-Sized Colemanite on the Rheological Properties of the Water Based Drilling Fluid. *Çukurova University Journal of the Faculty of Engineering and Architecture*, 33(4), 83-88.

Özkan A, Turan SE, Kaplan BM, 2018b. Investigation of Fly Ash Effect on Rheological and Filtration Properties of Drilling Muds. *Fresenius Environmental Bulletin*, 27(12A), 9189-9194.

Özkan, A., Kaplan, B.M., Özkan, V., Turan, S.E., Eker, Ç., (2017). Investigation of the Effect of Borax on the Rheological and Chemical Properties of Drilling Mud; *International Conference on Engineering Technologies (ICENTE'17)*

Özkan, A., Turan, S.E., Özkan, V., Kaplan, B.M., Eker, Ç., (2017). Rheological Properties of Ulexite Added Drilling Fluids; *International Conference on Engineering Technologies (ICENTE'17)*

Özüdoğru, S. ve Babür, E. (2001). Jeotermal Akışkan Üretim ve Re-Enjeksiyon Kuyuları, *Jeotermal Enerji Doğrudan Isıtma Sistemleri: Temelleri ve Tasarımı*, Sayfa: 35- 124, MMO Yayın No: 270

Yola, M.L., Eren, T. ve Atar, N. (2014). A novel efficient photocatalyst based on TiO₂ nanoparticles involved boron enrichment waste for photocatalytic degradation of atrazine. *Chemical Engineering Journal*, 250, 288-294.

EXPLORING TURKEY'S AIRPORT NETWORK STRUCTURE: A COMPLEX NETWORK APPROACH

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Abstract

In recent years, examining the statistical properties and making different classifications of airport networks has become one of the most popular research areas. In this paper, a complex network theory approach was used in order to reveal Turkey's Airport Network (TAN). Data, which covers passenger transportation in last weeks of consecutive three months after the reduction of travel restrictions due to the coronavirus pandemic, was gathered from FlightRadar. R programming language was applied for data processing and visualization. Network measures like average path length and clustering coefficient to show connectivity and centrality measures (degree, betweenness, and closeness) were computed for demonstrating Turkey's domestic airport infrastructure as a network. Since the complex network theory approach has not been comprehensively applied to understand the airport network structure of Turkey, this study contributes to the current literature by offering an opportunity to compare network structures of different countries. As a conclusion, all calculations reveal that TAN is structured as a hub and spoke network which has a high level-organized complexity in which parts of the network are correlated and nodes are preferentially connected to each other. The main limitation of this study is that the real network structure has not been compared with random, small world and scale-free simulations.

Keywords: Turkey's Airport Network, complex network analysis, centrality, connectivity.

1. INTRODUCTION

Managing an air transport network is quite challenging due to the high cost and low return characteristics of the aviation industry. It requires a great deal of effort to control and manage, as it basically consists of large network of airports connected by flights. In fact, air transport networks are often modeled and described as a network of airports. On the other hand, expanding and developing these networks brings many benefits to society, especially from an economic point of view. Therefore, in order to take appropriate strategic decisions for managing such large systems, it is of great importance to recognize these networks and to be able to describe their characteristics with substantial outputs. In accordance with this, they are examined with perspectives that include different theories and methods in various disciplines. When the relevant studies in the literature are reviewed, it has been seen that there has been recent interest in using concepts from graph theory to analyze complexity of air transport networks.

As a complex network is characterized as a network with many elements with uneven patterns and dynamic structure (Boccaletti et al., 2006), airports as large systems are complex networks. Consequently, the complex theory approach has been preferred in different studies for examining the statistical properties and classification of air transport networks and two characteristics have been the common focus of these studies. These two characteristics are

related to the network having either small-world and/or scale-free properties and as a matter of fact that both can be seen in a network at the same time. While small world (SW) property was described as networks which is clustered extremely (Watts & Strogatz, 1998), power law degree distribution is associated with scale-free (SF) network (Newman, 2003). These two characteristics were studied for networks of different countries like India (Bagler, 2008), US (Xu & Harriss, 2008), Italy (Guida & Maria, 2007), China (Wang et al., 2011), Australia (Hossain & Alam, 2017) and Argentina (Guillaumet, 2018). The network structure of the whole world was also studied by Guimera & Amaral (2004).

Analyzing air transport network of Turkey was considered significant by some researchers (Song & Yeo, 2017; Depren & Yavuz, 2018; and Erdem et al., 2020). However, efforts in this area still remains scarce. Since air transport networks have a huge impact of on the economy, employment and therefore people's quality of life, understanding these networks and their structure is critical. With the increase in studies on air transport networks of different countries, the research of Turkey, which is advantageous with its geopolitical location, contributes both to literature and practice. It has inevitable theoretical contribution because it increases the number of studies in this field and it applies complex network theory, which is constantly in use, and its specific measurements in the aviation context. Besides, this study makes room for future studies as it produces valuable results in order to be able to compare with the previous ones analyzing air transport networks of different countries. In addition to its theoretical contribution, a detailed understanding of the air transport network as the big picture guides practitioners to make decisions towards the existing or new routes as the impact of their existing routes and their importance within the network are clearly shown. In summary, this study focuses on Turkey's air transport network and enquires it with complex network theory.

2. METHOD

In this study, FlightRadar flight data was utilized as the data source and all data were collected using R programming language. Three different time periods, which are 29.07.2020 - 05.08.2020, 26.08.2020 - 01.09.2020, 25.09.2020 - 01.10.2020, were selected as samples. The most important reason for this choice is that these periods include the opening-out after the first Covid-19 wave. The datasets are detailed as daily data of the last weeks of the 3 months that are July, August, and September. It was observed that there were very similar schedules in the remaining weeks of the months, therefore using 1 week of data from each month was considered sufficient for the study.

After data were cleaned and computed by R Language, it was seen that the number of airports open for operations in Turkey was given as 54 by FlightRadar in these selected periods. In the study, airports and routes were used as vertices and edges respectively in calculations. It was seen that the Turkey's domestic network has 46-47 vertices and 145-150 edges and it stays constant for all three samples. More details about Turkey's flight network samples are found in Table 1.

Table 1. Turkey's Flight Network Size

Turkey's Airport Network (TAN)	Sample 1			Sample 2			Sample 3		
Time period	29.07.2020 - 05.08.2020			6.08.2020 - 01.09.2020			25.09.2020 - 01.10.2020		
Network type	Airports	Unique Routes	Flights	Airports	Unique Routes	Flights	Airports	Unique Routes	Flights
Domestic	47	150	4320	46	147	4617	47	145	4194
Overall	232	614	7832	228	629	10161	245	617	9662

3. ANALYSIS AND DISCUSSION

When all airports and related flight numbers are examined, the top five busiest airports for 3 samples are İstanbul Sabiha Gökçen Airport (SAW), İstanbul Airport (IST), İzmir Adnan Menderes Airport (ADB), Ankara Esenboğa Airport (ESB) and Antalya Airport (AYT). The most unexpected result regarding these airports is that Sabiha Gökçen Airport is the busiest airport in terms of the number of flights, although it is counted as the secondary airport of İstanbul. This can be explained by its role as a hub for low-cost airlines. Furthermore, route between Sabiha Gökçen Airport (SAW)-Antalya Airport (AYT) is the busiest one among all domestic airport pairs. This route serves both business and leisure travel demand.

It is crucial to understand the topology of an air network for various reasons. First, this type of analysis provides information for distinguishing nodes in the network in terms of their centrality and importance and it is worth grasping the overall strengths and weaknesses of the network. Secondly, topological analysis reveals the most efficient routes.

In this paper, as a first step, the *topological analysis* of the Turkish airport network was carried out by computing cumulative degree distribution, average path length, diameter and clustering coefficient. Cumulative degree distribution $P(>k)$ represents the probability of a random node to have k or higher number of connections. It was found for TAN that this distribution follows a power law $P(>k) \sim k^{-\gamma}$ with similar γ values of 1.056, 1.014, and 1.014 for the 3 samples respectively. This indicates that there are a few large hubs and numerous weakly connected spokes. The average path length is defined as the average number of connections a passenger needs to make to reach between any two domestic airports in Turkey. Average path lengths of each sample are 1.86, 1.88, and 1.90 respectively. Airports have strong connectivity because average path length for all is 1.88. For connectivity, diameter was also calculated as indicator which shows the longest path of the network. Sabiha Gökçen Airport (SAW)- Isparta Süleyman Demirel Airport (ISE) route was found as farthest vertices in Sample 1 and 2, while Çanakkale Airport (CKZ)- Kayseri Erkilet International Airport (ASR) route was found as the farthest vertices for Sample 3. Minimum 3 flights connect these airports and the diameter of TAN is also equal to this. Moreover, clustering coefficient indicates interconnectivity which measures the fraction of the connected neighbors of an airport. This value was discovered very close for each sample, was consecutively 0.22, 0.20 and 0.20 which indicates relatively lower interconnectivity.

Centrality measures (degree, betweenness and closeness) were calculated in order to identify the most significant vertices within the network. These measures are important as they also demonstrate which airports are affecting the connectivity performance. First of all, degree centrality mainly reveals the number of routes attached to the airports. In terms of this, İstanbul Airport is the leader in all three samples. Although İstanbul Sabiha Gökçen Airport provides more flights, İstanbul Airport has better performance for offering greater variety in destinations. Power law exponent of the degree distribution changes from 0.981 to 0.958 between samples, following the same pattern (Figure 1). Considering the airports in the network, it was seen that the top 5 airports which are İstanbul Airport (IST), İstanbul Sabiha Gökçen Airport (SAW), İzmir Adnan Menderes Airport (ADB), Ankara Esenboğa Airport (ESB) and Antalya Airport (AYT) dominate the route network. All airports out of these were found to have less than 10 degrees. Eigenvector centrality was taken into account as another measure. As related values were very identical with degree centrality, the top 5 degree airports remain the same.

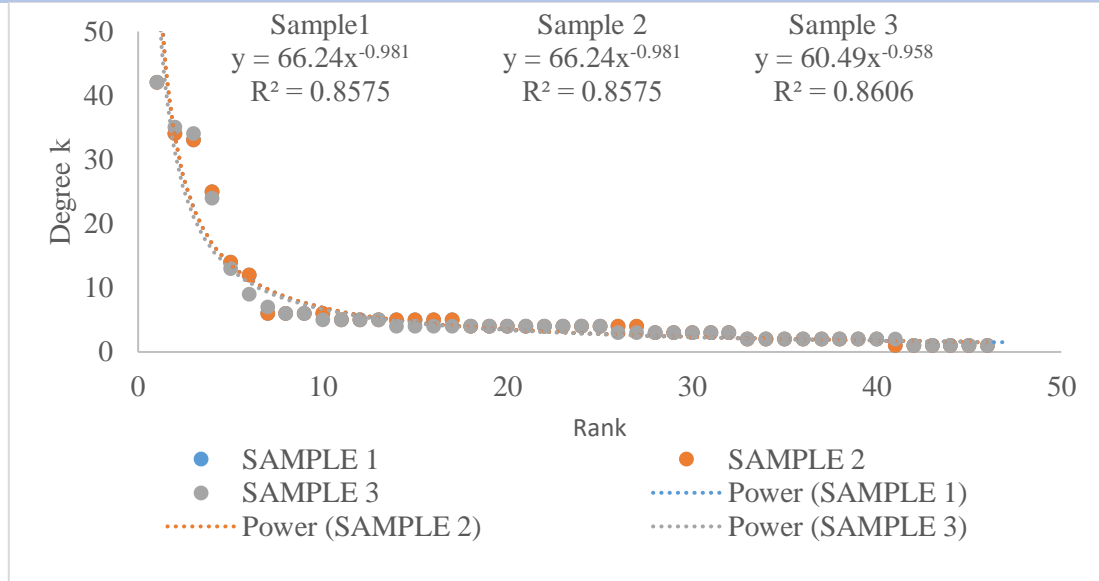


Figure 1. Degree-rank distribution of three samples (all follow power law)

As a second measure of centrality, betweenness was calculated. In other words, the frequency with which a vertex is found to lie on the shortest path between any two vertices in the network was measured. A high betweenness rating indicates that the airport is a vital link connecting various portions of the network. In Turkey’s air network, it was clear that high degree airports and high betweenness airports were in close proximity to one another. Although a prior discovery by Guimera & Amaral (2004) for the global airport network indicated that high betweenness airports were not always high degree airports, in this study, this high degree-high betweenness of Turkey's domestic airport network was revealed (Figure 2). Top 5 airports -especially IST, which is the leader in this sense, followed by ESB and SAW- were found as most crucial hubs in the network and more than 90% of domestic air transport is based on these airports.

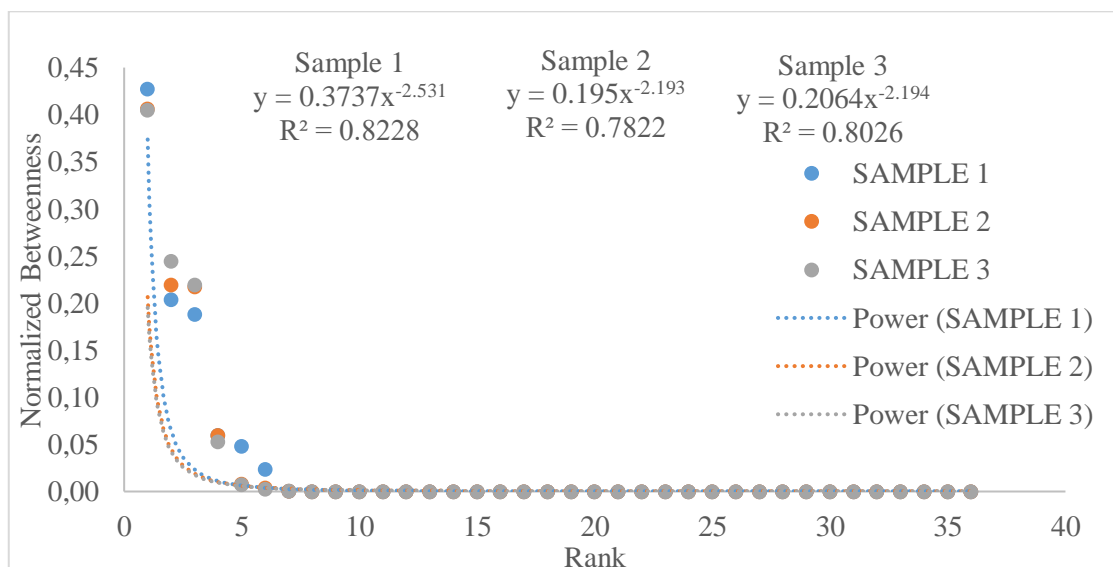


Figure 2. Betweenness-rank distribution of three samples (all follow power law)

As a last centrality measure, closeness which is used to determine vertex's relative importance by considering how close it is to every other vertex in the network, was calculated. Closeness centrality reduces as the number of connecting flights required to reach different sections of the network increases. Same as the previous one, the leader in all samples for this measure was Istanbul Airport. This means that Istanbul Airport is the most accessible airport in the domestic network. The closeness values remained constant throughout the 3 samples (Figure 3).

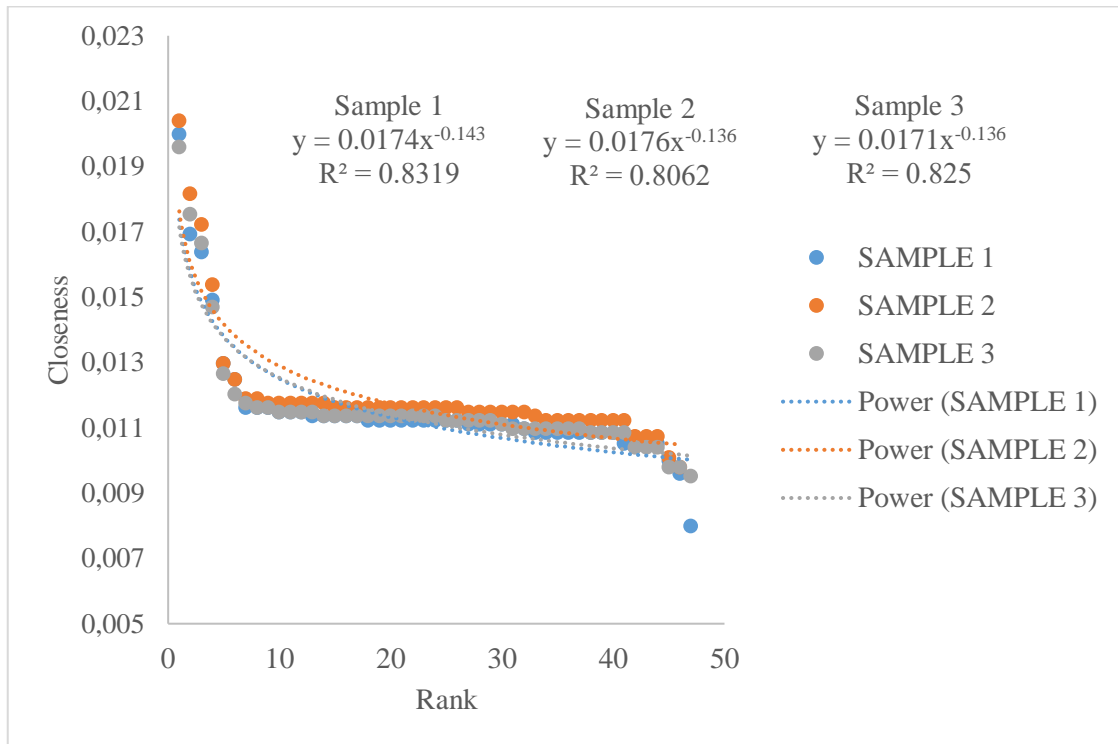


Figure 3. Closeness-rank distribution of three samples (all follow power law)

4. CONCLUSION

The aim of the paper was to investigate the structure of Turkey's airport network with complex network theory approach. FlightRadar flight data was collected, processed, and analyzed by using R language. Both network and centrality metrics were computed, and results denoted that Turkey's air transport network has characteristics of a hub and spoke network. In accordance with other studies, small-world characteristics prevailed in TAN. It has been also revealed that cities with a better economy and a higher population have highly centralized hub airports.

Moreover, when compared with other countries, average path length of TAN is close to those of Italy, USA, China, India, and Argentina. This measure shows that hub airports are dominant in the network. In other words, if there is a disruption in the operation of hub airports, network connectivity will be adversely affected. On the other hand, TAN has a smaller clustering coefficient compared to other countries. Small clustering coefficient is observed due to the rate of increase in the number of nodes is higher than the rate of increase in the number of edges and a lower clustering coefficient represents lower interconnectivity. In order to increase interconnectivity, lower degree nodes can be connected to each other.

There are a few limitations in this study and these constraints are related to the sampling duration of the data, the variety of the variables, and the improvability of the measurements. For a future research, data from different time periods can be used (e.g. pandemic-free periods). Also, the international flights to/from the country can be included. Edges can be weighted using variables such as passengers, weight of cargo, movement of aircrafts and

different measures like assortativity can be added for analysis. Lastly, simulations of random networks can be carried out to compare TAN with models.

REFERENCES

- Bagler, G. (2008). Analysis of the airport network of India as a complex weighted network. *Physica A: Statistical Mechanics and its Applications*, 387(12), 2972-2980.
- Boccaletti, S., Latora, V., Moreno, Y., Chavez, M., & Hwang, D. U. (2006). Complex networks: Structure and dynamics. *Physics Reports*, 424(4-5), 175-308.
- Depren, S. K., & Yavuz, F. G. (2018). The Network Analysis of the Domestic and International Air Transportation Structure of Turkey. *Mugla Journal of Science and Technology*, 4(2), 148-155.
- Erdem, U., Cubukcu, K.M., & Tsiotas, D. (2020). Mapping the topology of the air transport network in Turkey. *Environment and Planning A: Economy and Space*, 52(1), 6-9.
- Guida, M., & Maria, F. (2007). Topology of the Italian airport network: A scale-free small-world network with a fractal structure?. *Chaos, Solitons & Fractals*, 31(3), 527-536.
- Guillaumet, M. P. (2018). A complex network approach to the Argentinian Airport Network.
- Guimera, R., Mossa, S., Turtschi, A., & Amaral, L. N. (2005). The worldwide air transportation network: Anomalous centrality, community structure, and cities' global roles. *Proceedings of the National Academy of Sciences*, 102(22), 7794-7799.
- Hossain, M. M., & Alam, S. (2017). A complex network approach towards modeling and analysis of the Australian Airport Network. *Journal of Air Transport Management*, 60, 1-9.
- Newman, M. E. J. (2003). The Function and Structure of Complex Networks. *SIAM Rev.*, 35(2), 167-256.
- Song, M. G., & Yeo, G. T. (2017). Analysis of the air transport network characteristics of major airports. *The Asian Journal of Shipping and Logistics*, 33(3), 117-125.
- Wang, J., Mo, H., Wang, F., & Jin, F. (2011). Exploring the network structure and nodal centrality of China's air transport network: A complex network approach. *Journal of Transport Geography*, 19(4), 712-721.
- Watts, D. J., & Strogatz, S. H. (1998). Collective dynamics of 'small-world' networks. *Nature*, 393(6684), 440-442.
- Xu, Z., & Harriss, R. (2008). Exploring the structure of the US intercity passenger air transportation network: a weighted complex network approach. *GeoJournal*, 73(2), 87.

EFFECT OF WINGLETS ON FLOW AND HEAT TRANSFER IN A PERIODIC GROOVED CHANNEL

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Abstract

In this study, the effects on the flow and heat transfer of different winglet configurations in a periodic grooved channel are numerically investigated. The numerical study is carried out with the Computational Fluid Dynamics (CFD) based ANSYS-Fluent program and the governing equations are solved using the SIMPLE algorithm. The present study is compared with the literature studies. Water is used as the working fluid and aluminum is considered as the channel material. The fluid is incompressible, single-phase, and Newtonian-type. The channel flow is steady, two-dimensional, and in a laminar regime. Two different winglet configurations are considered with solid winglet and perforated winglet. The lower and upper surfaces of the grooved channel are kept at a constant temperature of 350 K. Nusselt number (Nu) and friction factor (f) are calculated for different Reynolds numbers ($200 \leq Re \leq 1000$) along the channel and also this study is compared to channel flow without winglets. To understand the flow and heat transfer mechanism, the velocity and temperature contours are obtained at different Reynolds number in the periodical grooved channels. The numerical findings show that the flow and heat transfer are significantly affected by the winglet configurations and the winglets increase the heat transfer, especially at high Reynolds numbers. Moreover, it is observed that the perforated winglets considerable reduce the friction factor compared to the solid winglets. The highest Nusselt number are achieved at $Re=1000$ for solid winglets.

Keywords: Winglet, Grooved channel, Nusselt number, Friction factor

INTRODUCTION

Corrugated channels are widely used in several industrial applications and these geometries both increase surface area and cause self-flow oscillation. They can also substantially improve thermal efficiency depending on the geometrical properties of the channels. Heat transfer in corrugated channels has been researched in many numerical and experimental studies, and it has been reported that these surfaces have a considerable effect on thermal enhancement but increase the pressure drop compared to smooth channels (Naphon and Kornkumjayrit, 2008; Deylami, et al., 2013; Davkhar and Deshmukh, 2021). Moreover, channel geometries are examined with the aim of increasing thermal performance with different configurations added to the channels, including baffles, fins/ribs, and winglets. These modifications, known as VGs, are reported to improve the flow mixing and increase the heat transfer rate due to the turbulator effect. The VGs will expand the contact surface of the fluid, create a swirling flow, and thereby change the flow structure. Flow and thermal characteristics of VGs with different geometries have been investigated by researchers. Very high heat transfer improvement has been achieved in studies on this subject (Li and Gao, 2017; Modi and Rathod, 2019).

Promvong et al. (2020) experimentally and numerically investigated thermal efficiency using a heat exchanger with discrete V-type winglets. The results revealed that at a specific winglet height, the smallest pitch length ensured the highest Nusselt number and pressure drop. The thermal and frictional behaviors of a triangular VG in a channel with different cross-sectional areas were analyzed by Tian et al. (2020). They found that VGs significantly enhanced heat transfer performance. Islam et al. (2021) conducted experimental work to examine the flow and heat transfer of delta-shaped VGs in heat exchangers. They reported that longitudinal vortices, induced vortices, and circulation zones led to significant heat transfer improvement. Bidar et al. (2021) presented a comprehensive review study of the effects of different types of VGs in improving thermal performance in heat exchangers.

VGs considerably enhance thermal efficiency, but they cause significant pressure drop due to restriction of the flow field in the channel. In order to diminish the friction loss caused by VGs while keeping the heat transfer rate as high as possible, some researchers proposed perforated VGs with various hole ratios (Skullong et al., 2016; Kumar and Kim, 2016; Ameer et al., 2021; Ganie et al., 2022; El-Habet et al., 2022). Ibrahim et al. (2019) presented an experimental and numerical exploration of the hydraulic and thermal characteristics of perforated and non-perforated fins and reported that perforated fins had better thermal improvement with decreased pressure drop. Al-Said (2020) numerically analyzed thermal efficiency for different parameters in an air heater with perforated curved baffles together with pressure difference. He reported that the highest thermal performance of the air heater was approximately 77% at a hole diameter of 3 mm, and a curved baffle angle of 7°. Boukhadia et al. (2018) numerically researched the effects on flow and heat transfer of triangular, circular, and rectangular perforated baffles for a heat exchanger. They found that perforated baffles caused the smallest pressure drop and circular perforated baffles provided the best heat transfer improvement.

According to review of the current literature, the effects of wavy channels in different geometries and solid or perforated VGs added into the channel in different configurations on flow and heat transfer have been investigated. No study has been found in the literature comparing the flow and heat transfer of a periodic corrugated channel with solid and perforated winglets under steady laminar flow conditions. Therefore, in this work, the effects of winglets on flow and heat transfer in a grooved channel with non-winglet, solid winglet, and perforated winglet configurations are numerically explored.

NUMERICAL STUDY

The geometry of the periodic corrugated channels with non-winglet, solid winglet, and perforated winglet configurations is given in Figure 1. The height of the channel is $H = 12$ mm. At the inlet and outlet of the channel, there is an unheated flat section of $L_1 = 5H$ and $L_3 = 10H$, respectively, and the length of the corrugated channel is $L_2 = 14H$. The other dimensions of the channel and winglets are given in Table 1.

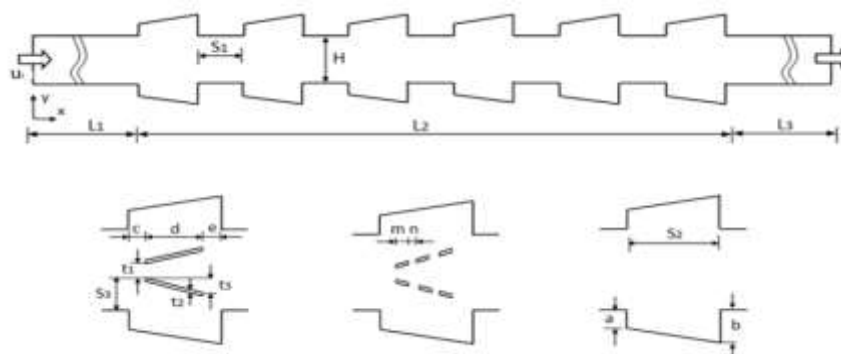


Figure 1. The geometry of the numerical model.

Numerical solutions are applied for five different Reynolds number (Re: 200, 400, 600, 800, 1000). Water is used as the working fluid and aluminum is considered as the channel material.

Table 1. Dimensions and symbols of the channel and winglets (mm).

Symbol	S ₁	S ₂	S ₃	a	b	c	d	e	t ₁	t ₂	t ₃	m	n
Value (mm)	12	18	5.0	2	5	3	8	7	2	0.3	3.0	2	1.2

The fluid is incompressible, single-phase, and Newtonian-type, the flow is unsteady, two-dimensional, and in a laminar regime. Fluid properties do not change. Gravity and viscous terms are neglected. Heat transfer with radiation is ignored. According to this assumptions, the following equations are used.

$$\nabla(\rho u) = 0 \tag{1}$$

$$\frac{\partial(u_i u_j)}{\partial x_i} = -\frac{\partial p}{\partial x_i} + \frac{1}{\text{Re}} \nabla^2 u_j \tag{2}$$

$$u_i \frac{\partial T}{\partial x_i} = \frac{1}{\text{Re Pr}} \nabla^2 T \tag{3}$$

Solutions are achieved with the FLUENT 15.0 program (2015) and simulations are solved with the SIMPLE algorithm. The convergence criterion is accepted as 10^{-7} for all equations.

The Reynolds number (Re) is calculated as follows:

$$\text{Re} = \frac{\rho u D_h}{\mu} \tag{4}$$

Here, ρ is the density of fluid, μ is the dynamic viscosity of the fluid, and u is the mean fluid velocity.

The heat transfer is calculated with the local Nusselt number (Nu_x), which is written as follows:

$$Nu_x = \frac{h D_h}{k_f} \tag{5}$$

Here, k_f is the thermal conductivity coefficient of the fluid and h is the convective heat transfer coefficient. The average Nusselt number can be calculated as follows:

$$Nu = \frac{1}{L} \int_0^L Nu_x dx \tag{6}$$

The friction factor (f) is given by the following equation:

$$f = \frac{2 \Delta P D_h}{\rho u^2 L} \tag{7}$$

In this study, solutions for different grid numbers are compared and a grid-independent solution is obtained. After 77920 grid numbers, the difference between Nusselt numbers was determined to be less than 1%. Therefore, the mesh number of 77920 was adopted for the numerical model.

The inlet temperature of the fluid is $T_o = 293$ K. At the channel entrance and outlet, the “velocity inlet” and “outflow” boundary conditions are used, respectively. The lower and upper surfaces of the corrugated channel are maintained at a constant temperature of $T_w = 350$ K. Non-slip and adiabatic boundary conditions are defined for the unheated section at the entrance and exit of the channel.

RESULTS AND DISCUSSION

To confirm the validity of the solutions, the results of the present work were compared with those of the study conducted by Boukhadia et al., (2018). The agreement between the results of literature study and present study is shown in Figure 2.

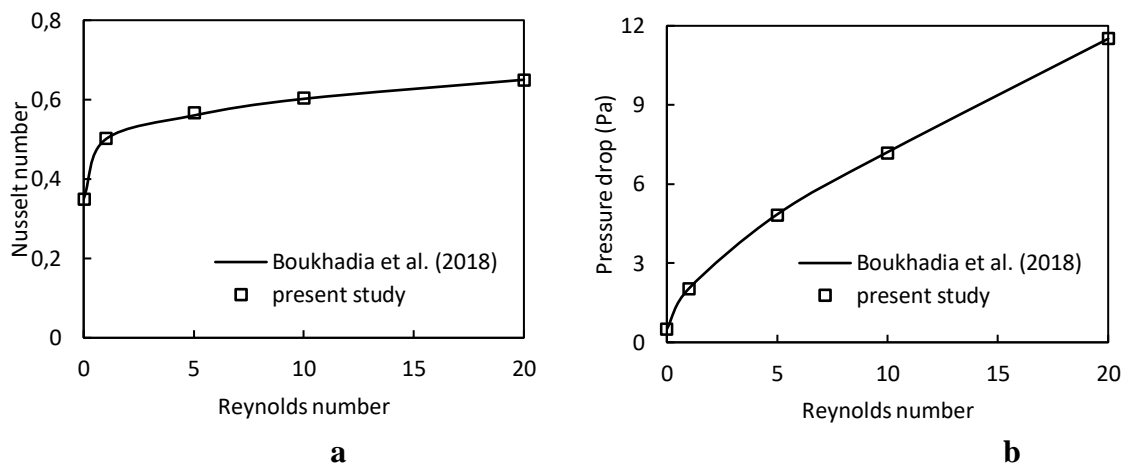


Figure 2. Validation of the numerical study by comparison with literature work.

Figure 3 presents the velocity fields, temperature distributions, and vorticity magnitudes for different Reynolds numbers in the case of without winglet. The Reynolds number affects the velocity, vorticity, and temperature structures. An increment in fluid velocity causes a rising in the mass flow rate of the fluid in the channel and the channel surfaces have more contact with cold fluid. It is seen that the flow loops concentrated at the entrance and exit of the channel throat at $Re = 200$ spread longitudinally into the channel as Re rises. The increasing Re causes these recirculation zones to grow. These structures provide better mixing of the fluid at the surface and in the central region, preventing high temperature gradients along the channel surfaces. From the temperature distributions, it is seen that the channel temperature is lower at $Re = 1000$ than at $Re = 200$.

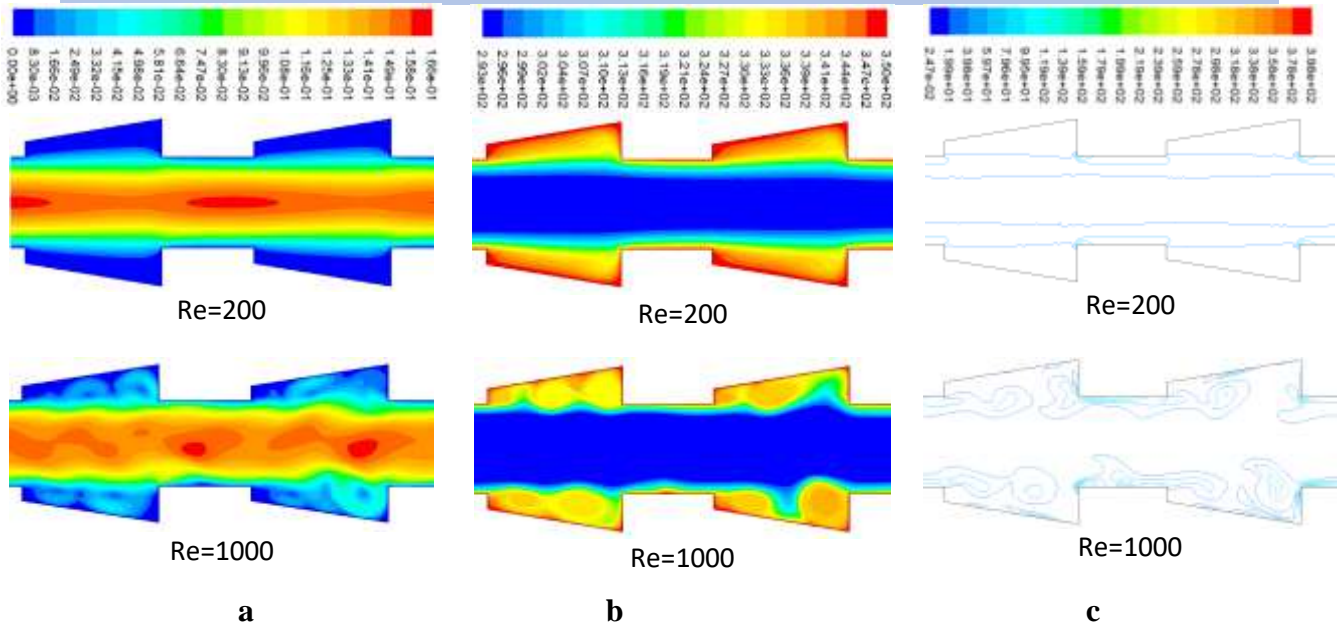


Figure 3. Velocity fields (a), temperature distributions (b), and vorticity magnitudes (c) for different Re at in the case of without winglet.

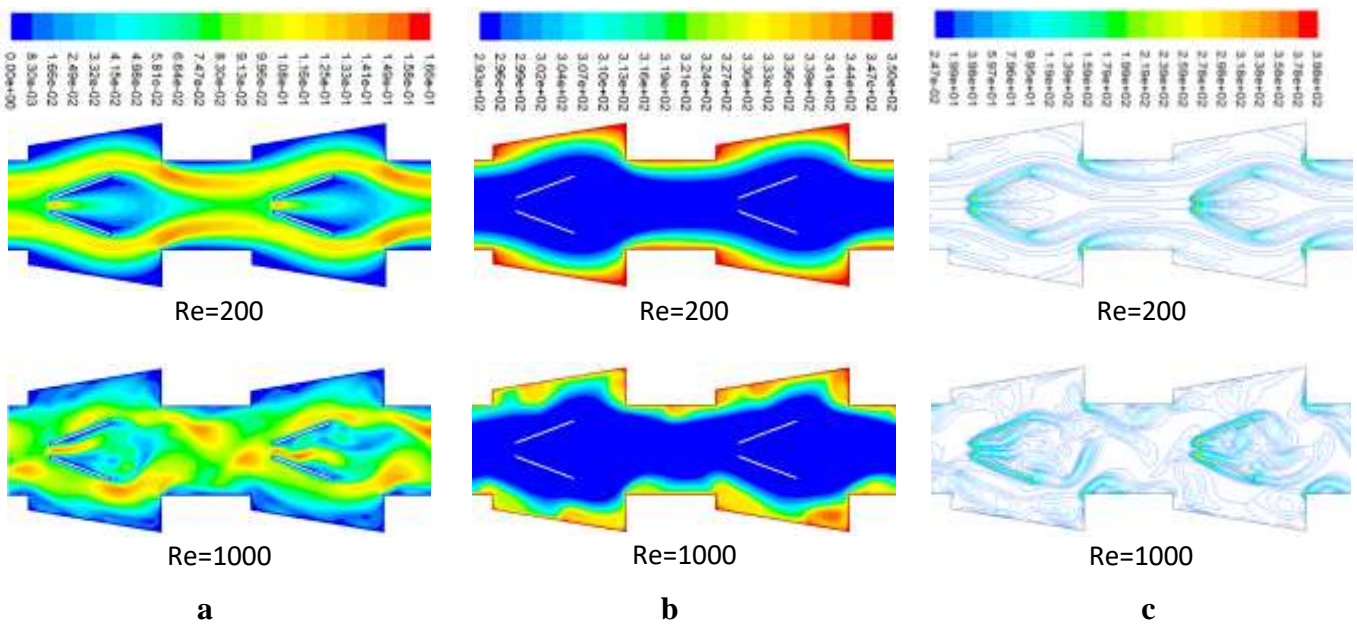


Figure 4. Velocity fields (a), temperature distributions (b), and vorticity magnitudes (c) for different Re at in the case of solid winglet.

Figure 4 shows the velocity fields, temperature distributions, and vorticity magnitudes for different Reynolds numbers in the case of solid winglet. It is seen that the flow passing over the winglets and being split into two branches is recombined again in the throat part of the channel at low Reynolds numbers, but it is not recombined at high Reynolds numbers due to too many flow loops (Figure 4a). The surface temperature of the channel is higher at low Re values and the surface temperature decreases with rising Re values (Figure 4b). The vortices are concentrated around the winglets and in the throat of the channel (Figure 4c).

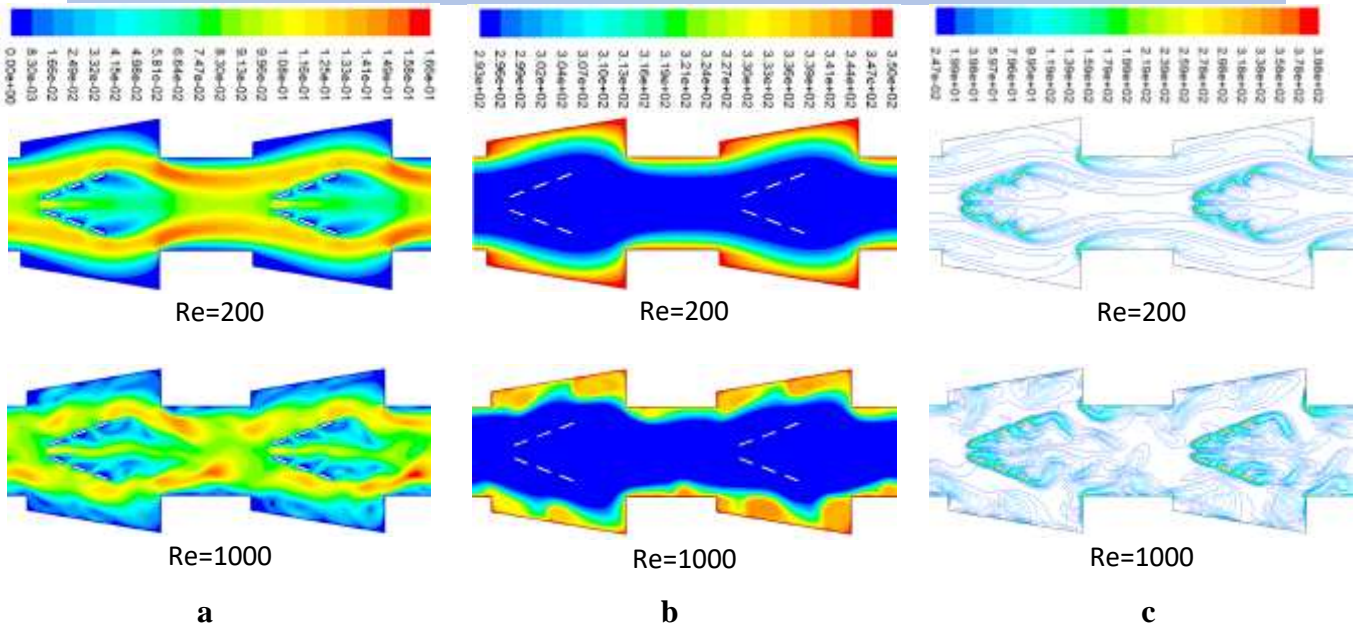


Figure 5. Velocity fields (a), temperature distributions (b), and vorticity magnitudes (c) for different Re at in the case of perforated winglet.

Figure 5 presents the velocity fields, temperature distributions, and vorticity magnitudes for different Reynolds numbers in the case of perforated winglets. Increasing the Re in the channel with perforated winglets also increases the flow oscillations and vortex structures. The holes in the winglets cause the stagnant fluid between the winglets to mix and they also help reduce friction due to the reduced contact area.

For different Reynolds numbers at all channel cases, Figures 6a and 6b show the changes of Nusselt number and skin friction coefficient, respectively. As Reynolds number increases, Nusselt number also increases in each channel case (Figure 6a). It is seen that the highest Nusselt number is obtained for all Reynolds numbers studied in the case of solid winglet. The highest Nusselt number is found to be approximately 8.41 in the case of solid winglet for $Re = 1000$. In Figure 6b, it can be seen that the skin friction factor is highest in the case of solid winglet. The skin friction factor is high in the case of solid winglet due to the large surface area and greater obstruction of the flow area. It is seen that the case of perforated winglet reduces friction loss compared to solid winglet. The highest skin friction factor is found to be approximately 1.13 in the case of solid winglet.

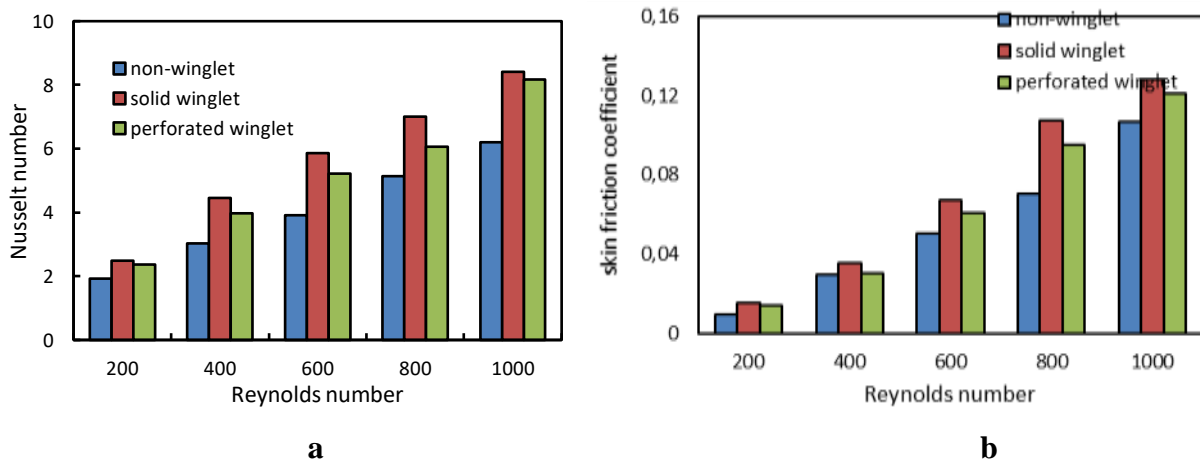


Figure 6. Nusselt number (a), skin friction factor (b) with varying Reynolds number for all channel cases.

CONCLUSION

This study investigated numerically the flow and heat transfer of a grooved channel without/with winglets under steady laminar flow. The effects on the hydraulic and thermal behaviors of Reynolds number were examined and instantaneous flow and temperature distributions in the channel were obtained.

The prominent findings of the study were as follows:

- The flow and temperature contours were highly influenced by winglets.
- Channel geometry, winglets and Reynolds number have considerable effects on heat transfer and friction factor.
- Recirculation zones occurred in the channel due to the winglets and these structures were repeated periodically in each grooved part.
- The heat transfer and friction factor increased with Reynolds number.
- The maximum heat transfer was achieved in the case of solid winglet as $Nu=8.41$ at $Re = 1000$.
- The highest skin friction factor was found in the case of solid winglet at $Re = 1000$.

REFERENCES

- Ameur H, Sahel D, Menni Y 2021. Numerical investigation of the performance of perforated baffles in a plate-fin heat exchanger. *Thermal Science*, 25 (5B): 3629-3641.
- ANSYS Inc. 2015. ANSYS Fluent user guide & theory guide- Release 15.0, USA.
- Bidari MV, Nagaraj PB, Lalagi G 2021. Influence of different types of vortex generators (VGs) to enhance heat transfer performance in heat exchangers. A review. *International Journal of Ambient Energy*, DOI: 10.1080/01430750.2021.1980740.
- Boukhadia K, Ameur H, Sahel D, Bozit M 2018. Effect of the perforation design on the fluid flow and heat transfer characteristics of a plate fin heat exchanger. *International Journal of Thermal Sciences*, 126: 172-180.
- Davkhar NE, Deshmukh NK 2021. Review on analysis of heat transfer and fluid flow characteristics in corrugated duct. *International Journal of Research Publication and Reviews*, 2(1): 262-268.
- Deylami HM, Amanifard N, Sanaei M, Kouhikamali R 2013. Numerical investigation of heat transfer and pressure drop in a corrugated channel. *International Journal of Engineering Transactions A: Basics*, 26(7): 771-780.
- El-Habet MA, Ahmed SA, Saleh MA 2022. The effect of using staggered and partially tilted perforated baffles on heat transfer and flow characteristics in a rectangular channel. *International Journal of Thermal Sciences*, 174: 107422.
- El-Said EMS 2020. Numerical investigations of fluid flow and heat transfer characteristics in solar air collector with curved perforated baffles. *Engineering Reports*, 2: e12142.
- Ganie AH, Memon AA, Memon MA, Al-Bugami AM, Bhatti K, Khan I 2022. Numerical Analysis of laminar flow and heat transfer through a rectangular channel containing perforated plate at different angles, *Energy Reports* 8 (2022) 539-550.
- Ibrahim TK, Al-Sammarraie AT, Al-Taha WH, Salimpour MR, Al-Jethelah M, Abdalla AN, Tao H 2019. Experimental and numerical investigation of heat transfer augmentation in heat sinks using perforation technique. *Applied Thermal Engineering*, 160: 113974.

Islam Md, Nurizki A, Barsoum I, Ayish N, Simmons R 2021. Experimental study of heat transfer and flow of delta winglets inline arrays in a tube heat exchanger for enhanced heat transfer. *Heat Transfer*, 50: 3582–3602.

Kumar A, Kim M-H 2016. Thermal hydraulic performance in a solar air heater channel with multi V-type perforated baffles. *Energies*, 9: 564 (18).

Li Z, Gao Y 2017. Numerical study of turbulent flow and heat transfer in cross corrugated triangular ducts with delta-shaped baffles. *International Journal of Heat and Mass Transfer*, 108: 658–670.

Modi JA, Rathod MK 2019. Comparative study of heat transfer enhancement and pressure drop for fin-and-circular tube compact heat exchangers with sinusoidal wavy and elliptical curved rectangular winglet vortex generator. *International Journal of Heat and Mass Transfer*, 141: 310-326.

Naphon P, Kornkumjayrit K 2008. Numerical analysis on the fluid flow and heat transfer in the channel with V- shaped wavy lower plate. *International Communications in Heat and Mass Transfer*, 35: 839-843.

Promvongse P, Promthaisong P, Skullong S 2020. Experimental and numerical heat transfer study of turbulent tube flow through discrete V-winglets. *International Journal of Heat and Mass Transfer*, 151: 119351.

Skullong S, Promvongse P, Thianpong C, Pimsarn M 2016. Thermal performance in solar air heater channel with combined wavy-groove and perforated-delta wing vortex generators. *Applied Thermal Engineering*, 100: 611–620.

Tian M-W, Khorasani S, Moria H, Pourhedayat S, Dizaji HS 2020. Profit and efficiency boost of triangular vortex-generators by novel techniques. *International Journal of Heat and Mass Transfer*, 156: 119842.

CONTRIBUTION TO THE CHARACTERIZATION OF THE PHYSICO-CHEMICAL
QUALITY OF GROUNDWATER IN THE AL HOCEIMA REGION (MOROCCO).

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Abstract

This study was directed on the Ghis Nekor spring, situated in the north of Morocco. This work means to concentrate on the nature of groundwater in the locale of Al Hoceima for human utilization, and their physicochemical and bacteriological portrayal. As well as the assurance of the essential wellsprings of pollution for their security and their protection as per the Moroccan regulation on water, particularly since this sort of water is exceptionally mentioned by the occupants of the area. The crumbling of water quality in the groundwater of Ghis Nekor is because of an anthropogenic beginning. It can likewise be connected with the disintegration of minerals that make up the dirt. To evaluate the bacteriological and physicochemical nature of groundwater in the Nekor watershed, significant components were dissected in water tests gathered from 17 sources scattered along with the bowl. This examination has uncovered that the water tests are exceptionally accused of vital mineralization (≥ 1400 mg/l). The Piper outline permitted characterizing the predominant hydro substance facies, show that a large portion of the examples in synthetic facies: Chloride sodium and potassium or sulfate sodium and Chloride and sulfate and calcium magnesium. Two significant peculiarities of mineralization were featured based on the vital part examination PCA and the investigation of the proportions of significant components, the disintegration of the stone because of its contact with water, and the commitment of supplements and consequently to the trade and re-energize of the spring. The utilization of the various leveled investigation method HCA prompts three homogeneous gatherings. The bacteriological assessment of this water uncovered huge pollution by waste microbes.

Keywords: Aquifer, Ghis-Nekor, water quality, physico-chemical parameters, bacteriological parameter.

DUALITY THEORY FOR OPTIMISTIC BILEVEL OPTIMIZATION

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Abstract

In this paper, we exploit the so-called value function reformulation of the bilevel optimization problem to develop duality results for the problem. Our approach builds on Fenchel-Lagrange-type duality to establish suitable results for the bilevel optimization problem. First, we overview some standard duality results to show that they are not applicable to our problem. Secondly, via the concept of partial calmness, we establish weak and strong duality results. In particular, Lagrange, Fenchel-Lagrange, and Toland-Fenchel-Lagrange duality concepts are investigated for this type of problems under some suitable conditions. Thirdly, based on the use of some regularization of our bilevel program, we establish sufficient conditions ensuring strong duality results under a generalized Slater-type condition without convexity assumptions and without the partial calmness condition. Finally, without the Slater condition, a strong duality result is constructed for the bilevel optimization problem with geometric constraint.

Keywords: Optimistic bilevel optimization, lower level value function reformulation, duality theory.

RECENT DEVELOPMENTS IN FUNCTIONAL SPORTSWEAR

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Abstract

The Cambridge Dictionary states that sportswear is "clothes that are worn for sports or other physical activities." The Merriam-Webster Dictionary defines sportswear as "clothing suitable for recreation" and more broadly as "clothing designed for casual or informal wear." According to the Macmillan Dictionary, sportswear in British means "clothes used for playing sport" while in American it means "casual clothes" Recently, the term "athleisure" has also been used, combining the terms "athlete" and "leisure." On the one hand, athletic-inspired clothing is now standard everyday wear, especially among the younger generation. On the other hand, the sports industry encompasses a wide range of functional and protective activewear that borders on technical textiles in its properties and performance. Both recreational and competitive sportswear have become increasingly sophisticated due to rapid developments in fibre and fabric technology, modern garment construction methods and seamless knitting techniques. These influences have translated into products ranging from extreme sports and adventure travel to corporate and casual wear. In sports, recreational athletes often use advanced equipment that is identical or similar to that worn by competitive athletes because it offers better performance and greater safety. A new concept such as "bodymapping" is ideal for professional and amateur sports. Bodymapping clothing can be additionally treated to offer antimicrobial, anti-odour, and moisture-management properties to provide true multifunctionality. Smart textiles and clothing have much more dynamic properties than conventional textiles and clothing. "Passive smart textiles," which do not change their properties in response to changing environmental factors, have been perfected by integrating electronics into their structure, resulting in "active smart textiles." Sporttech is the intersection of sports and modern technology, which can be used as a platform for the success of textile/clothing brands.

Keywords: sportswear, athleisure, sportech, smart textiles, wearable technologies, bodymapping, sustainability.

INTRODUCTION

Innovation and development in the textiles and clothing is accelerated by the automotive/transportation industry in general, agriculture, construction, footwear, sports, and the medical industry. Close contacts between designers, development engineers, yarn and fabric manufacturers and suppliers, textile machinery manufacturers, and direct users of textiles and clothing are leading to strategies aimed at producing and selling innovative multifunctional and sustainable products. These strategies, which also apply to sports textiles and clothing are leading to a gradual transition to a circular economy.

Recently, there has been a focus on social responsibility in the management of resources in the textile and clothing industry. Attention has been paid to the reuse, recycling and upcycling

of raw materials and the minimisation of waste. Sustainable preparation, textile and clothing manufacturing and finishing processes have been developed.

The Cambridge Dictionary states that sportswear are "clothing worn for sports or other physical activities." The Merriam-Webster Dictionary defines sportswear as "clothing suitable for recreation" and more broadly as "clothing designed for casual or informal wear." According to the Macmillan Dictionary, sportswear in British means "clothes used for playing sport" while in American it means "casual clothes".

Based on the definitions, sportswear is a broad term that includes not only clothing for sports activities, but also everyday clothing. This is in line with today's lifestyle, where comfortable and relaxed clothing is welcome in our leisure time, as opposed to work and business attire. Nowadays, we often wear functional sports clothes and shoes such as anoraks, polo shirts, fleece sweaters, trainers, etc. in our free time, even if we are not actively engaged in sports at the time of wearing.

Sportswear or athleisure has also reached street fashion and even high fashion. Many modern fashion brands offer sportswear lines and collections for men, women and children. In recent days and even in the past, many fashion designers have designed professional sportswear collections. Like Jean Patou for tennis player Suzanne Lenglen in the 1920s and Stella McCartney in 2017 for Adidas and Wimbledon player Garbine Muguruza. (Tennis Buzz, 2017)

There is another term for sportswear. From the Cambridge dictionary, "An athlete is a person who is very good at sports or physical exercise, especially one who competes in organized events." Merriam-Webster defines "athlete" as a person who is trained or skilled in exercises, sports, or games requiring physical strength, agility, or stamina." So we can say that athletes wear "athletic wear."

Recently, the term "athleisure" has also been used, combining the terms "athlete" and "leisure". The Cambridge dictionary defines athleisure as "a style of clothing that is comfortable and suitable for doing sports, but also fashionable and attractive enough to wear for other activities." Merriam-Webster defines athleisure as "casual clothing designed to be worn both for exercising and for general use."

Athleisure is a hybrid sports trend with outfits that look like sportswear. It can be considered a fashion industry movement enabled by improved textile materials with multiple functions that make sportswear more versatile, comfortable, safe and fashionable. The influences of science, technology and fashion are reflected in products ranging from extreme sports and adventure travel to corporate and casual wear. High-tech and high-performance materials and concepts can be used for athleisure. (Gosselin, 2020; John, 2021)

CONTEMPORARY SPORT TEXTILES - SPORTECH

On the one hand, sports-inspired clothing such as athleisure is now standard in everyday life, especially among the younger generation. On the other hand, the sports industry encompasses a wide range of functional and protective activewear that borders on technical textiles in its properties and performance. Both recreational and competitive sportswear have become increasingly sophisticated due to rapid developments in fibre and fabric technology, modern garment construction methods and seamless knitting techniques. In sports, recreational athletes often use advanced equipment that is identical or similar to that used by competitive athletes because it offers better performance and greater safety. Functional technical textiles and apparel intended for use in sports are referred to as sportech. (Kiron, 2021)

Sportech are technical textile products used in sports and recreation. They include sportswear, sports goods, and sports accessories. Sportswear is clothing with performance-enhancing

properties such as moisture management, comfort, stretch and recovery, UV and antimicrobial protection, etc. Sports goods are active sporting items for the specific sport, such as inflatable balls for football, volleyball or rugby, field hockey sticks, golf clubs, etc. Sports accessories are playing equipment such as nets, rings, etc., to create the necessary playing conditions. (Anandhakumar, 2021a; Anandhakumar, 2021b)

The increasing interest in active sports and outdoor recreation has led to immense growth in the consumption of textile materials in the manufacture of sports and recreational (leisure) clothing, goods and equipment. As the graph shows, world trade in sports textiles is growing rapidly. Taking 2000 as the base year, world trade in sportech has tripled since the beginning of the century, while the figures for outerwear and fabrics and leather are significantly lower. The basis for the sector's significant growth appears to be changes in fashion and consumer habits internationally. In particular, two major macro trends are significantly influencing consumer choices. (Antonini, 2019)

On the one hand, the increasing focus on health and wellness is encouraging behaviors that focus on personal care and outdoor living. On the other hand, fashion houses are increasingly offering casual and informal clothing, i.e., athleisure. (Vogue Business, 2021; Business Wire, 2022)

FUNCTIONAL SPORTSWEAR CHARACTERISTICS

Functional sportswear has some special features, which have become possible thanks to the use of high-tech and smart materials and modern textile processes. The latest trends in the textile and clothing industry show the importance of thinking outside the box and using non-textile and non-clothing technologies in the production of sportswear to achieve maximum functionality, comfort, wellbeing and safety.

There are some general features that are very important for sportswear, while each sport requires sportswear with targeted and specific functions.

- Sportswear should not restrict the movements of the body.
- It should enable better performance.
- It must ensure safety.
- Sportswear must be easy to wear, easy to handle and easy to maintain.
- A comfortable feel against the skin is also very important.
- Sportswear must be lightweight and able to be packed to a minimum volume.
- Aesthetic appearance is also important, especially in competitive sports where athletes represent an institution or a country. (Anandhakumar, 2021a, Anandhakumar, 2021b)

It is very important that functional sportswear exhibits:

- antistatic performance,
- heat transport function,
- ultraviolet protection performance,
- moisture transport function and
- antimicrobial performance. (Kiron, 2021)

The most important properties of sportswear according to the application and performance are:

- strength,
- stretchability and recovery,
- tear resistance,
- abrasion resistance,
- durability,

- quick drying to keep the skin dry. (Kiron 2021)

RECENT CONCEPTS IN FUNCTIONAL SPORTSWEAR

A number of new concepts for sports textiles have emerged recently, including seamless knitting, body mapping, multifunctionality, smart textiles, wearable technologies and others. Sporttech is the intersection of sports and modern technology that can be used as a platform for textile/apparel brands to succeed.

Seamless knitwear

One of the necessary characteristics of sportswear is comfort, that is, that the body can move freely and the skin is not irritated by seams. The only textile technology used in the production of sportswear that enables the production of seamless clothing is knitting. Seamless circular knitting technology is a revolutionary concept for producing knitwear with almost no seams, combining elements of hosiery knitting with body-size circular knitting. It was first introduced by Santoni in Paris in 1999. To date, it has become an important sub-area of knitting, constantly evolving and always offering innovative solutions. With the advent of electronics, computer-aided design, and control systems, the principles of hosiery knitting could be applied to seamless knitted body parts, integrated waist bands, and shoulder straps to create a seamless body-size garment. (Yu et al, 2006)

The driving force behind the development of seamless knitting continues to be the Italian circular knitting machine manufacturer Santoni, which has developed a range of electronic Seamlesswear circular knitting machines over the past 20 years, making it the world leader in this technology. The seamless garment technology is the ultimate knitting technology in the weft knitting. It was initially used for the production of innerwear. Due to the minimal number of seams and the absence of elastic bands and tags, innerwear produced on seamless machines is very comfortable to wear. Because of the unlimited pattern possibilities, seamless technology is now being used to produce very exclusive outerwear.

Seamless technology is a must for producing compressed garments for sportswear that fit closely to the body. The absence of seams that rub against the body is a must to make the garment wearable and more comfortable. Sportswear must also have pores in certain areas to allow air to flow through or sweat to evaporate. In addition, sportswear is usually complemented by bright stripes and logos to increase visibility and recognition. For sports such as running, cycling, and climbing that are performance-oriented, seamless sportswear provides additional protection through knitted structures with calibrated compression that act as reinforced zones (Santoni, 2022).

Therefore, seamless knitting offers a unique combination of properties such as comfort, a smooth fit, support, breathability, light weight, an aesthetic appearance and easy maintenance. The structure can consist of different layers with specific constructive properties, constructed zones (bodymapping) and wellness applications, and different elasticity in different areas of the body, resulting in excellent body fit. Seamless knitting also allows a wide range of color and texture patterns. The variety of seamless garments therefore includes activewear, athleisure wear, casual wear, medical wear, swimwear and underwear. The fabric knitted on the seamless knitting machine can have a combination of different structures: single jersey, mesh, rib, jacquard, as well as Santoni's patented anti-drop stitch. (Knitting industry, 2018; Santoni, 2022)

Bodymapping

Before bodymapping was introduced, sportswear usually consisted of only one type of textile material. In many cases, this proved unsatisfactory in terms of comfort. In order to meet the

different requirements for moisture wicking, insulation and weather protection, athletes often had to wear several layers of clothing on top of each other, according to the "onion-skin principle". The principle of so-called bodymapping is an invention of the company W.L.Gore & Associates from 2006. Bodymapping takes into account the spatial distribution of heat and moisture production in the different body regions by using different textile materials. Based on the findings about thermoregulation, it makes sense to develop clothing, especially for sportswear, that is adapted to the needs of different parts of the body so that it is comfortable to wear. For example, a windproof textile material on the chest and back would keep out the cold wind, while a textile material under the armpits that is particularly breathable and moisture-wicking would ensure that it stays dry there. (Knitting Industry, 2011)

Therefore, the production of bodymapping sportswear has become the basis of the material and mechanical functionalisation of knitwear, because the thermal regulation of sports activities is different in different parts of the body. In sportswear that fits closely to the body, areas are designed with different materials and structures, resulting in different performance characteristics. Functionalised fabrics and garments can be thicker in some areas and thinner in others. Ventilation may be present in key areas prone to heat buildup - such as the lower back, under the arms and behind the knees (Figure 1).

Bodymapping garments can be developed in three ways:

- using and placing different fabric materials to different clothing parts,
- altering the fabric weave/knit structures within a piece of the target fabric (i.e., fabric with multiple weave/knit structures), and
- a combination of the above approaches. (Wang et al, 2014)

The most important thing about the construction of bodymapped garments is that there are no seams. A seamless knitting technique is usually used, which reduces fabric waste while maximising comfort.

The advantages of using bodymapping clothing over conventional clothing are:

- seamless transition from one pattern to another to highlight body parts,
- improved comfort, support and breathability,
- light contouring,
- precise fit that allows maximum freedom of movement,
- pleasant feeling on the skin,
- improvement options with adjustable waistbands, reflective details for better visibility and more,
- treatment option with antimicrobial, anti-odour and moisture management properties,
- sustainable production with environmentally friendly yarn. (Apex Mills, 2020)



Figure 1. Seamless bodymapping clothing from Shima Seiki, presented at Itma 2019 in Barcelona.

The bodymapping concept is constantly being developed and improved. Salewa, for example, has reinterpreted the bodymapping principle (the right fabric in the right place) in a very original way, not only selecting a mix of materials with different thicknesses and structures, but also using complementary fibres (carbon, windproof membrane, wool) on a strong Dryarn base to achieve the common goal of creating an optimally functional line of high-performance underwear. The carbon fibre supports the muscles and provides unparalleled comfort during mountain sports. Dryarn combined with carbon fibres reduces heart rate by 4 beats per minute, decreases lactic acid concentration by 7 to 10% and optimises perspiration output to 3 litres per minute. The windbreak membrane provides optimal wind protection while maintaining breathability. The high-performance membrane is also lightweight and comfortable to wear. Wool fibres are used for optimal comfort in extreme cold. The newly developed structure improves the feeling of comfort when in contact with the skin and allows efficient air circulation. It creates a thermodynamic air cushion that optimises the preservation and distribution of body heat. (Dryarn, 2011)

Smart textiles

The term "smart material" was first coined in Japan in 1989. The first textile material to be called a smart textile was a silk thread with a memory effect. Smart materials in textiles did not appear on the market until the late 1990s. Today, smart textiles are far more complex and are sometimes referred to as wearable computers. Smart textiles, also known as electronic textiles (e-textiles), are fabrics that integrate ultra-thin, flexible and transparent sensors, actuators, electronics, mobile connectivity and even nanogenerators for power. The combination of these components gives smart clothing new functionality that improve its performance and utility for the wearer compared to its non-smart counterparts. Smart fabrics are intelligent systems that can observe or communicate environmental conditions and detect and process the wearer's condition. They use electrical, thermal, mechanical, chemical,

magnetic and other inputs and outputs (Figure 2). The electrical materials used in smart garments should not affect the comfort of conventional garments made of textile materials. One of the main challenges for smart clothing is the requirement to achieve and combine various properties such as flexibility, user comfort, and the ability to miniaturise the components. To achieve this, researchers are using different materials such as nanomaterials, polymers, dielectric elastomers and composites. These are tailored to a specific application depending on their characteristic behavior in response to different stimuli. (Technofashionista 2021; Nanowerk, 2022)



Figure 2. Smart balaclava (with the built-in heating area around the mouth, to warm the cold air before it hits the lungs) from Stoll, presented at Itma 2019 in Barcelona.

Smart textiles are classified into three types based on their performance: passive, active, and ultrasmart. Passive smart textiles are the first generation of smart textiles that detect external conditions, such as UV protective clothing, conductive fibers and so on. Since they are just sensors, passive smart textiles can only sense their environment. Passive materials usually do not adapt based on the information they perceive. When environmental conditions change, the fabric remains unchanged. Active smart textiles adapt and change the way they function in response to changes in the external environment or human input, such as motion or weather. These fabrics can change shape, store and control heat, and perform other functions. Ultrasmart textiles sense, respond and adapt to environmental situations in the same way as active intelligent textiles, but they go one step further. They sense, respond, monitor and adapt to stimuli or environmental conditions such as thermal, mechanical, chemical, magnetic or other sources. An ultrasmart textile consists of a unit that functions much like a brain, with cognitive, reasoning and activating capabilities. (Technofashionista 2021)

Wearable technologies

Wearable technology, also known as "wearables," is a category of electronic devices that can be worn as accessories, embedded in clothing. They are hands-free devices powered by microprocessors that can send and receive data over the Internet. They detect, analyze and

transmit information about body signals such as vital signs and/or environmental data and provide biofeedback to the wearer. For most sports, however, it is advantageous if the athlete's equipment is not too heavy and bulky, so adding electronics is a major problem. In sports, wearable technologies are used to achieve better results, track athletes' physical condition, and ensure safety. Examples of wearable technologies in sports include body monitoring systems and data such as electrocardiogram (ECG), respiration, temperature, fluid balance, acceleration, position, etc. (McCann & Bryson, 2009)

Polar Electro was the first wireless heart rate monitoring system, launched in 1982. (McCann & Bryson, 2009) In 2006, Apple launched its first activity tracker, the Nike+iPod Sport Kit, which combined the popular Cupertino music player with a smart pedometer. It featured a miniature sensor that fit under the insole of a Nike+ shoe. A similarly sized receiver was plugged into an iPod nano to track workouts. It was Apple's first step toward mobile health-tracking initiatives. The introduction of the Nike+iPod Sport Kit coincided with a broad push toward health-oriented devices across the technology industry. (Dormehl, 2021) Later that year, the Nintendo Wii joined the trend with motion-controlled games like Wii Sports. More recently, Apple has been working on smart fabric buttons that can be integrated into regular clothing, turning it into smart clothing. The smart fabric buttons contain a range of sensors, from optical, ambient light, temperature, and air gesture sensors to proximity sensors and health information collection technologies. Electronic devices could be integrated into wearable structures such as a watch band, hat, glove, or shirt. (Kozuch, 2021; Hart, 2021).

Multifunctionality

Functional properties of sportswear can be defined as all effects that go beyond purely aesthetic and decorative functions. Often, multiple functions are required, leading to what we can call "multifunctional textiles and clothing" (Almeida, 2021), which also applies to sportswear. In short, multifunctionality is a concept that reduces the need for numerous products with individual functions. The need to develop the concept of multifunctionality arose because some functional problems related to clothing could not be solved simply by combining different materials or structures, creating a technological and performance barrier.

Multifunctional materials represent a major step in product development because they efficiently combine structural properties with added functionality. Many of these products are inspired by nature, where size and weight are often critical and multifunctionality is a necessity rather than a luxury. Desert beetles, butterflies and electric eels, for example, have incorporated useful thermal, optical and electromagnetic properties into their body structures. The potential for using multifunctional materials spans a wide range of market sectors and products. Multifunctional materials also have the potential to support the sustainability agenda. For example, structures could be designed for reuse or recyclability through the use of smart materials or components. (Materials UK, 2022)

In the future, our wardrobe will be multifunctional and high-performance. Consumers will tend to buy fewer but better things that take more work off their shoulders. Stella McCartney's latest category speaks directly to this trend. She has launched Stellawear, a line that combines swimwear and lingerie collections, with pieces that defy categorization. A bodysuit can double as a maillot, and a sports bra can double as a bikini top. Made from recycled nylon with eco-friendly stretch and laser-cut details, the collection is McCartney's most eco-friendly lingerie collection ever. Fewer pieces also mean you have to worry less about what to wear. (Farra, 2020)

Sustainable design and engineering

There are many descriptions and definitions for the term "sustainability". A fairly compact definition has been offered by the World Commission on Environment and Development:

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"Meeting the needs of the present without compromising the ability of future generations to meet their own needs". (United Nations, 1987)

Attention to issues such as sustainability, environmental protection and health is growing both in public opinion and among policy makers. In this context, the textile and clothing industry as a whole, as well as individual sectors such as the technical textiles and clothing sector, including sportech, are considering adopting sustainable development as a business model that pays more attention to environmental issues. However, the path to sustainability as a means to promote growth requires innovation, both technological and cultural. (ACIMIT, 2015)

Product design and development as well as production planning play a fundamental role in the design and manufacture of sustainable products. This is particularly true for the design of functional and technical textiles and clothing, including sportech, which is a complex and interdisciplinary process involving a team of professionals with a wide range of expertise from different industries. In recent years, attention and sensitivity to ethical and environmental issues has increased, leading to greater awareness among individuals and attention-grabbing initiatives through various campaigns.

Sustainable design and engineering, including product life cycle thinking and sustainable assessment, is becoming increasingly important in the textile industry, including sports textiles. Textiles and clothing for sports that use sustainable materials, innovative production processes, and after-treatments that add higher value are often marketed as prestigious brands. It is true that sustainability that is not fake can only increase its value and reputation. Patagonia, for example, an outdoor and functional (sports) apparel company, has carefully and strategically developed its sustainable concept and image. The company prides itself on its inventiveness and is always looking for the best and most environmentally friendly way to produce its goods. Their criteria for the best product are based on function, repairability, and most importantly, durability. They are committed to the most direct ways to limit ecological impact by developing goods that can last generations or be recycled. The brand, which constantly urges consumers to consider the environmental impact of their purchases, ran the famous "Don't Buy This Jacket" ad on Black Friday, its sale day in 2011. It was published on a full page in the New York Times, urging viewers not to buy the jacket and why. The message behind the campaign was to encourage people to consider their impact on the environment and only buy what they need, inspiring consumers to think twice before buying. It's no surprise that the ad attracted a lot of attention in a country where consumption is associated with cultural identity. The result was that the company's sales increased by about 30% in the nine months following the ad. They donated all of their revenue to environmental groups (Lleshi 2021; Patagonia 2021).

Above all, functional and sustainable textiles and clothing, including sportswear, are some of the most innovative being designed today, and together they are driving the rest of the industry. Sustainability is no longer an option, it's a must.

Circular economy

The last 150 years of industrial development have been dominated by a one-way or linear model of production and consumption in which goods are produced from raw materials, sold, used, and then disposed of as waste. This model has been extraordinarily successful in providing affordable products to consumers and material well-being to billions of people. In developed economies, it has largely supplanted the traditional economy, which provided for more reuse and regeneration but required more labour and yielded lower returns on investment. (Ellen Macarthur Foundation, 2013)

Nevertheless, the performance of the linear model reaches a limit. The durability of the design and the required durability in use are often not well matched. Clothing today often does not

reach its theoretical end of life at all because its use does not match the intent of its design. Clothing currently accounts for a significant amount of waste in the form of garments that are discarded at the end of their useful life. (Ellen Macarthur Foundation, 2013) Increasing the durability, repairability, and longevity of clothing requires engaging stakeholders throughout the value chain, from manufacturers and brands to consumers. This includes manufacturing durable clothing, marketing clothing as garments that can be worn beyond a short micro-season, and convincing consumers to play a role in finding a second home for garments they no longer using. (Amundi Institute, 2022)

The circular economy is a counter-movement to the current linear industrial model of 'take-make-dispose', which is concerned with the increasing exploitation of environmental resources. It is conceived as a self-containing closed-loop system that aims for zero waste by maximizing reuse, repair, remake, and recycling in conjunction with minimizing consumption practices. (Fehrer and Gerke, 2020)

The concept of the circular economy promises a way out. Here, products do not quickly become waste, but are reused to gain their maximum value before returning safely and productively to the biosphere. There are profitable circular opportunities to reuse end-of-life clothing, which can not only be worn again but also passed on to other industries to make insulation or filling material, or simply recycled into yarn to make fabrics that save new fibre. (Ellen Macarthur Foundation, 2013)

Sports brands are also evolving their development and production strategies toward a circular economy. Nike's vision for the circular economy, for example, is rooted in bold, science-based goals that draw on more than 30 years of research into ways to reduce environmental impact. This deep commitment to sustainability is driven by the belief that protecting the future of sports means nothing less than protecting the future of the planet. That means sourcing better materials, rethinking design methods and manufacturing processes, and getting products back from athletes to refurbish or recycle. (Nike News, 2022)

CONCLUSIONS

Technical textiles, including textiles for sports, are the fastest growing sector of the textile industry. They are developed and manufactured to meet the demanding and high-performance requirements of products for special use in sports. On the one hand, they are used as everyday leisure wear and by recreational athletes, and on the other hand, they help competitive athletes achieve their goals and best results. Both recreational and competitive sportswear have become increasingly sophisticated due to rapid developments in fibre and fabric manufacture technology, modern garment construction methods and seamless knitting techniques. Paradoxically, recreational athletes often use advanced equipment that is identical or similar to that of competitive athletes, even if they do not exploit its full potential, but simply because it looks good and also offers better performance and greater safety.

Sportswear is a very versatile sector due to the variety of materials used, the technologies chosen and the optimization and functionalization during the design and production process. However, in line with trends and the evolution of textiles and clothing as a whole, the development of textiles for sports today focuses on sustainability, well-being, multifunctionality, smart options and safety.



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REFERENCES

- ACIMIT Servizi (ed) 2015. The ACIMIT green guide 2015. MCL Global, Normanton, 56 pp.
- Anandhakumar J. Developments in sports textiles. Available at: <https://www.textiletoday.com.bd/developments-in-sports-textiles/> [15.08.2021a]
- Anandhakumar J. Technological Developments In Sports Textiles. Available at: <https://textilevaluechain.in/in-depth-analysis/technological-developments-in-sports-textiles/> [24.09.2021b]
- Almeida L. Functionalisation of textiles - Future perspectives. Available at: <https://www.technicaltextile.net/articles/functionalisation-of-textiles-3174> [30.03.2022]
- Amundi Institute 2022. The wheels of a Circular Economy go round and round - N°5 The fashion industry: making circular the “new look” of fashion. Available at: <https://research-center.amundi.com/article/wheels-circular-economy-go-round-and-round-ndeg5-fashion-industry-making-circular-new-look-fashion> [20.01.2022]
- Antonini M. Technical Textile for Sportswear: a Fast-Growing Business at an International Level. Available at: <https://www.exportplanning.com/en/magazine/article/2019/10/02/technical-textile-for-sportswear-a-fast-growing-business-at-an-international-level/> [02.10.2019]
- Apec Mills 2020. Body Mapping Technology for Textiles. Available at: https://www.apexmills.com/media_post/body-mapping-technology-for-textiles/ [24.07.2020]
- Business Wire. Sports & Fitness Clothing Industry Assessment, 2022 & Beyond, Featuring Profiles of 556 Competitors - Fitness Routines Change as a Result of COVID-19 - ResearchAndMarkets.com. Available at: <https://www.businesswire.com/news/home/20220315006195/en/Sports-Fitness-Clothing-Industry-Assessment-2022-Beyond-Featuring-Profiles-of-556-Competitors---Fitness-Routines-Change-as-a-Result-of-COVID-19---ResearchAndMarkets.com> [15.03.2022]
- Dormehl L 2021. Today in Apple history: Nike+iPod brings fitness tracking to your pocket. Available at: <https://www.cultofmac.com/437845/today-in-apple-history-nikeipod-brings-fitness-tracking-to-your-pocket/>
- Dryarn 2011. Dryarn® and Salewa. Performance on the peaks. Available at: <https://www.dryarn.com/en/world-en/news-en/dryarn-and-salewa-performance-on-the-peaks/> [18.02.2011]
- Ellen Macarthur Foundation 2013. Towards the circular economy. Opportunities for the consumer goods sector. 96 pp. Available at: <https://emf.thirdlight.com/link/x8ay372a3r11-k6775n/@/preview/1?o>
- Farra E. Stella McCartney Is Launching a New Category That "Can Do It All". Available at: <https://www.vogue.com/article/stella-mccartney-stellawear-multi-functional-swimwear-activewear> [09.09.2020]
- Fehrer J, Gerke A 2020. Circular Economy and Circular Business Models in Sports Circular Economy. Available at: <https://www.researchgate.net/publication/345770860> [12.11.2020]

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

Gosselin V. Athleisure wear: A trend movement in the fashion and sportswear industries. Available at: <https://www.heuritech.com/articles/trends/athleisure-wear/> [26.10.2020]

Hart S 2021. How Apple plans to turn your jacket into an iPhone. Available at: <https://www.t3.com/news/apple-turn-your-jacket-into-an-iphone> [24.02.2021]

John L. Athleisure – Sportswear Become A Fashion Trend 2021. Available at: <https://garmentprinting.com.au/blog/athleisure-2021/> [13.09.2021]

Kiron MI. Raw Materials of Sportswear Textiles: Characteristics and Types. Available at: <https://textilelearner.net/sportswear-properties-types/> [07.07.2021]

Knitting industry. Circular Knitting. Comfort Mapping to enhance next generation sportswear. Available at: <https://www.knittingindustry.com/comfort-mapping-to-enhance-next-generation-sportswear/> [23.03.2011]

Knitting industry. Textiles Intelligence. Seamless knitting and stitch-free seaming in performance apparel. Available at: <https://www.knittingindustry.com/seamless-knitting-and-stitchfree-seaming-in-performance-apparel/> [18.07.2018]

Kozuch K 2021. Forget Apple Watch 7 — new Apple patent reveals smart clothing. Available at: <https://www.tomsguide.com/opinion/forget-apple-watch-7-new-apple-patent-reveals-smart-clothing> [25.02.2021]

Lleshi J. York StJohn Blogs. Jovana Lleshi's blogs. Available at: <https://blog.yorksja.ac.uk/jovanalleshi/> [23.3.2021]

Materials UK. Multifunctional materials. Reports 2006. Available from: <http://www.matuk.co.uk/docs/Multifunct.pdf> [31.3.2022]

McCann J, Bryson C 2009. Smart clothes and wearable technology. Cambridge: Woodhead Publishing, 459 pp.

Nanowerk. Smart Textiles and Smart Clothing – The New Black for the Internet of Things. Available at: <https://www.nanowerk.com/smart/smart-clothing.php> [01.14.2022]

Nike News. How Circularity Drives Sustainable Innovation at Nike. Available at: <https://news.nike.com/news/how-circularity-drives-innovation-at-nike> [10.03.2022]

Patagonia. Core values. Available at: <https://www.patagonia.com/core-values/> [24.11.2021]

Santoni. Seamless. Available at: <https://www.santoni.cn/en/seamless> [29.03.2022]

Techfashionista. Smart Textiles In Fashion: What They Are, Types & Exciting Examples. Available at: <https://thetechfashionista.com/what-are-smart-textiles-and-examples/> [06.11.2021]

Tennis Buzz. Wimbledon 2017: Garbine Muguruza outfit. Available at: <https://tennisbuzz.com/wimbledon-2017-garbine-muguruza-outfit/> [26.06.2017]

United nations 1987. Our common future. Report of the World Commission on Environment and Development. Available at: <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf> [20.03.1987]

Vogue Bussiness. Comfort and wellness set to define luxury in 2021. Available at: <https://www.voguebusiness.com/consumers/comfort-and-wellness-set-to-define-luxury-in-2021> [08.01.2021]

Wang F, Del Ferraro S, Molinaro V, Morrissey M, Rossi R 2014. Assessment of body mapping sportswear using a manikin operated in constant temperature mode and

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

thermoregulatory model control mode. *International journal of biometeorology*, 58(7):1673-82. doi: 10.1007/s00484-013-0774-4

Yu W, Fan J, Harlock SC and Ng SP (eds.) 2006. *Innovation and technology of women's intimate apparel*. Cambridge: Woodhead Publishing, 248 pp.

NON-NEWTONIAN STEADY FLOW FLUIDS OVER A PAIR OF GROOVED
CYLINDERS IN TANDEM ARRANGEMENT

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Abstract

The steady laminar flow of incompressible non-newtonian fluids around a pair of parallel grooved cylinders has been numerically investigated. The pressure, friction and total drag coefficients, the streamlines velocity, pressure coefficient have been studied in this research; the primary objectives of this study are to find out how the power-law index affects the drag coefficient, as well as how the sinusoidal form grooved affects the hydrodynamics of the fluid. The present study reports on a groove amplitude of 0.04. The sinusoidal shape grooves were chosen at 10, evenly spaced around the diameter of the cylinder, over a Reynolds number up to 40. The power-law index was determined to be 0.4, 1, and 1.8, while the Gap ratio between the cylinders is 2. The numerical approach used in this simulation is based on the finite volume method with a radial and circumferential resolution of 600x130 grid points, respectively.

The predicted results show an excellent agreement with the available results in the literature for both upstream and downstream cylinders. It can be seen that the presence of the grooves on the surface of the cylinders leads to a marked reduction in the total drag coefficient for both cylinders. Where this trend is more pronounced as the power-law index increases.

Keywords: Drag Coefficient, Grooved, Non-Newtonian, Tandem, Steady.

EFFECTS OF CLIMATE CHANGE ON REAL ESTATE VALUE

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Abstract

The human activities are the main cause of climate change. The impact of this change is multiple on the environment such as : drought, water scarcity, salinization, frequent storms, glacier melting and sea level rising. Its impacts affects not only the whole population in the world but also the biodiversity. In addition, its negative effects are not limited to the environment, climate change touches the real estate in general and its value in particular.

Through this presentation, the theme relating to the effects of climate change on the property value will be adressed. Indeed, the real estate market value is negatively affected by climate change impacts. Flooding, drought, water scarcity, water quality degradation, seal level rising are factors which affect the property prices. An analytical approach is adopted to examine this issue based on laws texts, courts decisions, appraisers reoprts and the research findings in the field.

This topic is proposed not only to assess the influence of climate change on the real estate appraisal and provide land appraisers with necessary tools to take into account the impacts of climate change but also to prevent the policy makers on how this scourge affects the economy by decreasing the value of one of the most important sector.

Key Words: Climate change, effects, real estate appraisal, property value.

RETHINKING AFRICAN FEMINIST DISCOURSES: A GYNOCRYTICISM
APPROACH TO IFEOMA OKOYE'S *BEHIND THE CLOUDS*, DANIEL
MENGARA'S *MEMA* AND LOLA SHONEHIN'S *THE SECRET LIVES OF BABA
SEGI'S WIVES*

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Abstract

This paper is a gynocriticism analysis of Ifeoma Okoye's *Behind the Clouds*, Daniel Mengara's *Mema* and Lola Shonehin's *The Secret Lives of Baba Segi's Wives*. It purports to evidence aspects of women against women. It is critically shared view that feminists look upon men as victimizers of women, but less attention has been devoted to women who victimize their fellows. Through gynocriticism, a progressive trend of the feminist approach, this research work investigates both the main factors motivating women to victimize each other in the society, and the consequences and perspectives about such a violence against women by women as they are contextualized in the novels considered. Facing polygamy, power abuse and jealousy, women are pushed to ill-treat their similar. However, in their bad behaviour, women are confronted to vengeance and false accusation. The final assessment is that, in the 21st century African society rife with oppressive and retrogressive customs and values that oppress and subjugate women, the latter's journey from these shackles of patriarchal bondage to freedom, fulfilment and social change requires a rethinking of African feminist discourses. Ever since at crossroads, African women need no longer to limit themselves in their choice of strategies or weapons if there any hope to win their battle, and change the status quo.

Key words: Violence, women, behaviour, awareness, equality.

COMPARATIVE ANALYSIS OF ECONOMIC COMPETITION BETWEEN
EMERGING CHINA AND USA

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Abstract

China plays an active role in various moves and actions, especially in the economic and political fields, and draws attention with its effort to become a rising power globally. The progress of China as a rising power, especially in the economy and politics, causes it to be in tension and conflict with the United States, which has been strong and influential in every field for a long time. The race between the economic power of China and the USA, which tries to be especially economically effective in the global arena and aims to increase their economic activities in various markets, and the dimensions of this race play a critical role. Moreover, since the tensions and conflicts between both the USA and China today are generally in terms of economy and trade, the analysis of the causes and dimensions of these tensions is significant. In addition, the desire for economic dominance between the USA and China in the global arena caused both countries to realize various strategies and moves, and the strategies continued with the economic cooperation of these countries with other actors. Today, this competition between the USA and China, which can be seen as two big giants in the economic field, and the size of this rivalry continues to increase. In this context, in general, this article will try to analyze and answer the conflicts between the USA and China, the causes of tensions and the US attitude in the rise of China, from an economic and commercial point of view, by examining the general characteristics and lines of the economies of the USA and China.

Keywords: Emerging of China, United States, Economic Competition

INTRODUCTION

Today, with the phenomenon of regionalization and especially globalization, both political and economic relations continue to gain momentum throughout the world. In this context, it can be seen that it is of critical importance in terms of establishing and developing economic relations with various international actors, eliminating the risk of conflict between partner actors and creating a peaceful situation. Similarly, it is clear that the mutual economic and trade cooperation and relations between international actors have a balancing and mitigating effect against possible military, political and social conflicts that may occur among each other in the future. However, despite the economic cooperation and various economic relations developed, the economy and trade among international actors are often negatively affected by various conflicts, primarily military and political. In this context, The commercial and economic dimension, which is negatively affected by other conflicts, is important in terms of

revealing the possibility of causing a process that increases the probability of conflict between various actors. The existing commercial and economic interaction and relations between the US and China are of critical importance in terms of being an example to this situation. In the process extending from the past to the present, as a result of many situations between China and the USA, there are tensions in the field of economic competition and trade between both powerful global actors. It is possible to see that there are various economic and commercial tensions and commercial competition between both the USA and China, especially factors such as industry, technological elements and global foreign trade surplus. On the other hand, there are many factors and reasons for the formation of the economic and commercial competition between the US and China. In this context, the conflicts and tensions between the two globally powerful and influential actors are generally important in that both countries are the result of a power struggle. At this point, it is wrong to think that this economic and commercial competition between the actors is only due to the desire to gain economic power. At the same time, it is of critical importance as it shows that both the USA and China are in a global and dominant power struggle. Since the economic competition between China and the USA is a frequently discussed topic today and both countries are trying to become a dominant power in the global economic arena, I thought that this issue should be examined. In this context, this article will comparative analyze the content, causes and dimensions of tension and competition in the field of economy and trade between China, which is destined to become today's rising power, and the United States, which has long been an active country on a global basis. At this point, although the USA is seen as an effective and combative actor in the economic competition with China, I believe that China is ahead of the USA, especially thanks to its economic and trade development and rise. In this context, it is critical to analyze the general outlines and characteristics of the economies of both actors before examining the economic competition between today's developing and strengthening China and the US, which is a globally influential and powerful country, and the characteristics of this competition.

Economic Position of The USA

The general lines of the US economy, its economic strategies and its active role in the world economy play a key role in the USA being counted as an effective and powerful actor in the global arena. In addition, this situation is important in that it causes the USA to be one of the largest examples of free markets worldwide. Similarly, it is possible to see the existence of many factors in the global influence of the American economy. In this context, when the general lines of the US economy are analyzed, it is seen that America's diverse and valuable natural resources and especially its qualified workforce play a major role in the global economy. Also, the strong position of the USA in this area was directly reflected in the basic indicators of the global economy. This situation has caused the USA to be one of the best and largest economies in the world in the global economy. Moreover, the foreign trade balance of the USA and its effective power especially in the field of import and export draw attention in the formation of the current economic lines of the USA. In addition to being the leader in this regard in the world with its exports and high export figures, especially within the scope of products, the United States is also at the top in the service sector. On the other hand, the potential for foreign direct investment that the United States has plays a key role in ensuring that the global economy is also in an effective position. In addition, the attractive and wide market opportunities of the USA lead to a great potential for foreign investors and capital. The stabilization and stable growth of the US economy puts the USA in the leading position among the countries that attract the most foreign investment and capital in the world in terms of global economic indicators. Furthermore, It is possible to see the general lines of a strong economy of the USA in national income and growth indicators. According to Dedekoca, *“The USA constitutes twenty percent of the world production with a size of 14.9 trillion USD according to purchasing power parity. “(Dedekoca, 2011, p. 52).* In this context, the size of

both the national and international purchasing parity of the USA draws attention. Generally, when the characteristics and general lines of the US economy are evaluated, it can be seen as a strong actor in the economic field with its attractive position, potential and successful economic moves and policies in the global arena.

Economic Position of China

China, which is an influential actor in Asia, has been attracting attention on a global basis with its rise and development in recent years. This rise and development momentum of China manifests itself in many areas, especially in economic and technological areas. In addition, China's stable economy and developing growth rates in recent years can be seen as the main factors in China's rise. In this context, according to Deniz, “ *With the measures taken and the incentives given, the Chinese economy has achieved an average growth rate of 9-10% after 2000 and respectively 9.3% in 2003, 9.2% in 2004, 9.9% in 2005, 10.7% in 2006, 11.4% in 2007, 8.7% in 2009, 9.2% in 2011, 7.8% in 2012 and In 2013, it reached 7.7% growth rates.* “ (Deniz, 2014, p. 197). On the otherhand, In addition to the steady growth of China, there are many policies, incentives and factors that China has implemented and adopted in the rise of China on a global basis. At this point, many policies and incentives with international validity have been adopted in order to gather foreign investments and capital specifically for China. Thanks to this incentive policy adopted by China, China began to be seen as the heart of Asia in a short time. In this context, China has gained a significant speed towards becoming a rising power, especially with the technology and industry moves and transfers it has realized by attracting the attention of many foreign capital and investors. Furthermore, another important factor in China's rising trend is China's strategic approaches to economy and trade. In this context, when the Chinese economy is analyzed in general, it is possible to see that China has adopted an export-oriented international strategy and policy. According to Çiçek, “*With the economic strategy it has adopted, China increases its economic gain by selling goods abroad and encourages industry and industrialization in the country in this way.* “ (Çiçek, 2017, p. 20). With this policy determined by China, it expands and strengthens its local markets by exporting its own products and goods to foreign countries, thus making economic growth sustainable. On the otherhand, China's investments in various regions and its trade and economic interactions with various countries in these regions have a critical importance in the rise of China as a global economy. At this point, the European Union, which is an effective example of international regionalization especially in Europe, is seen as a large and potential market for China. According to Çiçek, “ *China's economic relations with the European Union show mutual dependence, and the fact that China's market shares and positions are not unilateral has advantages for both sides.*“ (Çiçek, 2017, p. 22). In this context, China's interactions outside the region and various economic cooperations it has established are seen as effective factors in the rise of China by increasing its influence in the economic field on a global basis. Moreover, when evaluated in general, the combination of the solid foundations of China's economic lines with various incentive policies and export strategies is seen as the factors that are effective in China's acceleration in the economic field and being an effective actor. The rise of China in the field of economy attracts the attention of the USA, another economic giant, and this situation leads to the formation of competition between the two countries.

Economic Competitiveness of China-US Relations

The USA, which was seen as a hegemonic actor in its century, strives to make its current dominance sustainable in the future and sees any country that can take its place as a threat. In this context, according to Çeçen, “*In this direction, the United States has three goals. Its first goal is to maintain its central economic and political hegemon position. Its second goal is to create a new world order in accordance with it. Its third goal is to prevent the emergence of another new hegemonic power, which can prevent these two aims.*“ (Çeçen, 2017.p. 235).

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However, in recent years, the rise of China globally, especially in the economy, is often mentioned on the world agenda, and it is understood that the Chinese economy is in a rapid acceleration in the global economy due to its effectiveness and strength in a global scale. In other words, In particular, China is a rising actor with its large and shaky development in the global economy and technology, as well as its growth rates on a global basis. Moreover, the rising power of China has also attracted the attention of the United States, which has been seen as a hegemon power in the world both politically and economically for many years, and this has required the United States to make some moves. In this context, the USA has tended to change and update its various national and international development policies. In addition, the USA has tried to plan new strategies against the rise of China, and the purpose of these new strategies is to move against the rise of China and come to the fore in the economic competition with China. At this point, the USA has adopted various protectionism policies to prevent the rise of China and to slow down the momentum of the developing Chinese economy. This situation paved the way for the trade war and competition between the Rising China and the USA. According to Dulkadir, “ *Trade wars launched by the USA against China start when a country perceives the trade practices implemented by another country as unfair. The purpose of this is to protect the economy of any state or to harm the rival country economically.* “ (Dulkadir, 2020, p.86). At this point, it is possible to see that the protectionist policies and strategies adopted by the USA are of critical importance at the point of economic competition between the USA and China. In this context, the various protectionism strategies adopted by the United States began immediately after China was seen as a threat and continued with various retaliatory moves and strategies when China was on an economic upward trend. Some of these retaliations can be seen as the USA's putting excessive tax rates on many products in trade with China within the scope of its protectionist policies and strategies towards China, and targeting China's economic loss by changing its economic tariffs with China. Moreover, parallel to this situation, China quickly retaliated with various moves against this aggressive stance of the USA in economic terms within this economic competition. In this context, China retaliated by placing extra taxes on trade with the USA against these retaliatory strategies of the USA. According to Kaya “ *There was retaliation against retaliation in the trade war that took place in the competitive relations between the USA and China. According to this, when the USA made mutual taxation to China and then China to the USA, the tariffs, which started under the name of protectionism, were replaced by trade wars.* ” (Kaya, 2019, p. 22). On the other hand, similarly, it is possible to see that China has made moves that will eliminate the US as a global economic power by developing its own strategies and moves against various strategic moves of the US and in economic competition with the US. In this context, the basic policies and strategies adopted by China in its upward trend and especially in its economic race with the USA play a key role. According to Dingil and Güven, “ *The policy that forms the economic foundations of China is based on a win-win frame and China's regional and global goals based on mutual gain relations on the basis of actors.* ” (Dingil&Güven, 2021, p.291). It is understood that during China's economic competition with the USA, its interaction with other actors and profitable cooperation are one of the key factors in the rise of China. Furthermore, one of the strategies and policies followed by China in order to reach the summit by eliminating the USA in the field of economy and to strengthen its presence in the international economy is the One Belt One Road project. China aims to be involved in new regional sundays with this economic-based project, to take advantage of investment opportunities for the future, also to stand out from the competition with the United States and to move away from the threats of the United States. In this context, according to Kaya, “ *The economic policies followed by China to strengthen its own stance; The existence of projects such as the One Belt One Road Project and Made in China 2025 worries the USA and makes it feel like a loss of power.* “ (Kaya,2019, p.23). With this policy that China has adopted, it is possible to see that it has made moves that will develop its own economy and continue its rise by owning both land and railway networks between the

continents. In this context, it is seen that China plans to continue its rising China image by surpassing the USA in the economic dimension both with the strategies and policies it implements today and the projects it plans to realize in the future.

CONCLUSION

Eventually, This article has comparatively examined the dimensions, reasons and content of the economic competition between China, which is seen as the rising power and value of today, and the USA, which has been seen as the hegemon power all over the world for a long time. At this point, the general lines of the economies of both powerful actors were analyzed and the areas in which the economic competition between China and the USA took place were examined. When evaluated in general, both the USA and China are seen as very effective and powerful actors in the field of economy with their strengths and the strategies they have developed. This situation creates an economic competitive environment for both countries and it is seen that these two powerful actors are often at war with each other in a commercial sense. For a long time, the USA has been seen as the number one in the world economically, and it is developing various moves and strategies in order not to spoil this leading position and to hinder the rise of China. However, China draws attention as a rising economic power with its effective economic foreign policies, international projects and various international cooperations it has established. In this context, when the current position of China and its economic rivalry with the USA are analyzed, It can be seen that China is one step ahead of the USA, with which it is in economic competition, with the strategies it has adopted and its comprehensive international economic projects for the future.

REFERENCES

- Dedekoca, E., 2011, “*ABD-Çin İlişkilerinin Ekonomi Politikası ve Yeni Dünya Düzeni Oluşumuna Etkileri*“, İstanbul Kadir Has University, p. 8- 135
- Deniz, T., 2014, “ *Strategic Moves Of The Rising Power People’s Republic Of China* ” , Electronic Journal of Social Sciences, Vol: 13, No: 50, p. 188-212.
- Çiçek, M., 2017, “*ABD-Çin Rekabeti Ekseninde AB-Çin İlişkileri*” , Yalova University Journal of International Relations , p. 11-79.
- Dulkadir, D., 2020, “ *Transformation in the World Power Hierarchy and Hegemonic Rise of China* ” , Necmettin Erbakan University Journal of the Faculty of Political Science , Vol:2, p. 78-94
- Çeçen, A., 2017, “*ABD Süper Güç Olarak Kalabilir Mi?* ” , Journal of Avrasya, p. 233-251
- Kaya, M., 2019, “ *ABD-Çin Ticaret Savaşları ve Türkiye* ” , Journal of Vocational and Social Sciences of Turkey , Vol:2 , p. 18-30.
- Dingil, H., Güven, A., 2021, “ *An Example of Net Assesment on US-China Struggle: Could India Be a Struggle Tool?* “ , Afyon Kocatepe University Journal of Social Sciences, Vol:23, No:1 , p. 290-302.
- Şanlı, O., Ateş, İ., 2020, “ *ABD-Çin Odaklı Ticaret ve Kur Savaşlarının Dünya Ekonomisine Etkileri*”, Aydın Adnan Menderes University Journal of Institute of Social Sciences, Vol:7, No:1 , p. 75-101.

DEVELOPMENT AND UTILIZATION OF MONO-COMMODITY MULTI-
LOCATION MODEL FOR MANUFACTURING INDUSTRY

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Abstract

This paper presented the development and utilization of mono-commodity multi-location linear programming techniques for determining optimum transportation network of a manufacturing industry in Lagos, Nigeria. Two plants, three depots and twenty retailers axis were considered. The model was analyzed using LINGO software. The analysis was carried out in two phases by considering numbers of truckload transported and each of the company's products transported from plants to depots and depots to retailers with their optimal transportation cost. It was affirmed that in the current practice, the transportation cost of truckload from plants to depots to retailers is ₦3,544,000,000,000 and when optimized, the cost is ₦1,932,650,000 while considering each product, the optimized transportation cost is ₦1,871,065,369,000. This outcome indicates that the transportation network generated considering each product will yield 47.2% gain in profit than the current network. It is therefore recommended that mono-commodity multi-location transportation network be used.

Keywords: LINGO Software, Mono-Commodity Multi-Location, Transportation Cost, Transportation Model, Transportation Network.

1. INTRODUCTION

Nigeria is a developing country with the largest population in Africa, invariably with largest markets. It is one of the most populated countries in the world, with Lagos being the most populated state. It is filled with well-educated people who diversified into different sectors like agriculture, manufacturing, telecommunications, financial services to mention but a few.

The population and human resources available in Lagos state give rooms for any business to thrive. However, the huge infrastructural shortfall in the state is a deterrent to viability of businesses, and it is causing challenges to the performance and productivity of manufacturing industries. The problem includes; bad roads, epileptic power supply, multiplicity of taxes and high fuel price.

For business and production to thrive, the raw materials, work-in-progress and finished goods must be effectively transported from one point to the other at a minimum cost to reach the customers at the cheapest possible cost and of good quality. When this happens, it gives the manufacturer a competitive advantage, a good image in the market and sustainability.

Hence, transportation service is crucial for economic development as it enhances access to world markets, global integration and foreign investment. The impact of efficient and effective transportation services cannot be underestimated in both developed and underdeveloped countries.

In order to alleviate the suffering of the company, the value of research findings, experience and results achieved by researchers in the past concerning similar problems cannot be underestimated in achieving a better enabling environment, profit-oriented network and customer's satisfaction in a supply chain. Research revealed that operation research tool was first used by British and U.S. Military management when scientists were called on to solve the problem of allocating scarce resources to military operations and activities within each operation in an effective manner. It was also discovered that an industrial boom immediately after World War II resulted in complexity and specialization in organizations.

In the early 1960's, researchers involved in solving military problems have started applying operations research to various business, industry, and government organisations. To date, operation research tools such as linear programming, dynamic programming, queuing theory and inventory theory are being used by researchers in solving a series of problems including, social, economic, geographical, management, health and engineering and other spheres of life. The advent of computer revolution lent great impetus to the growth of operation research as it requires a large number of computations to deal with complex problems effectively. Various algorithms have been developed which give systematic solution procedures for solving different types of problems. The algorithms are efficient and routinely used on problems with many variables. The algorithms include; EXCEL, TORA, LINGO, LINDO, C PLEX.

With various factors militating against manufacturing industries in Lagos, resulting to waste of resources, poor workers income, poor quality, high product cost and poor delivery. It becomes inevitable to embark on this research, aimed at developing efficient transportation model to alleviate the suffering of a reputable manufacturing company and using it as benchmark for other manufacturing industries. The model will be of significant impact in minimizing transportation cost, maximizing profit and eradicating problem of losing customers to competitors by meeting customers' demand at low cost and promptly, reducing products prices and producing better quality.

Transport system modeling plays some part in the development of transport policies and strategies. If models were more appropriate and were better applied, they would considerably enhance the formulation of transport policies and the development of strategies (Furnish and Wignall, 2009).

An Optimum transportation system could be defined as "the art of combining the right amount of the right products, delivered to the right place at the right time". Nowadays, a company's depends on its efficiency in managing its transportation network.

Transportation network is a network of facilities and distribution options that performs the functions of procurement of materials, the transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Transportation network exists in both service and manufacturing organizations. Realistic optimum transportation networks have multiple end products with shared components, facilities and capacities (Ermis, et.al, 2004).

The efficiency of a supply chain is influenced by several factors; stock management, production planning, risk/hazard management, production costs, scheduling and distribution strategies and customer specific demand.

In decision-making, the use of transportation model cannot be underestimated, especially in supply chain management and logistics. However, despite series of problems encountered by manufacturing industries in Lagos State, the tool will alleviate losses experienced so far by

the company as researchers who embarked on such project affirm it has never failed to save huge sums of money for the companies.

1.1 Problem Statement

The manufacturing industry plant 1 is the second largest plant in the world and largest in Africa situated in Lagos which is a populous and industrial heart of the country and plant 2 also situated in Lagos is the first plant in Nigeria. The state is faced with problem of congestion, pollution, bad roads which results in disruption of business activities due to the fact that, there is no free flow of goods and raw materials. Hence, to alleviate the problems aforementioned and improve company's position in market, it is necessary to develop the best transport network which will enhance efficiency and effectiveness resulting in minimization of transport cost and increase in profitability and productivity. This can be achieved through effective modeling and evaluation of the company's transportation problem.

1.2 Objectives of the Study

1. To develop a mono-commodity multi-location model for solving transportation problem
2. Evaluate the model using LINGO software
3. Determine optimal transportation network of each product

1.3 Scope of the Study

For effective research;

- The work will be limited to two plants in Lagos State, their depots and retailers.
- Only four products Product 1(P1), Product 2(P2), Product 3(P3) and Product 4(P4) will be considered.
- The model formulation will cover three sectors (plants – depots – retailers) and five periods, 1,2,3, 4 and 5 (2014 – 2018).

However, the model can extend to any length of time depending on the capacity of the software.

2. RELATED LITERATURE

Salehi et.al (2013), carried out a research on optimization of transportation system in cement industry a Linear Programming model was developed from the data collected to achieve the first phase that entails determining number of needed trucks for any route of each period and the second phase that entails determination of quantity of needed trucks to each route for any period, a linear programming model is utilized using LINGO software package which possess special facilities to solve models with numerous variables with high constraints. The third phase is to bridge gap. Due to solution in first and second phases, the extra trucks were used to bridge the gap. The algorithms developed gives rooms to update of information and data.

Seyedhosseini and Ghoreyshi (2014) formulated an integrated production and distribution planning model for perishable products with inventory and routing considerations. The model supply chain network is single production facility with multiple distribution centres, considering a perishable product that has a fixed lifetime.

A homogenous fleet of vehicles is used for products transportation. The model is developed to minimize total cost by reducing trip rate, using a heuristic method due to complexity of the model which have submodels. The production submodel is solved using LINGO and a

particle swarm heuristic for distribution submodel. The efficiency of the model is deduced from randomly generated test problems.

Azizi et.al (2015) utilized transportation model in solving a problem of a sharp decline in profits experienced by Biopharma Company in distribution of their products from six different plants to retailers. With the aid of solver tool, optimal solution was computed which gave room to generation of new shipment plan that effectively cut down 12% of the company's loss.

Suleiman et.al (2015) generated a linear programming model from data obtained from Coca-Cola Bottling Company using North West Corner and Least Cost method which was verified using stepping stone method and evaluated with LINGO software, it was discovered that the Linear Programming model and stepping stone method evaluated with LINGO package, yielded same result and transportation cost minimized.

Bai et.al (2017), developed transportation cost model for International containerized soybean exports in United States. The researchers utilizes information gathered from USDA National Agricultural Service database and Agricultural Marketing Service (AMS) database and reports to determine production and transportation trends which is used to develop transportation network and model and Geospatial Intermodal Freight Transportation (GIFT) – model to enhance effective transportation of containerized soybeans at minimized cost.

Anand, et al (2017) used LINGO program to solve aggregate planning problem of red tomato tools, a small manufacturer of gardening equipment with manufacturing facilities in Mexico red tomato's products are sold to retailers in the united states. Red tomato products consist of the assembly of purchased parts into multipurpose gardening tool. With the aid of the LINGO program the company was able to overcome the obstacle of seasonal demand and maximize profit

Rizwanullah, et al(2017), used a LINGO based three-tier distribution approach in modeling of supply chain dynamics and it was ascertained that not every optimization procedure is suitable for all supply chain models and it is necessary to choose the appropriate procedure depending on the features of supply chain. The model can be generalized for multi-complex problem if the system supports to run the program. There are many hidden parameters in heuristics method while in LINGO based method, no need to add any such variables and the solution becomes easier and applicable.

Baohui and shiyang(2018), worked on application of LINGO in water resources optimization teaching based on Integer programming to improve the teaching quality of water resources optimization teaching and train students to master advanced and quick methods or techniques to solve the problems of integer programming of Engineering project due to problems Northwest China and North China is facing in terms of shortage of water resources for survival of human society, it was concluded that LINGO software is consistent, speedy and has a wide application space in solving water resources optimization problems. Also, it is beneficial to cultivate college student' innovative thinking and innovative consciousness.

Jibina and Lavanya(2019), worked on management of construction resources by using Integer and Dynamic programming with the aim of maximizing profit and allocation of limited resources in this project, the building raw material data was collected in the construction company. The construction schedule data was solved by Dynamic programming multi-stage graph method. The multi-stage graph problem which solve the shortest part and its minimum duration for each construction activity. So as it helps the construction project, each activity

completed within duration period. The resource data was solved by Integer programming gomory's cut method and LINGO software program to enable management to know how profit will be affected by increase or decrease in resource level and change in cost of raw materials. In this types of changes analyzed and profit was calculated by use of Integer programming and LINGO software programs. The result was compared and each way of calculation was accessed. Finally, the profit was easily found by LINGO software.

Abdelwali (2020), researched on "An Optimal Solution for a Real Transportation Problem with LINGO Code". In this paper, a Lingo code is prepared based on the formulation of transportation problem to solve an actual case study with the aid of Excel solver or spreadsheet. The optimal solution reduces the total ton-kilometers by 9:1702% of the real distribution amounts.

3. METHODOLOGY

3.1 Data Collection

The data was collected through the Manufacturing Company Transportation System Survey (MCTSS) and the secondary data (Journal, books and newspapers). The information collected through both sources includes;

- ✓ Interview with management personnel in transport, stores, production and maintenance department.
- ✓ Relevant data from production, maintenance, stores and transport department.
- ✓ Relevant data from the company's annual report and journal.
- ✓ Relevant data from depots

The research information includes;

- ✓ Numbers of plants and depots
- ✓ Numbers of dealers or retailers and customers
- ✓ Numbers of production lines, products produced and production capacity
- ✓ Transportation cost
- ✓ Annual demands at depot
- ✓ Average numbers of truckload transported per day per plant.
- ✓ Average numbers of truckload per day per depot
- ✓ Brand of products produced
- ✓ Raw materials, type, source and quantity available

Quantity of raw materials needed for each product

3.2 Model Formulation

- Assumptions
 1. Standard truckload used for transportation is 24 pallets truck to enhance easy estimation
 2. That all products moves from plants to depot and depots to retailers
 3. There is no product mixed up from plants to depots
 4. Only finished products were considered
 5. The required amount of goods at destination equals the quantity available at the source.
 6. Transportation cost is independent of the shipped amount.

3.3 Formulation of Mono-Commodity Multi-Location Model

Indices:

- $i = 1, 2 \dots \dots \dots I$ Index for plants
 $j = 1, 2 \dots \dots \dots J$ Index for depots.
 $k = 1, 2 \dots \dots \dots K$ Index for retailers

Parameters

- C_{ij} = Transportation cost per unit of products from plant i to depot j .
 C_{jk} = Transportation cost per unit of products from depot j to retailer k .
 P_{ij} = Quantities of product transported from plant i to depot j .
 P_{jk} = Quantities of product transported from depot j to retailer k .
 S_i = Production capacity from product at plant i .
 D_j = Quantities of product demanded at depot j .
 D_k = Quantities of product demanded at retailer k .
 Z_{ij} = Total cost of transportation from Plant i to Depot j .
 Z_{jk} = Total cost of transportation from Depot j to Retailer k .
 Z = Total cost of transportation from Plant i to Depot j and depot j to retailer k .

The General Form of the Model (plants to depots)

$$\text{Min } Z = \sum_{i=1}^I \sum_{j=1}^J C_{ij} \cdot P_{ij}$$

$$\text{Subject to; } \sum_{i=1}^I S_i \geq \sum_{j=1}^J D_j = \sum_{i=1}^I \sum_{j=1}^J P_{ij}$$

$$P_{ij} \geq 0 \quad i = 1, 2 \dots \dots I, j = 1, 2 \dots \dots J$$

From Depots to Retailer

The Model

$$\text{Min } Z = \sum_{j=1}^J \sum_{k=1}^K C_{jk} P_{jk}$$

$$\text{Subject to: } \sum_{j=1}^J S_j \geq \sum_{k=1}^K D_k = \sum_{j=1}^J \sum_{k=1}^K P_{jk}$$

$$P_{jk} \geq 0 \quad j = 1, 2 \dots \dots J \quad k = 1, 2 \dots \dots K$$

The Mono-Commodity Multi-Location Model

$$\text{Min } Z = \sum_{i=1}^I \sum_{j=1}^J C_{ij} \cdot P_{ij} + \sum_{j=1}^J \sum_{k=1}^K C_{jk} P_{jk}$$

$$= \sum_{i=1}^I \sum_{j=1}^J \sum_{k=1}^K C_{ijk} \cdot P_{ijk}$$

Subject to:

$$\sum_{i=1}^I \sum_{j=1}^J P_{ij} = \sum_{j=1}^J \sum_{k=1}^K P_{jk}$$

$$P_{ij} \geq 0, \quad P_{jk} \geq 0, \quad P_{ijk} \geq 0 \quad i = 1, 2 \dots \dots I, j = 1, 2 \dots \dots J, k = 1, 2 \dots \dots K$$

Indices:

$i = 1, 2$ ----- I Index for plants
 $j = 1, 2$ ----- J Index for depots.
 $k = 1, 2$ ----- K Index for retailers

Parameters

C_{ij} = Transportation cost per unit of products from plant i to depot j .
 C_{jk} = Transportation cost per unit of products from depot j to retailer k .
 C_{ijk} = Transportation cost per unit of products from plant I to depot j to retailer k .
 P_{ij} = Quantities of product transported from plant i to depot j .
 P_{jk} = Quantities of product transported from depot j to retailer k .
 P_{ijk} = Quantities of product transported from plant I to depot j to retailer k .
 Z = Total cost of transportation from Plant i to Depot j and depot j to retailer k .

4. DATA PRESENTATION AND ANALYSIS

A. Program And Steps Involved In Using LINGO software

SETS:

PLANTS/DEPOTS: SUP;

DEPOTS/RETAILERS: DEM;

LINKS (PLANTS/DEPOTS, DEPOTS/RETAILERS): QTY, CST;

ENDSETS

DATA:

PLANTS/DEPOTS = P1 P2 P3PN/D1 D2 D3DN;

DEPOTS/RETAILERS = D1 D2 D3DN/R1 R2 R3 . . . RN;

SUP = A_i/B_i ;

DEM = B_j/R_j ;

CST = C_{ij}/B_{ij} ;

ENDDATA

MIN = @SUM(LINKS(I,J):CST(I,J)*QTY(I,J));

@FOR(PLANTS/DEPOTS(I):

@SUM(DEPOTS/RETAILERS(J): QTY (I, J)) <= SUP(I));

@FOR(DEPOTS/RETAILERS(J):

@SUM(PLANTS/DEPOTS(I): QTY (I, J)) = DEM(J));

To operate the code for the optimization of the transportation model, you have to input the values of the transportation matrix in their respective positions

i.e input the name of the plants or depots at P1, P2 or D1, D2 an so on and also for depots or retailers at D1, D2 or R1, R2 and so on.

Then input the values of the supplies at SUP and demand at DEM. The cost of the commodity from plants to depots is typed at CST.

Then move to the LINGO ribbon and click solve. The result will be displayed.

*B. Total Transportation Cost of the Existing and Optimal Transportation Network
Considering Truckload (Plants To Depots)*

TABLE 1

Transportation Costs Per Truckload (₦m) (2014 – 2018)

Plant/Depots	D1	D2	D3	Supply
PLANT 1	10.6091	8.9416	0	126710
PLANT 2	0	0	3.0467	70560
Demand	70560	56150	70560	

Source: Author’s Compilation (2020)

TABLE 2

Numbers Of Truckload Transported (2014 – 2018)

Plant/Depots	D1	D2	D3	Supply
PLANT 1	70560	56150	0	126710
PLANT 2	0	0	70560	70560
Demand	70560	56150	70560	

Source: Author’s Compilation (2020)

TABLE 3

Total Transportation Cost of Truckloads (₦m) (2014 – 2018)

Plant/Depots	D1	D2	D3	Supply
PLANT 1	748578.1	502070.84	0	126710
PLANT 2	0	0	214975.2	70560
Demand	70560	56150	70560	
Total Transportation Cost of existing network = ₦1.47E+12				

In similar manner, the total transportation cost from depots to retailers is calculated and the result is ₦2,074,000,000,000

Therefore, the total cost from plants to retailers
 = Transportation cost from plants to depots + Transportation cost from depots to retailers
 = ₦1,470,000,000,000 + ₦2,074,000,000,000
 = ₦3,544,000,000,000

TABLE 4

Optimal Result of Existing Transportation Network (Plants-Depots) (2014 – 2018)

Plant/Depots	D1	D2	D3		Supply
PLANT 1	0	56150	70560	126710	126710
PLANT 2	70560	0	0	70560	70560
	70560	56150	70560		
Demand	70560	56150	70560		
Optimal Transportation Cost = ₦5.02E+11					

In the same vein, the optimal transportation cost from depots to retailers is ₦1.43E+12. Hence, the total optimal transportation cost from plants to depots and depot to retailers is 5.02E+11+ 1.43E+12 = 1.93E+12

**Total Transportation Cost of Existing and Optimal of Each Product in Cases From
Plants to Depots**

TABLE 5

Total Transportation Cost of Product 1 and Optimal Transportation Cost

Plant/Depots	D1	D2	D3	Supply	
PLANT 1	7977.6	6724.8	0	99224572	
PLANT 2	0	0	2289.6	49717446	
Demand	55359270	43865302	49717446		
Total Transportation Cost for Existing = ₦8.50453E+11					

Plant/Depots	D1	D2	D3	Supply	Supply
PLANT 1	5641824	43865302	49717446	99224572	99224572
PLANT 2	49717446	0	0	49717446	49717446
Demand	55359270	43865302	49717446		
Demand	55359270	43865302	49717446		
Total Transportation Cost for Optimal = ₦ 3.3999E+11					

TABLE 6

Total Transportation Cost of Product 2 and Optimal Transportation Cost

Plant/Depots	D1	D2	D3	Supply	
PLANT 1	2664	2246.4	0	78872488	
PLANT 2	0	0	763.2	31423900	
Demand	47490500	31381988	31423900		
Total Transportation Cost for Existing = ₦ 2.20994E+11					
Plant/Depots	D1	D2	D3	Supply	Supply
PLANT 1	16066600	31381988	31423900	78872488	78872488
PLANT 2	31423900	0	0	31423900	31423900
Demand	47490500	31381988	31423900		
Total Transportation Cost for Optimal = ₦ 1.133E+11					

TABLE 7

Total Transportation Cost of Product 3 and Optimal Transportation Cost

Plant/Depots	D1	D2	D3	Supply	
PLANT 1	6912	5817.6	0	31483642	
PLANT 2	0	0	1987.2	31902910	
Demand	15840130	15643512	31902910		
Total Transportation Cost for Existing = ₦ 2.63892E+11					
Plant/Depots	D1	D2	D3	Supply	Supply

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PLANT 1	0	0	31483642	31483642	31483642
PLANT 2	15840130	15643512	419268	31902910	31902910
Demand	15840130	15643512	31902910		

Total Transportation Cost for Optimal = ₦ 833,169,370

TABLE 8

Total Transportation Cost of Product 4 and Optimal Transportation Cost

Plant/Depots	D1	D2	D3	Supply	
PLANT 1	3715.2	3139.2	0	21422927	
PLANT 2	0	0	1065.6	15839907	
Demand	13211800	8211127	15839907		
Total Transportation Cost for Existing = ₦91739854138					
Plant/Depots	D1	D2	D3	Supply	Supply
PLANT 1	0	5583020	15839907	21422927	21422927
PLANT 2	13211800	2628107	0	15839907	15839907
Demand	13211800	8211127	15839907		

Total Transportation Cost for Optimal = ₦ 17,526,200,000

In the same manner the existing transportation cost from depots to retailers for Product 1, Product 2, Product 3 and Product 4 are respectively ₦1.20111E+12, ₦3.11074E+11, ₦4.04872E+11 and ₦1.40896E+11 and the optimal costs are ₦8.23857E+11, ₦2.12703E+11, ₦2.65313E+11 and ₦9.75414E+10 respectively

SUMMARY SHEET OF RESULTS

	EXISTING COST PLANT TO DEPOT AND DEPOT TO RETAILER (₦)	OPTIMAL COSTS PLANT TO DEPOT AND DEPOT TO RETAILER (₦) LINGO
TRUCKLOAD	1,470,000,000,000 + 2,074,000,000,000	502,070,000,000 + 1,430,580,000,000
TOTAL	3,544,000,000,000	1,932,650,000,000
PLANT TO DEPOT		
Product 1	850,453,000,000	339,993,600,000
Product 2	+ 220,994,000,000	+ 113,298,000,000
Product 3	+ 263,892,000,000	+ 833,169,000
Product 4	+ 91,740,000,000	+ 17,526,200,000
DEPOT TO RETAILER		
Product 1	+ 1,200,000,000,000	+ 823,857,000,000
Product 2	+ 311,100,000,000	+ 212,703,000,000
Product 3	+ 404,900,000,000	+ 265,313,000,000
Product 4	+ 140,900,000,000	+ 97,541,400,000
TOTAL	3,483,979,000,000	1,871,065,369,000

C. The Company's Transportation (Real) Network

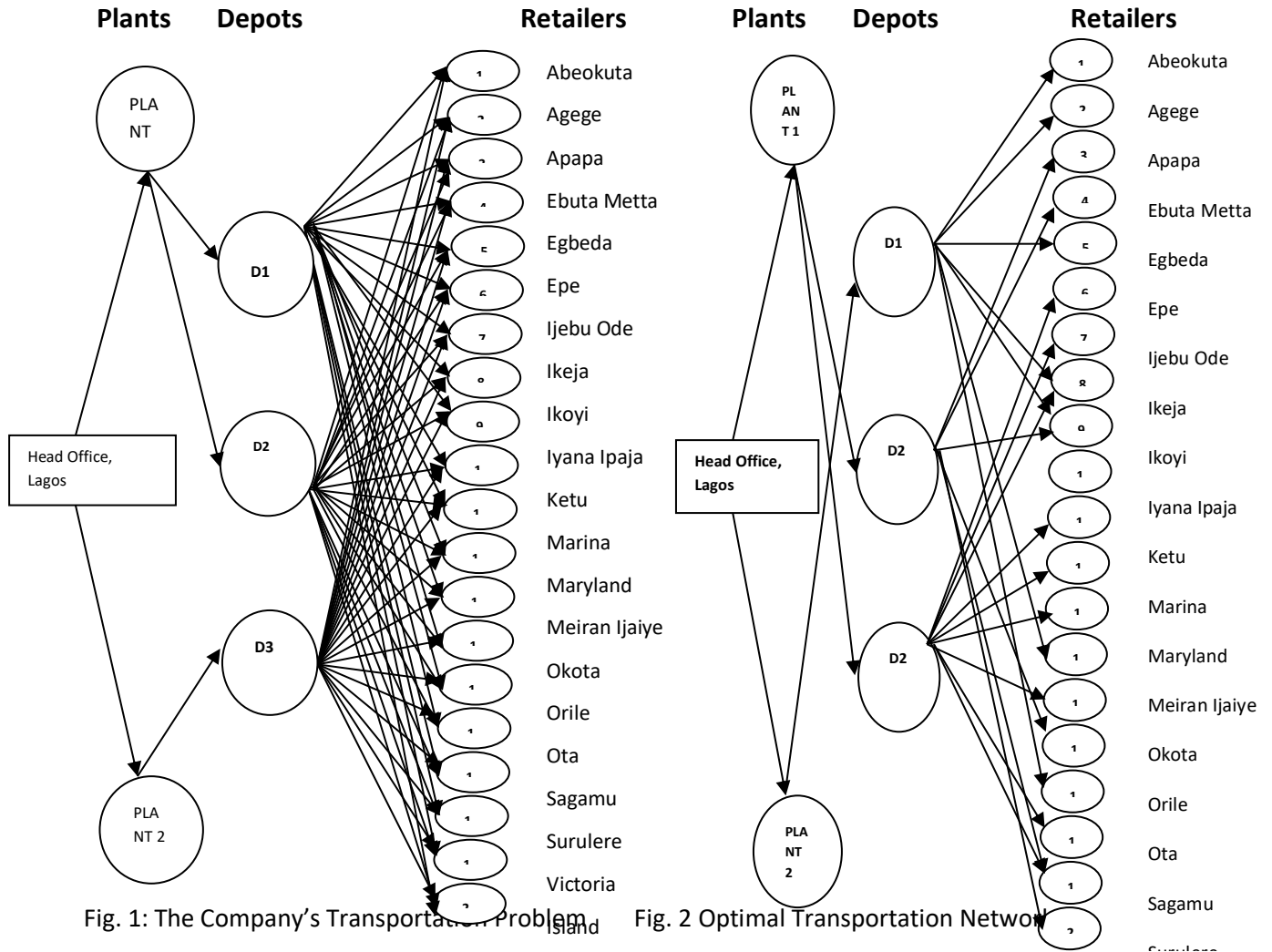


Fig. 1: The Company's Transportation Problem

Fig. 2 Optimal Transportation Network

Truckload from Plants to Depots

**Proposed Mono-Commodity Multi-Location
Optimal Network for Product 1**

**Proposed Mono-Commodity Multi-Location
Optimal Network for Product 2**

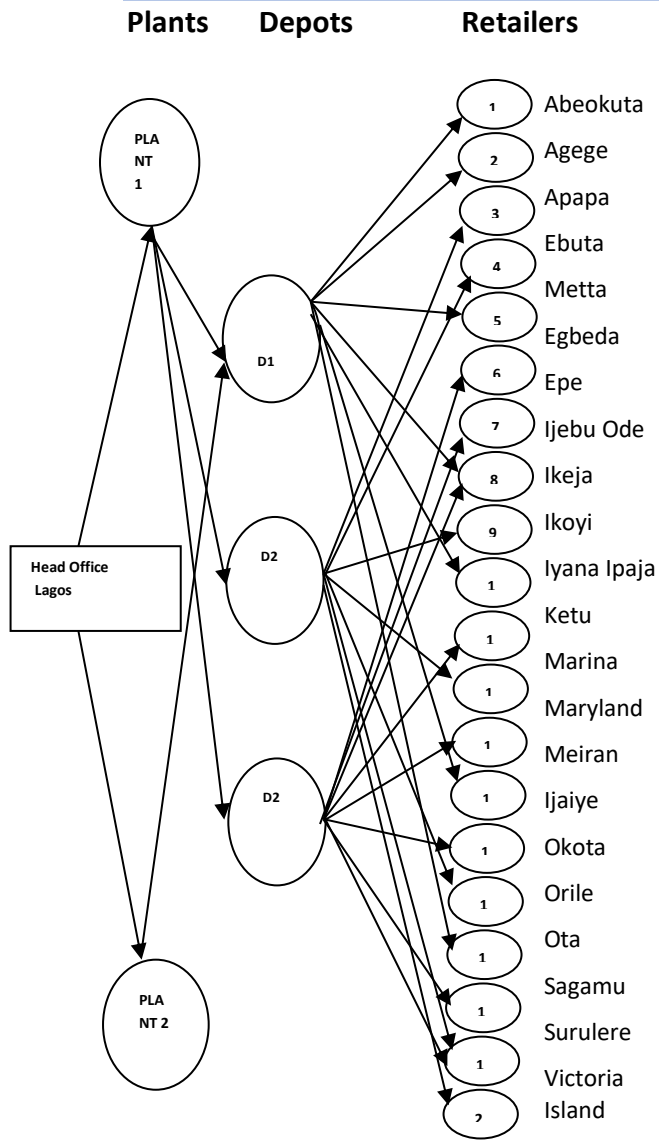


Fig. 3: Transportation network for product 1

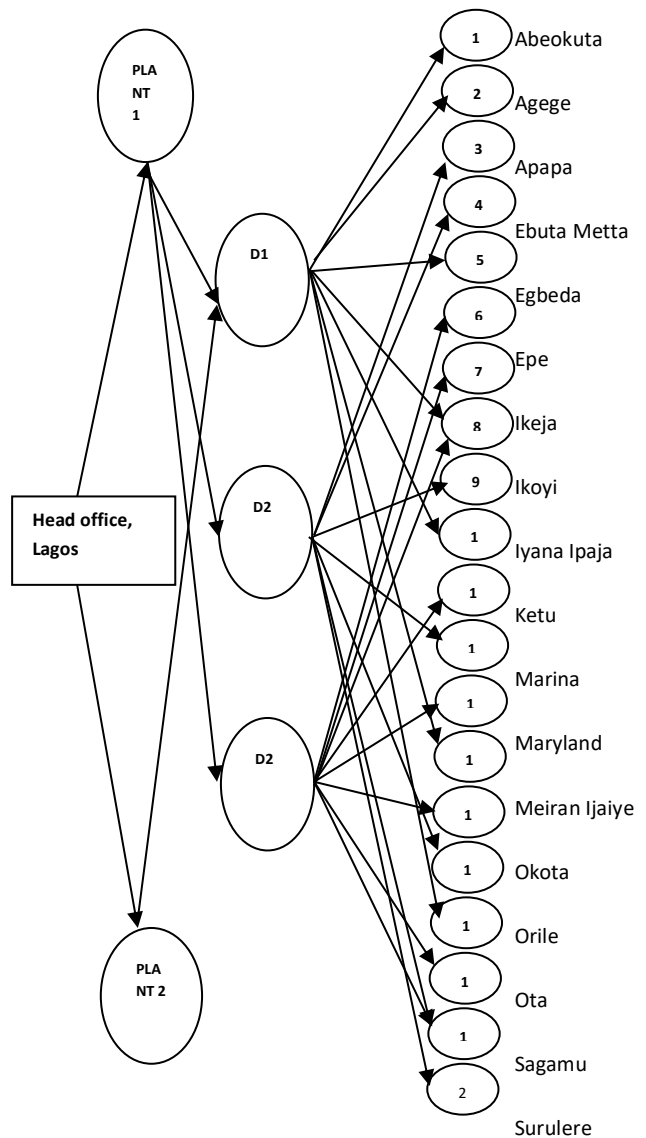


Fig. 4: Transportation network for product 2

Proposed Mono-Commodity Multi-Location
Optimal Network for Product 3

Proposed Mono-Commodity Multi-Location
Optimal Network for Product 4

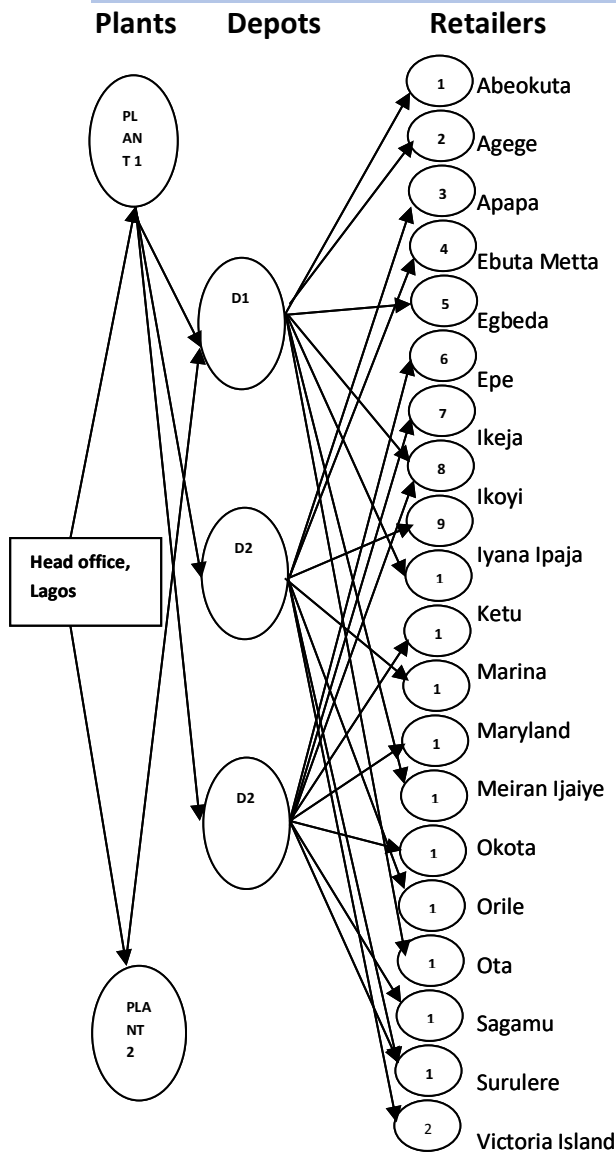


Fig. 3: Transportation network for product 3

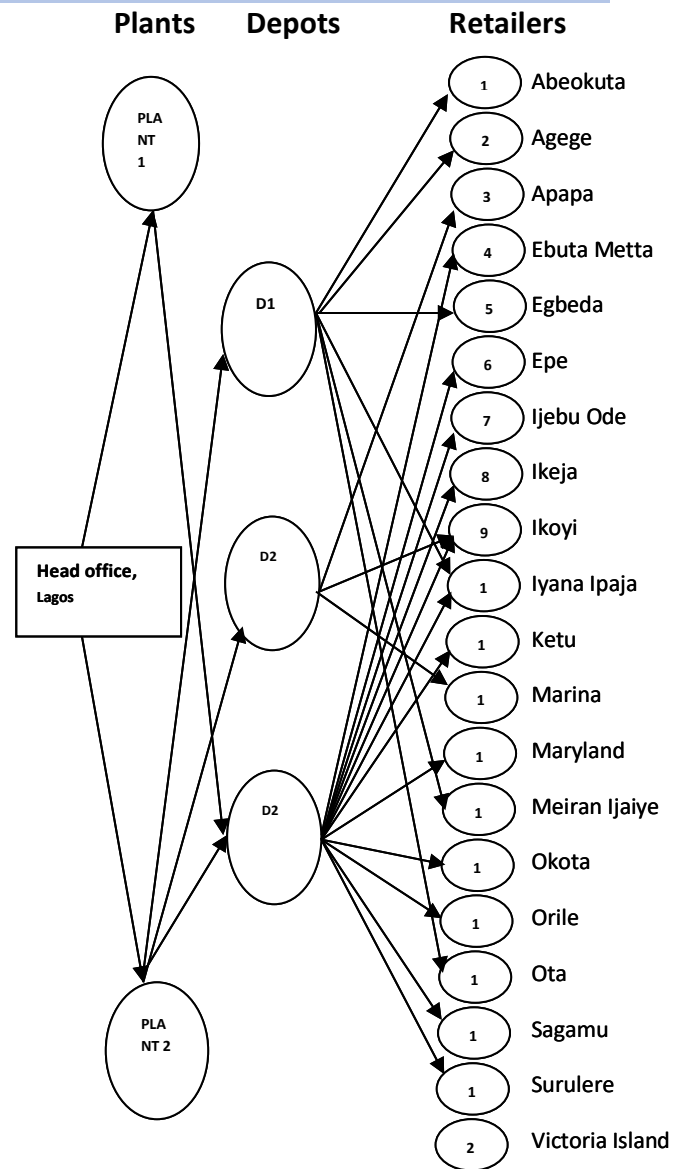


Fig. 4: Transportation network for product 4

5. CONCLUSION

The analysis to determine the optimal transportation network is carried out in two phases: The first phase is by optimizing the existing practice by taking into consideration the numbers of truckload transported from plants to depots and depots to retailers and secondly, by optimizing each of the product from plants to depots and depots to retailer. The two phases were evaluated using LINGO software package. The total transportation cost of existing practices are estimated but far higher than the optimal results, hence it is realized that the best optimal transportation cost (minimal) is from Mono-Commodity Multi-Location Model with total transportation cost of ₦1,871,065,369,000 (One Trillion, Eight Hundred And Seventy One Billion, Sixty Five Million And Three Hundred And Sixty Nine Thousand Naira Only) using lingo software and the least is optimizing taking into consideration the numbers of truckload with a total transportation cost of ₦1,932,650,000,000 (One Trillion, Nine Hundred And Thirty Two Billion And Six Hundred And Fifty Million Naira Only). Comparing the total optimal Mono-Commodity Multi-Location transportation cost to existing transportation cost

of truckload ₦3,544,000,000,000 (Three Trillion, Five Hundred And Forty Four Billion Naira), the difference is ₦ 334, 586, 926,200 (Three Hundred and Thirty-Four Billion, Five Hundred and Eighty Six Million, Nine Hundred and Twenty Six Thousand, Two Hundred Naira Only) annually resulting to 47.2% additional profit.

It is pertinent to note that if the transportation network generated from the Mono-Commodity Multi-Location Model using LINGO is utilized, the company's profit will increase, cost of product reduced and customer's satisfaction will be enhanced which will eventually lead to sustainability, good image and competitive advantage of the company.

REFERENCES

- Abdelwali, H.A., Alardhi, M., Murad, A.E., Al-Rajhi, J.M.S. (2020). An Optimal Solution for a Real Transportation Problem with Lingo Code. *International Journal of Traffic and Transportation Engineering*. 9(2): 37-40.
- Anand, J., Krishnaraj, C and Balakrishnan S. (2017). Solving Aggregate Planning Problem Using LINGO. *International Journal of Innovative Science, Engineering and Technology (IJSET)*.4(12), 95-100.
- Azizi, M., Birafane, M. and Boueddine, (2015). Solving Transportation Problem with LP: Biopharma Case Study. *IOSR Journal of Business and Management (IOSR-JBM)* 17(3): 15 – 24.
- Bai, Y. (2017). Transportation Cost Modeling of International Containerized Soybean Exports in United States. *International Journal of Production Economics*, 97(1): 75 – 88.
- Baohui, M. and Shiyang Yin. (2018). Application of LINGO in Water Resources Optimization Teaching Based on Integer Programming. *Scientific Research Publishing, Creative Education* 9,251616-2524.
- Ermis, M. Sahingoz, O.K. and Ulengin, F. (2004). "Mobile Agent Based Supply Chain Modeling with Neural Network Controlled Services; *Proceedings of 4th International ICS Symposium on Engineering of Intelligence Systems*, Island of Madeira, Portugal, pp. 1-8.
- Furnish, P. & Wignall, D. (2009). Making the Most of Models: Using Models to Develop More Effective Transport Policies and Strategies. Victoria Transport Policy Institute. www.vtpi.org.
- Jibina, R.P. and Lavanya, S.A (2019). Management of Construction Resources By Using Integer and Dynamic Programming. *International Journal of Innovative Research In Science, Engineering and Technology (IJIRSET)* .8(3).www.ijirset.com
- Rizwanullah., M., Kaanodiya, K.K. And Verma, S.K (2017). Modeling of Supply Chain Dynamics: A LINGO Based Three Tier Distribution Approach. *International Journal of Education And Applied Sciences Research*. 4(1): 24-32..
- Salehi, M., Soukhakian, M.A, Mozaffari, M.R. (2013). Optimization of Transport System in Cement Industry: A Case Study in Omid SimanDarab Cement Manufacturing Company. *European Online Journal of National and Social Sciences*, 2(3): 747 – 754.
- Seyedhousseini, S.M., and Ghoreyshi, S.M. (2014). An Integrated Model for Production and Distribution Planning of Perishable Products with Inventory and Routing Considerations. *Mathematical Problem in Engineering*. Volume 2014, Article ID475606.10 Pages.(<http://dx.doi.org/10.1155/2014/47606>).
- Suleiman, K., Aliyu, A.A., Cecilia, I. Ibrahim, Y. Bashir, Y. and Habibaba, A.

(2015). Application of Linear Programming Techniques in Minimizing Cost of Transportation. A Case Study of Coca-Cola Bottling Company. Dutse, Jigawa State. *Dutse Journal of Pure and Applied Sciences*, 1(2): 114 – 125.

SMART CONTRACTS AND CRYPTOCURRENCY AS THE LEGAL AND
MONETARY ENGINE FOR SPACE

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Abstract

Vacationing in space might look like an immediate impossibility, but between Elon Musk's SpaceX, NASA, and Jeff Bezos' Blue Origin, it is a more likely future reality. While it is uncertain how such a future will be like, look like and sound like, we can expect certain things like the need for coordination. If there is no proper and legitimate organization, life in space could become "solitary, poor, nasty, brutish, and short." Soon, we will need answers to questions like will we need a visa to visit space? If yes, who will issue it?

The one-sentence summary of The Outer Space Treaty is that: no one earthly government owns space, rather, it is the common heritage of all humankind. This consequentially means that no government's denomination can be adopted. How then would space-native transactions happen? Will this necessitate the creation of a Space-Native Digital Currency? Collateralized (on what?) or algorithm-backed?

This paper is divided into two major parts. The first part will explore the possibilities of smart contracts as the legal engine on which proper and legitimate organizations in space will run. The second part will explore the possibilities of cryptocurrency, as the monetary engine on which space-native transactions will happen. Arguments for smart contracts and cryptocurrency as the legal and monetary engine for space draw from the certainty that both are concepts that thrive on digital transformation and automation, which will be ubiquitous in space. A mixed methodology approach is employed to carry out this research.

Keywords: Space, Governance, Blockchain, Smart Contracts, Cryptocurrency, Spaceflight

A COMPARISON BETWEEN GROUND PENETRATING RADAR AND A REBAR LOCATOR ON A REINFORCED CONCRETE STRUCTURE

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Abstract

To effectively evaluate the components of a civil structure, non-destructive testing (NDT) methods can be applied, which allows for an analysis on the condition of the materials without causing damage or alterations to the structure. This form of inspection is well known in the maintenance and preservation of infrastructure such as buildings, bridges, and highways. The focus of this study was to compare data on reinforcing steel bars in an existing structure with implementation of two NDT instruments: ground penetrating radar (GPR) and a rebar locator. Both are ultra-wideband devices that have the capability to locate metallic objects beneath the surface. The surveyed area was a reinforced concrete (RC) floor in a new university building. The information collected consisted of the spacing of the rebar and the concrete cover thickness, which were compared to the specifications on the blueprint of the building for determining accuracy. The GPR utilized was a Proceq GP8000 where line scans were performed to produce radargrams for observation of the rebar spacing and cover thickness. The rebar locator employed was a BOSCH D-TECT 150 Wall Scanner, which detected the rebar and provided an exact measurement for the depth of the rebar. The results from the GPR and rebar locator confirmed that the existing structure satisfies the specifications set by the drawings. While the two instruments can deliver similar details regarding subsurface objects, they both have their advantages and limitations. The outcome of this study presented the applicability of using GPR and a rebar locator for acquiring information on the rebar in a RC structure.

Keywords: Ground Penetrating Radar, Non-destructive Testing, Reinforced Concrete

INTRODUCTION

The amount of time in which a structure or building is considered safe under performance and meets design standards can be referred to as service life. The service life is dependent upon different factors, such as the design, materials, and environmental conditions. Specifically, in reinforced concrete (RC) structures, the most common source for failure is from corrosion of the reinforcing steel, or rebar, which results from the presence of moisture and chloride ions (Lai, 2018). To evaluate these components and materials, non-destructive testing (NDT) methods can be implemented, which refers to the testing procedures that do not typically cause any damage to the structure. Many different NDT applications are utilized for concrete evaluations, which consist of techniques involving acoustic emission, infrared thermography, and ultra-sonic pulse velocity testing (Verma *et al.*, 2013). Similarly, electromagnetic (EM) energy testing methods are popular and include a variety of instruments.

A common NDT instrument used for surveying RC structures that works based on EM energy principles is known as a rebar locator, also sometimes referred to as a cover meter. Characterized as an ultra-wide bandwidth (UWB) device, rebar locators can detect the location of rebar, as well as other materials that are placed beneath concrete, such as pipes and wires. By utilizing pulse radar technology and signal processing techniques, rebar locators are efficient when finding the rebar location, spacing, and cover depth (Rathod *et al.* 2019). While obtaining the exact diameter of the rebar is not possible, estimations can be made. This testing method provides in-situ results with easy interpretation.

Similarly, another UWB device used in the surveying of structures is known as ground penetrating radar (GPR). GPR is a well-established application that is implemented for the detection of subsurface objects in many different fields of investigation. The American Society of Testing Materials (ASTM) provides the standard, ASTM D6432-19 as a guide for GPR usage in areas of engineering, hydrology, environment, and geology (ASTM, 2020). When scanning with GPR, the objects beneath the surface are distinguished by differences in the electrical and magnetic properties between the materials (Daniels, 2004). The EM waves are sent into the scanned material with a transmitting antenna while a receiving antenna collects the information that is represented as the reflected energy. Within the GPR system is a signal processing unit, which allows for the results to be displayed in image form. These images are created automatically as the area or path is scanned, but an analysis of the results requires some preliminary knowledge and expertise.

A rebar locator and GPR instrument can find similar details in RC structures, such as locating the rebar beneath the concrete and how deep it is from the surface. The implementation of both a rebar locator and a GPR are discussed in this research. Both instruments were used to scan a concrete floor in an existing structure to obtain information on the buried rebar. The results were analyzed to determine the accuracy of each instrument when compared to the original drawings of the structure.

MATERIALS AND METHODS

The existing structure surveyed for this study was the Engineering and Research Building (ERB) at Georgia Southern University, located on the Statesboro campus in the state of Georgia in the United States. This four-level building officially opened in January of 2021 and provides spaces for classrooms and advanced research labs available to engineering students on campus. For the experimental work, a concrete floor on the second level was scanned to obtain information regarding the rebar beneath the concrete. Since the building is considered new and does not require any major repair, the purpose of the evaluation was to check the placement of the rebar and the depth at which they were placed for confirmation. Shown in Fig. 1 is the area that was surveyed where the arrow indicates the path followed for surveying. From the plan drawings of the structure, the surveyed area was located to obtain information on the components. In Fig. 2, the specific component details are outlined for the sections. The placement of rebar is indicated in Fig. 2(a) and shows that there is a topping slab, which is the finished floor, over another layer of concrete. The depth from the reinforcement to the outer surface layer is shown that 50.8 mm (2 in) is typical but increases closer towards the beams. The rebar size used was #4, which has a diameter of 12.7 mm, and they were placed at 304.8 mm (12 in) on center, meaning from one center of the rebar to the next should be 304.8 mm.



Figure 1. Testing Site: Level 2 of ERB in Statesboro, GA.

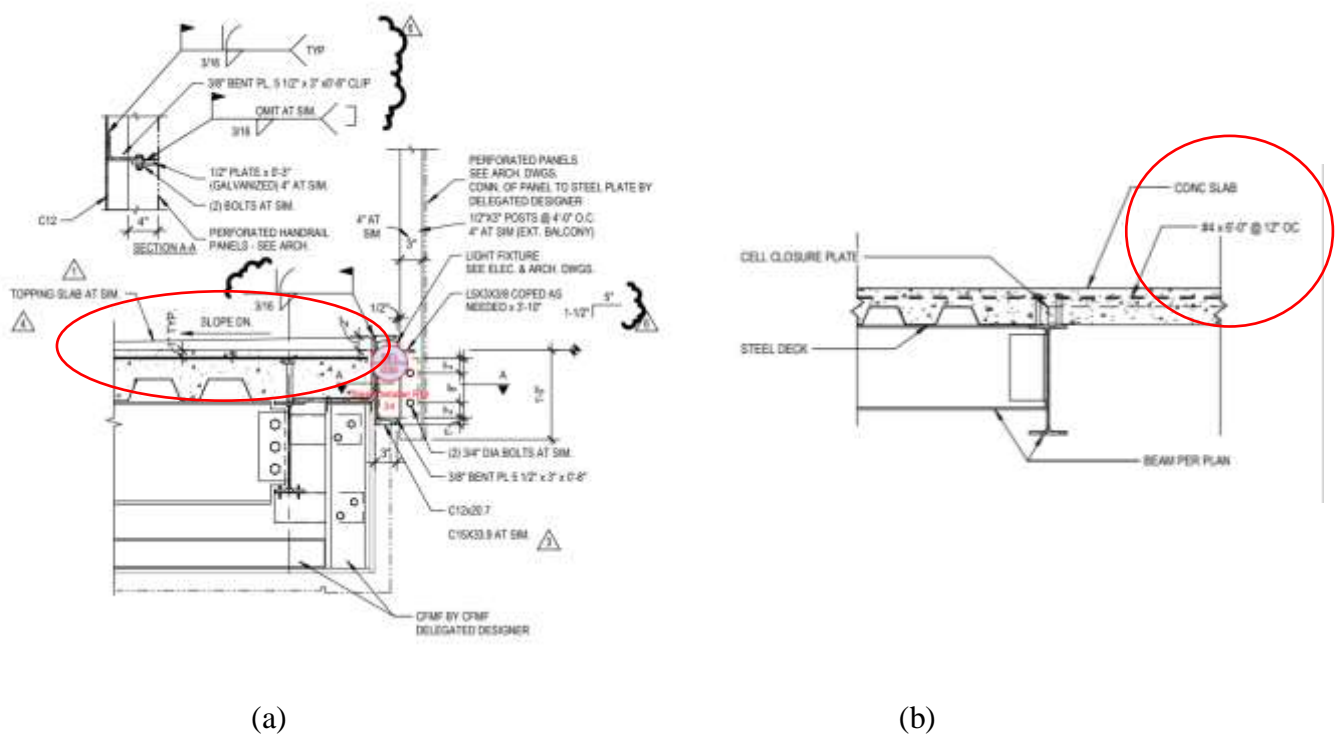


Figure 2. Level 2 – Area 1 of Framing Plan Details: (a). Section at Balcony Floor and (b). Typical Section at Change of Deck Direction. Units are shown in the United States Customary System (USCS) (Stevens & Wilkinson GA, INC. 2019).

The rebar locator used in this experiment was the BOSCH D-Tect™ 150 wall/floor scanner. This is hand-held device with four wheels to glide across the target surface. This specific instrument can locate a variety of concealed materials, such as the following: plastic pipes, metal pipes, wooden studs, hollow spaces, wiring, and reinforcing steel as previously mentioned (BOSCH, 2015). There are different choices for the operating modes depending on the material that is being scanned; some of these consist of concrete, deep concrete, and wet concrete. For this study, the operating mode of concrete was chosen since this is best for

cover depths with a maximum depth of 25.4 mm (3-1/8 in). The scanner must be moved crossway over the surface or perpendicular to the object being detected. To begin surveying, a piece of tape was put down to indicate the starting point. The rebar locator was moved in the longitudinal direction of the area, following the path of the rail shown in Fig. 1. Since different objects and materials can be picked up with the scanner, detection of rebar is indicated by a magnetic symbol in the corner of the display screen. Once the sensor detected the rebar, it was adjusted to find the center of it. Once the center was found, the spot was marked, and the depth of the rebar was recorded. Because the data cannot be saved through the scanner, documentation of the measurements is up to the user. Next, the scanner was moved to find the following detected rebar along the surveying path, which was also marked. A measurement was taken between the points to determine the spacing. This was done for 15 points of rebar.

For the GPR instrument, a Proceq GP8000 was implemented for surveying, as well as an iPad to obtain the results through the Proceq GPR Live App. This application provides the option to perform a line scan or an area scan. For a line scan, the GPR is moved in a straight line to produce a radargram, which displays hyperbolic signatures where objects are detected. These shapes represent the GPR moving toward the object and moving away from it, so the peak of the hyperbola is the subsurface object. This data format is referred to as B-scan data (Prego *et al.*, 2017). The area scan, which is known as C-scan data format, consists of more steps as the GPR surveys a small area with use of a grid paper; therefore, the GPR is not used in a continuous movement. However, the processed data forms an image of the placement and size of the objects beneath the material, so this provides an easier view of the results. For comparison purposes in this case, the line scan option was utilized to obtain the information on the rebar and was carried out in the same path as the rebar locator. From the produced radargram, the peaks of the hyperbolic shapes were identified as the cover depth, and the center from one peak to the next was documented as the rebar spacing (Hasan and Yazdani, 2014). To obtain a view beneath the surface, one area scan was completed for a better interpretation of results and provided some useful information related to the rebar. The produced results from the GPR and rebar locator are displayed and described in the next section. Below are the specific instruments used; Fig. 3 is the rebar locator, and Fig. 4. is the GPR.



Figure 3. BOSCH D-Tect™ 150 wall/floor scanner



Figure 4. Proceq GP8000 GPR

RESULTS

As mentioned previously, the results from the GPR were interpreted by analyzing the hyperbolic shapes. The black and white radargram produced from the line scan is displayed in Fig. 5 where the top hyperbolic shapes are the rebar. Using the adjustable grid line available on the Proceq GPR Live App, it was adjusted to the center of one hyperbolic shape to obtain the first measurement and moved to the center of the next shape for obtaining the distance between the two. The spacing between the points of rebar were all measured as 152.4 m (6 in). For the cover depth, which was measured from the surface to the top of the hyperbolic shape varied and was not uniform. The results ranged from 25.4 mm (0.8 in) to 50.8 mm (2 in). For a more precise image of the objects beneath the surface, an area of 0.61 m² (2 ft²) was scanned. This image in Fig. 6 shows the detectable objects or rebar at 50.8 mm since this was the maximum cover depth found; the results are in the spectrum display mode, which highlights the objects at the desired depth. The vertical objects are the rebar that were detected with the GPR and rebar locator, and they were also estimated to be about 152.4 m apart. Though, measuring the distance from this image was more difficult since the true center of the rebar cannot be accurately found.

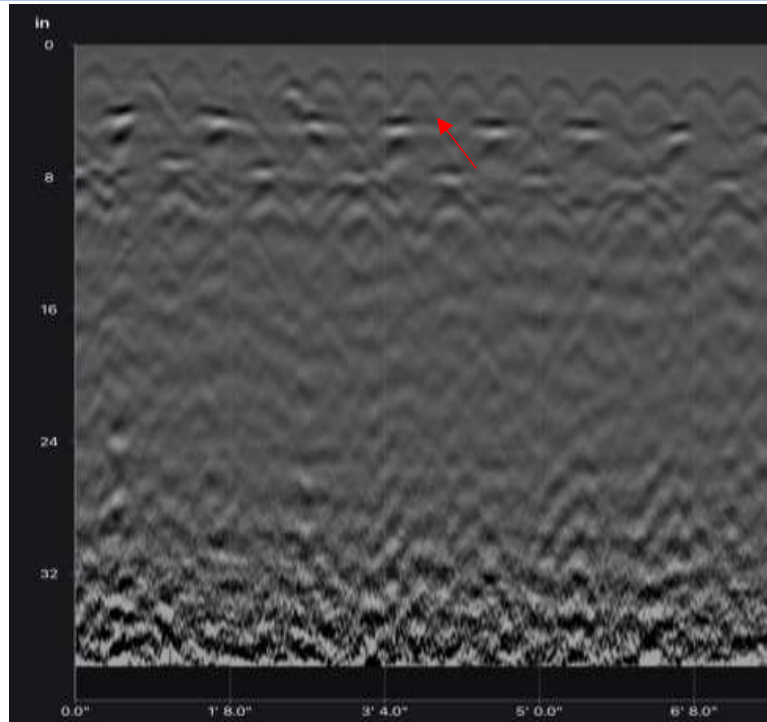


Figure 5. GPR Line Scan Results. Units are in USCS. Note: 1 in = 25.4 mm.

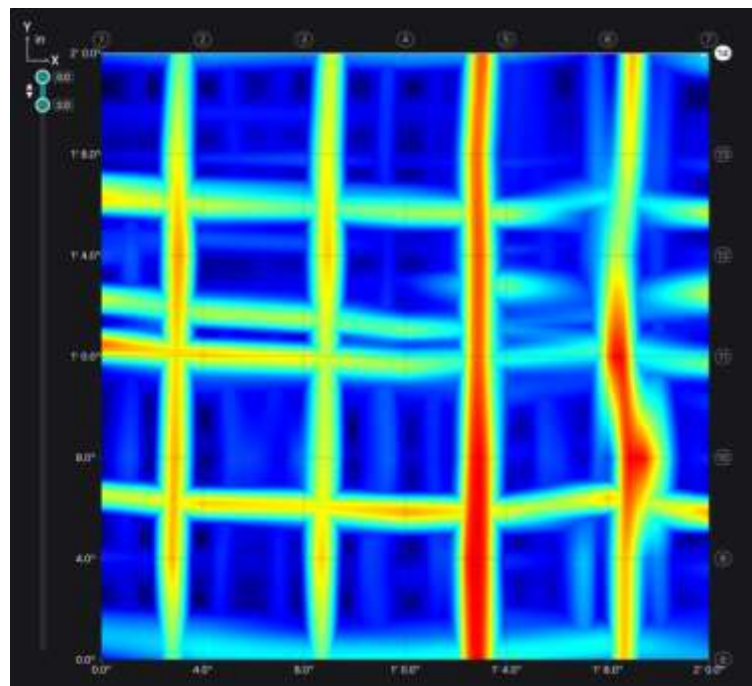


Figure 6. GPR Area Scan Results. Units are in USCS. Note: 1 in = 25.4 mm.

The results show that the two instruments are close in values in both the cover thickness and spacing measurements. When compared to the drawings, the cover depth obtained from the NDT tools are close in range with the depth of 50.8 mm. However, there is some fluctuation. The measurements with GPR ranged from 20.32 mm to 50.8 mm, while the rebar locator measurements ranged from 20.64 mm to 52.39 mm. A comparison between the GPR and rebar locator for estimation on cover depth is shown in Fig. 7. The estimations made for the rebar spacing is displayed in Fig. 8. The analyzed results from the GPR were consistent with a

spacing of 152.4 mm for the rebar. The measurements made with the rebar locator for spacing ranged from 144.78 mm to 152.4 mm. The rebar spacing on the drawings was noted to be at 304.8 mm, but the results with the NDT instruments determined the spacing to be half of that number. Because there was a change in direction of the slab in the area, it is possible that the regular spacing of the rebar was 304.8 mm and another layer of rebar was added, reducing the spacing of rebar to be the 152.4 mm.

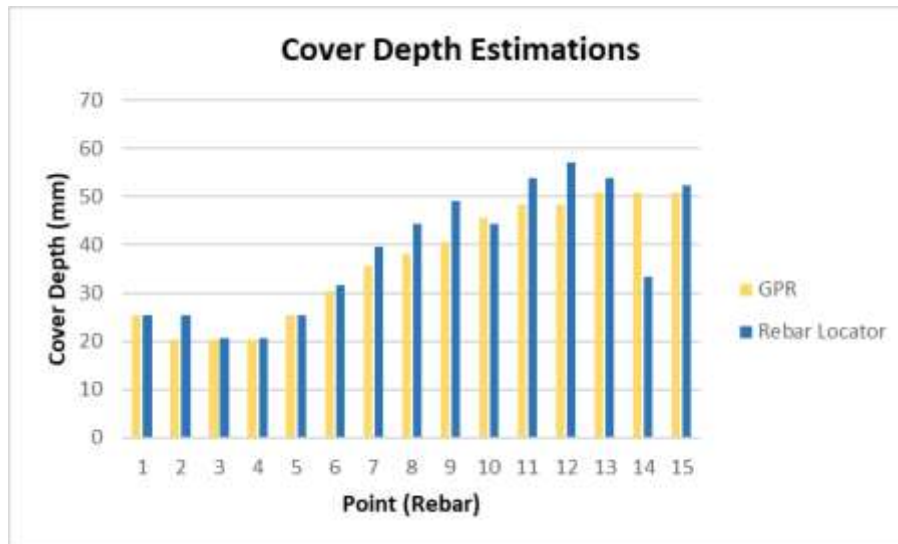


Figure 7. Cover Depth Estimations of GPR and rebar locator

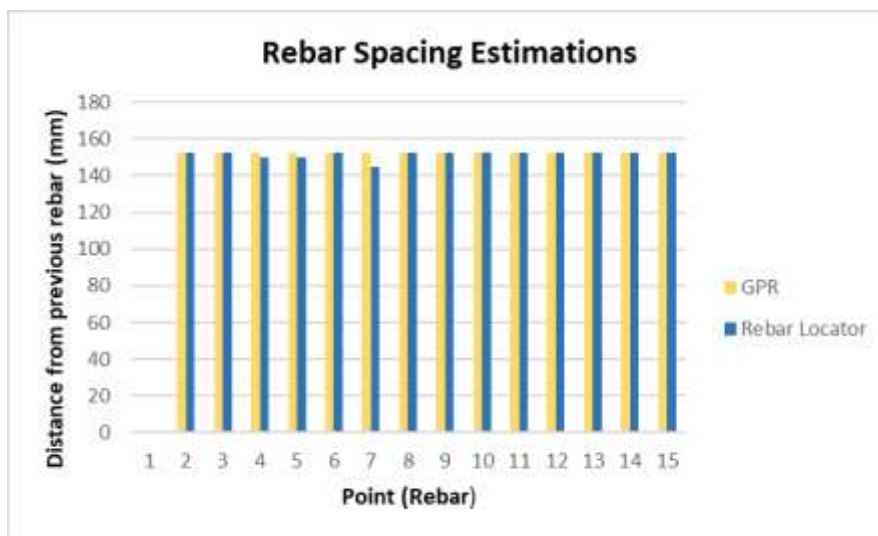


Figure 8. Rebar Spacing Estimations of GPR and rebar locator

DISCUSSION

The BOSCH wall scanner and Proceq GPR proved to be useful instruments for surveying concrete structures and were successfully implemented as NDT methods. However, each of these devices have their advantages and limitations to consider. An analysis on the feasibility of obtaining and interpreting results from the BOSCH scanner and Proceq GPR are presented.

For usage of the rebar locator, it is important to ensure the correct operation mode is selected or the equipment may not detect the objects correctly. Secondly, the rebar locator requires

time as the data for each point of interest is detected at one time, and the data must be recorded by hand. The time to accurately scan, measure, and record the data for the 15 points took about 30-45 minutes. Another limitation is once the scanner is taken off the surface, the previous points of object disappear. Also, a change in the vertical direction of the scanner, such as moving it up or down will alter the measurements, so it is important to keep the position of the scanner consistent and move it in one direction. The instrument must be held evenly with a firm hold, and since the concrete floor was smooth, there were no interferences. The advantages of using this method include the instant reading of results with precise values, and the inexpensive cost when compared to the price of the GPR equipment.

Alternatively, surveying with the GPR instrument when performing a line scan is quick; the time to obtain the line scan for this data only took about a minute. The challenge, however, arises with the evaluation of the results. The radargram produced is not an image with clear answers; the user must have prior knowledge on how to interpret the data. The other option for scanning, an area scan, provides a representation of the placement and direction of the objects beneath the tested material, which is beneficial to validate the results. Nevertheless, this task is time consuming for only a small area. The one area scan produced in this study took about 15 minutes to complete. Also, the user must keep the GPR steady because it is highly sensitive to misalignment, and this is shown in the results as some of the rebar does not appear to be straight. Since the data is stored into an App and can be shared, the GPR method is convenient and efficient. While understanding the results takes time, there are many options for image processing including color, background removal, and noise cancellation to name a few. The GPR method provides a more advanced evaluation when compared to the rebar locator.

CONCLUSION

The ability to evaluate structures with use of reliable NDT methods is becoming more popular as the need for maintenance of infrastructure is increasing. This study analyzes two possible evaluation methods available for the examination of structures: a wall/floor scanner (rebar locator) and a GPR. As the two of these devices operate based on EM energy, they have the power to detect objects beneath materials. In this case, concrete flooring was surveyed for the detection of rebar. After investigation of the results, the following conclusion can be made that the application of GPR and a rebar locator showed successful results in finding the cover depth and spacing of rebar beneath the surface. For an improvement on the accuracy of the obtained results, the next steps for this research could involve contacting the company that provided the drawings and requesting more information on the rebar. Though, without destructive testing, the true position of the rebar cannot be seen. Future testing with these devices could involve constructing concrete slabs with rebar since the location and position will be precisely known. From this, the actual accuracy of the data provided by the GPR instrument and rebar locator can be determined. Since the results from the GPR and rebar locator coincide, the information found presents that these instruments are reliable for rebar evaluation.

ACKNOWLEDGEMENTS

The assistance provided by my peers with the utilization of the GPR equipment is greatly appreciated. The group consisted of Ehsanul Kabir, Eman Woods, Jimmy Crain, and Tyler Brett, who are all students at Georgia Southern University. I would also like to thank the co-author of this paper, my research advisor and professor, Dr. Saman Hedjazi, for the support and guidance of this work.

REFERENCES

- ASTM Standard D6432-19, 2020. Standard guide for using the surface ground penetrating radar method for subsurface investigation. ASTM International. Available at: <https://www.astm.org/d6432-19.html>. [27.03.22]
- BOSCH, 2015. Wallscanner D-Tect™ 150. User Manual. Prospect, IL: © Robert Bosch Tool Corporation. Available at: https://www.boschtools.com/us/en/ocsmedia/Dtect150_1609929X08_315.pdf. [27.03.22].
- Daniels, D. 2004. Ground penetrating radar (2nd Edition), The Institution of Electrical Engineers, London, United Kingdom.
- Hasan, Md. I. and Yazdani, N. 2014. Ground penetrating radar utilization in exploring inadequate concrete covers in a new bridge deck. Case Studies in Construction Materials, 1: 104-114. <https://doi.org/10.1016/j.cscm.2014.04.003>.
- Lai, W.W-L, Dérobert, X. and Annan, P. 2018. A review of ground penetrating radar application in civil engineering: a 30-year journey from locating and testing to imaging and diagnosis. NDT & E International, 96: 58-78. <https://doi.org/10.1016/j.ndteint.2017.04.002>.
- Prego, F.J., Solla, M., Puente, I. and Arias, P. 2017. Efficient GPR data acquisition to detect underground pipes. NDT & E International, 91: 22-31. <https://doi.org/10.1016/j.ndteint.2017.06.002>.
- Rathod, H., Debeck, S., Gupta, R. and Chow, B. 2019. Applicability of GPR and a rebar detector to obtain rebar information of existing concrete structures. Case Studies in Construction Materials, 11. <https://doi.org/10.1016/j.cscm.2019.e00240>.
- Stevens & Wilkinson GA, INC. 2019, July 19. J-313 – Center for Engineering and Research [blueprint], 4012 Forest Dr, Statesboro, GA.
- Verma, S.K., Bhadauria, S.S. and Akhtar, S. 2013. Review of nondestructive testing methods for condition monitoring of concrete structures, Journal of Construction Engineering, 2013. <https://doi.org/10.1155/2013/834572>.

**NUTRIENT CONTENTS AND ANTI-NUTRITIONAL FACTORS OF LUPINE
SEEDS, AND USAGE POSSIBILITIES IN BROILER NUTRITION**

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Abstract

In animal production, a large part of the costs (at the ratio of 60-70%) is constituted of feed expenses. One of the main issues while preparing the diet, is to meet the daily nutrient requirements of animals in an optimum ratio to ensure they continue to live and perform in a healthy way, and besides to make an economical animal production by taking into account the costs. However, maintaining the health and welfare of animals is also a key feature in animal production. In order to meet all these important issues together, researching alternative feed raw materials and revealing their usage possibilities has always been the focus of common interest for scientists and producers. In recent years, consumers also play a decisive and guiding role in these issues. Nowadays, the increasing feed ingredient needs in organic poultry production and gaining importance of both ecologically, and economically sustainability leads researchers to the alternative feedstuffs. With the effect of all these factors mentioned before and the current pandemic conditions, it is seen that there is an increasing trend all over the World (especially in the European countries) to prepare poultry diets with the products grown in their own lands. In addition, some of the major feedstuffs in poultry diets are also used in human nutrition, and the need for these raw materials in other industries affects the supply-demand balance and causes an increase in prices of feed raw materials. Considering all these issues, the importance of countries' use of alternative raw materials such as lupine grown in their own lands for animal nutrition is increasing and attracting attention for world agriculture, animal production, increasing diversity, ecologic and economic sustainability. In the study, it was aimed to prepare a review about the nutritional properties, anti-nutritional factors, and usage possibilities of lupine varieties in broiler diets.

Keywords: lupine, broiler, anti-nutritional factors, quinolizidine alkaloid.

INTRODUCTION

In animal production, feed costs constitute 60-70% of the total expenses (Şenköylü, 2001). To meet the nutrient and welfare requirements of animals economically are the key points of maintaining animal production. Also, sustainability is another main issue for environmental perspective. Besides all these issues, effects of pandemic conditions and war in Ukraine on food and feed raw materials lead to increase the feedstuffs' prices as well. Due to these conditions, alternative feed sources that cultivated in countries' own soils would make an important difference for animal producers, and feed industries to get through from this period.

Lupines might be a good feed raw material, due to its nutrient properties. Australia, Poland, and Morocco are the most lupine produced countries in 2020 (FAOSTAT, 2022). World total production data was shown in Table 1.

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Table 1. Production values of lupines (*Lupinus spp.*) in 2020 were derived from FAOSTAT (2022) data.

Countries	Production (tonnes)	Area harvested (ha)	Yield (kg/ha)
Australia	474629	484240	980.2
Poland	261500	170540	1533.4
Morocco	56483	84920	665.1
World	1046170	888507	1177.4

In addition, they have an important symbiotic relationship with soil-borne nitrogen-fixing bacteria. Leguminosae family plants have nodules in their roots that formed by soil-borne rhizobia bacteria to absorb inert nitrogen from soil air and convert it into biologically useful ammonia, a process referred to as biological nitrogen fixation. Agricultural use of inorganic fertilizer usage is reported as 190 million tonnes in 2019 and 57% of fertilizers is nitrogen source (FAO, 2021). This statistic highlights the importance of the issue. However, legume crops do not need additional nitrogen fertilizer, and also release excess nitrogen in the soil. Due to that release, synthetic nitrogen fertilizer requirement decrease for the following crop, either (Rawal and Navarro, 2019).

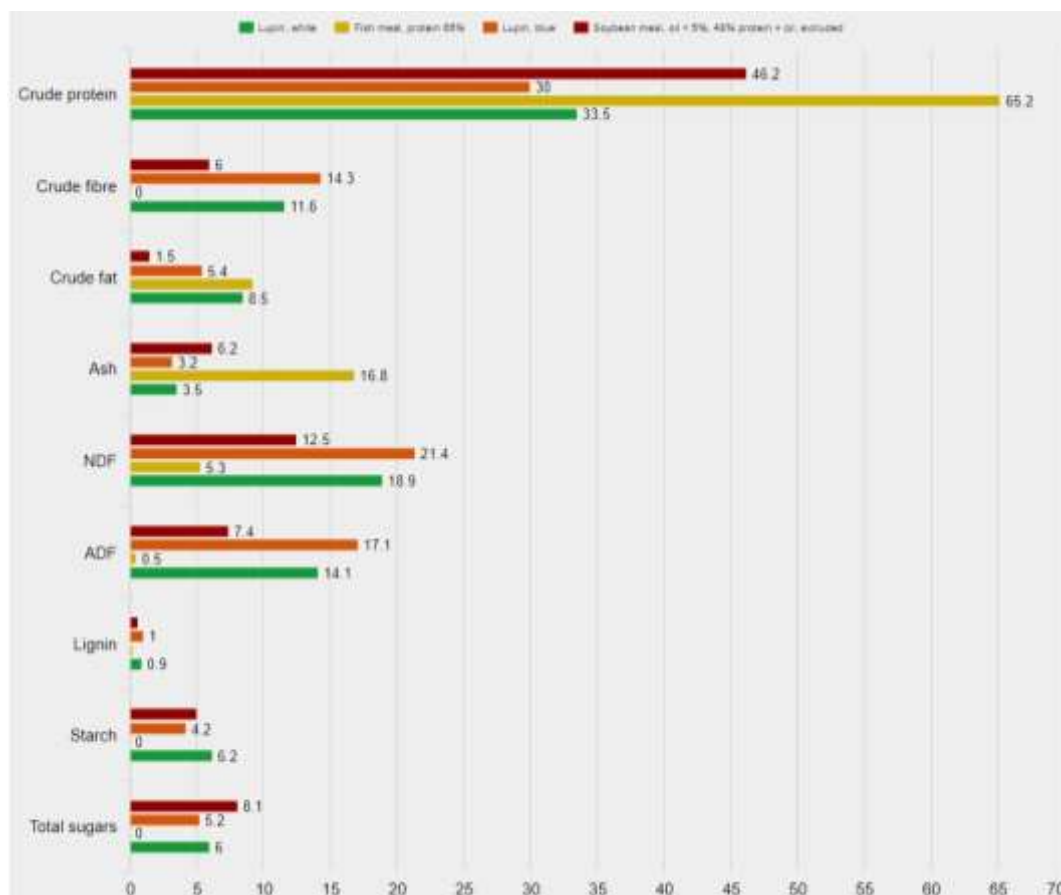


Figure 1. Main constituents of soybean meal, fish meal, blue and white lupin (% as fed; INRAE, 2022a)

Nutrient properties of Lupine varieties

Main nutrient contents of different protein sources (soybean meal, fish meal, blue and white lupine) of broiler diets (% as fed) were given comparatively at Figure 1. Blue and white lupine seeds contain 30-33.5% crude protein, 14.3-11.6% crude fiber, 5.4-8.5% crude fat, 4.2-6.2% starch, 17.1-14.1% ADF, 21.4-18.9% NDF, 1-0.9% Lignin (INRAE, 2022a). In addition, lupine starch is resistant and slowly digestible. (Martinez-Villaluenga et al., 2008).

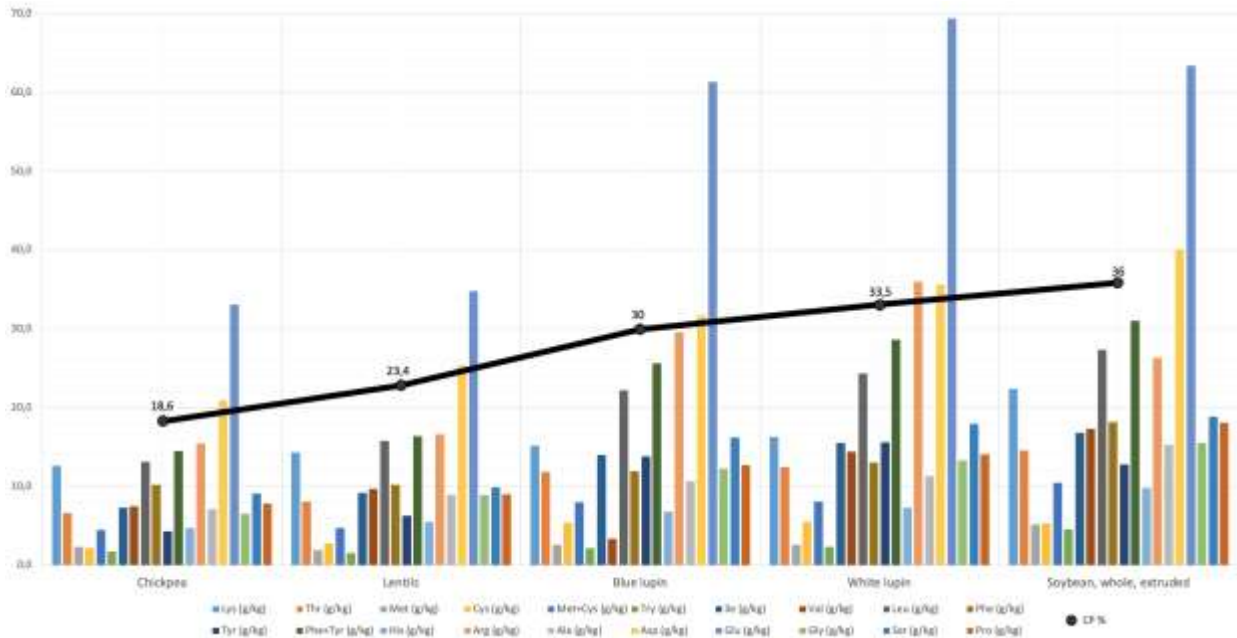


Figure 2. Crude protein and amino acid profiles of some legumes (reviewed from INRAE, 2022b)

Crude protein (CP, %), and amino acid (g/kg) levels of some legumes were shown in Figure 2 (INRAE, 2022b). Lupines are poor in methionine and cysteine amino acids, which are limiting amino acids for poultry. Amino acid balance in poultry diets are essential to meet birds’ requirements (Şenköylü, 2001, Figure 2).

Crude fat and fatty acid profiles of some legumes were composed from INRAE feed tables (2022b; Table 2). According to that levels of oleic (C18:1), linoleic (C18:2), and α-linoleic (C18:3) acids are found abundant fatty acids in blue and white lupine seeds. Besides, Viveros et al. (2007) underlined that cholesterol lowering impacts of lupine seeds.

Table 2. Crude fat and fatty acid profiles of some legumes (reviewed from INRAE, 2022b)

	C12: 0 (g/k g)	C14: 0 (g/k g)	C16: 0 (g/k g)	C16: 1 (g/k g)	C18: 0 (g/k g)	C18: 1 (g/k g)	C18: 2 (g/k g)	C18: 3 (g/k g)	C20: 0 (g/k g)	C20: 1 (g/k g)	C22: 0 (g/k g)	C22: 1 (g/k g)	C24: 0 (g/k g)	Fatty acids %	CF %
Chickpea	0	0.08	6.8	0.1	0.7	17.5	18.2	1.7	0.3	0.3	0.2	0.03	0.1	4.7	5.5
Lentils	0	0.06	1.7	0.02	0.2	2.4	5.1	1.3	0.1	0.1	0.1	0.08	0.1	1.1	1.4
Blue lupine	0	0.1	5.3	0.03	3.3	16.3	18.3	2.7	0.5	0.2	1.1	0.2	0.4	4.8	5.4
White lupine	0.01	0.08	5.6	0.4	1.5	37.5	11.2	6.3	1	3.7	3.4	1.5	0.5	7.6	8.5
Soybean, whole, extruded	0	0.4	19.8	0.2	6.7	40.8	95.4	12.8	0.5	0.3	0.8	0.3	0.4	17.7	18.4

CF: Crude fat

Figure 3 shows energy values of maize, soybean meal, white and blue lupine for different animal species (kcal/kg as fed; INRAE, 2022). Maize, soybean meal, white and blue lupine AMEn (kcal/kg) values for broilers were found as 3200, 3440, 2330, 2030 kcal/kg, respectively.

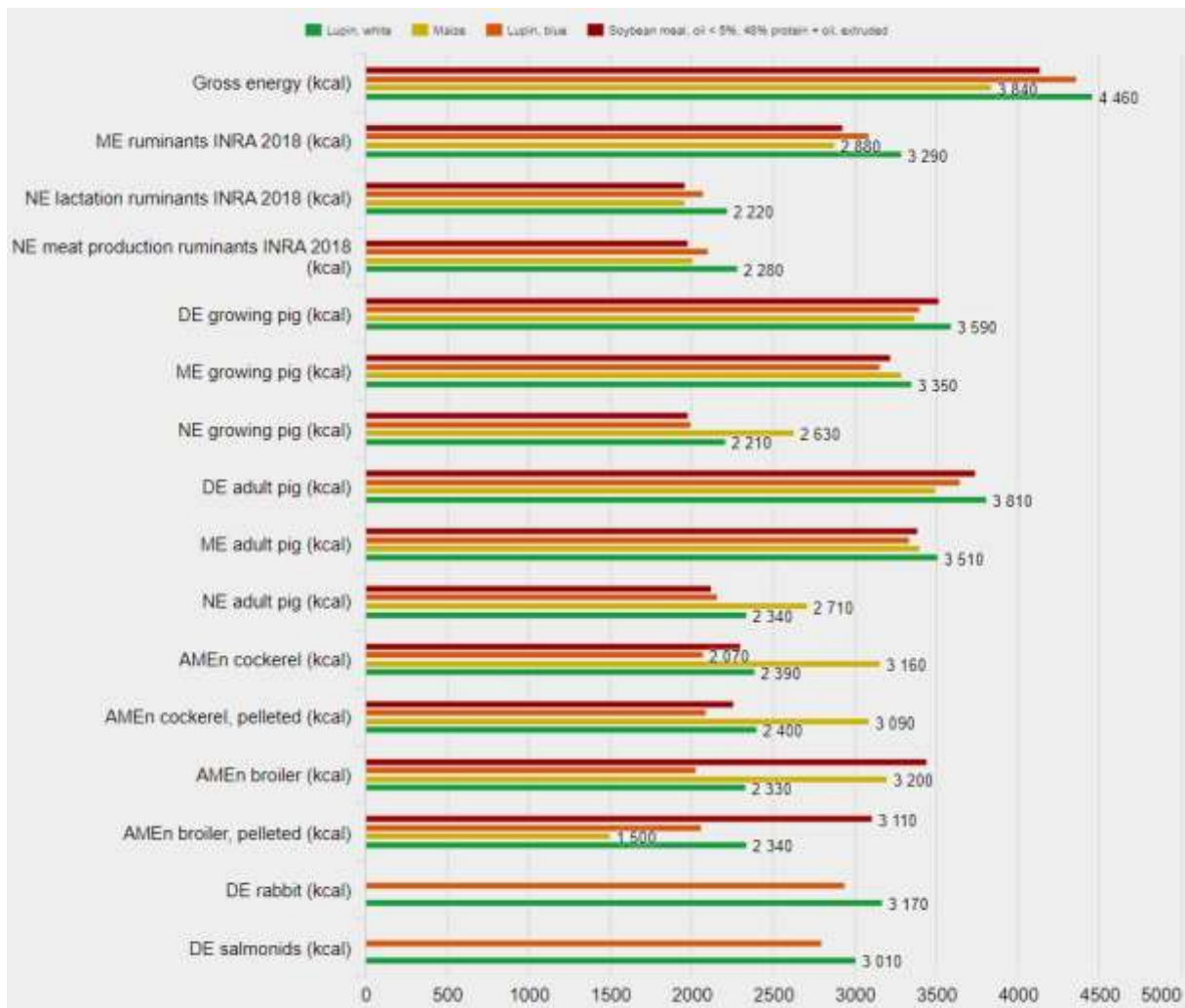


Figure 3. Energy values of maize, soybean meal, white and blue lupine for different animal species (kcal/kg as fed; INRAE, 2022c)

Anti-nutritional factors of Lupine varieties

Lupine seeds have some anti-nutritional factors, which limit their usage in diets and impact adversely animal performance and health. These anti-nutritional factors are Alkaloids, Non-starch polysaccharides (NSPs), Phytate P, Raffinose family oligosaccharides (RFO) (Senkoylu, 2001; Hejdysz ve ark., 2018; Konieczka and Smulikowska, 2018; Kubiś et al., 2020; Boeck et al. 2021). Major alkaloids, that were found in *Lupinus spp.*, are Quinilozidine alkaloids (QAs). They have bitter taste, toxic compounds, and play an important role in plants’ self-protection against herbivores, and pathogenic organisms (Erdemoğlu et al., 2007). They also reported that as alkaloid ratios of lupine species decrease, their resistance to diseases and pests also decreases. QAs were shown at Figure 4 (Petterson, 2000). However, different methods and processes might be used for reducing anti-nutritional factors in lupine seeds, such as soaking, autoclaving, dehulling, fermentation, and germination for human and animal consumptions (Samtiya et al., 2020).

In addition to anti-nutritional factors, researchers indicated that there are some beneficial compounds (phenolic compounds, and selenium, vitamin E, Zn, Cu, and Mn) in lupine seeds. These compounds might have antioxidant, antimicrobial, anticarcinogenic, cholesterol-lowering effects onto fed animals (Boschin and Arnoldi, 2011; Hejdysz et al., 2018b).

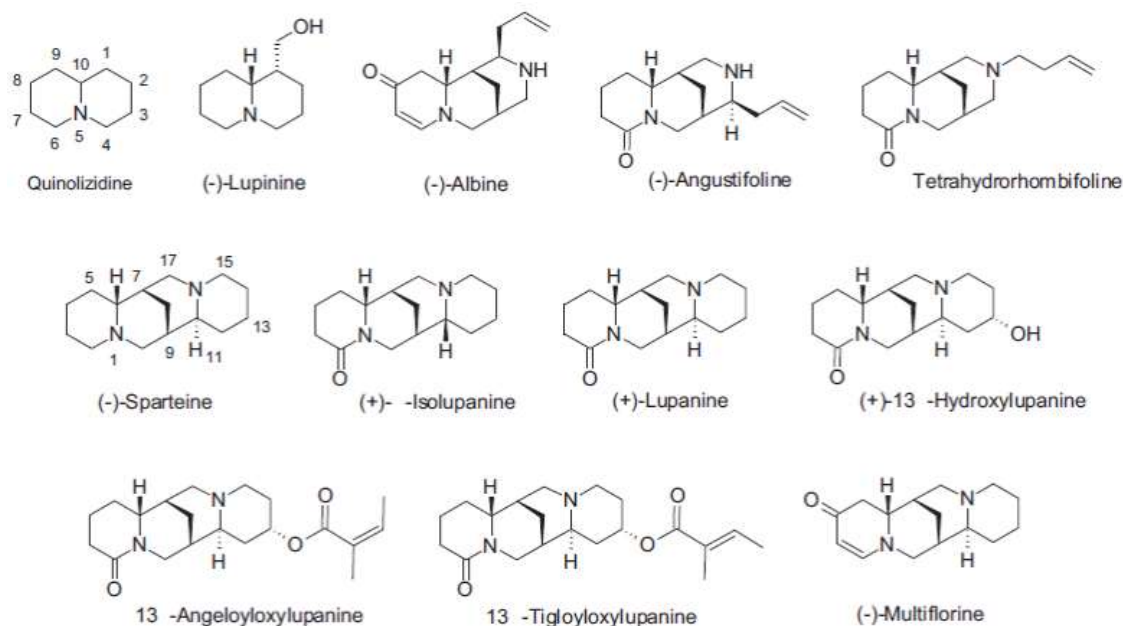


Figure 4. Quinolizidine alkaloids were found in lupine varieties (Pettersen, 2000).

Jeroch et al. (2016), were summarized the use possibilities of *Lupinus spp.* in broiler diets. They indicated that recommended maximum levels in diets change between 10% to 20%. However, Smulikowska et al. (2014) emphasized that not to use at starter diets. On the contrary Nalle et al. (2011) stated that it would make no harm to add 20% lupine seeds to the starter diets of young chicks.

As can be seen, researchers have obtained different results regarding the level of lupine use. The possible reasons might be related with differences between lupine varieties, differences in NOP contents of varieties, and unbalanced diets (in terms of energy and amino acids). Kubiś et al. (2020) also added that high levels of raffinose family oligosaccharides (RFO) found in lupine seeds (about twice as much as SBM) might also cause adverse effects on poultry.

CONCLUSIONS

Many studies have been carried out on the use of lupine species in poultry nutrition since the alkaloid ratios are reduced by selection and due to they are a good source of protein. Most of the results recommended maximum use of 20% in broiler diets. However, contradictory results have also been obtained. Determining levels of nutrient contents, and anti-nutritional factors in lupine cultivars are very important before inclusion to the poultry diets. Another crucial factor is preparing balanced diets with supplementation of synthetic and/or organic amino acids.

REFERENCES

Boeck T, Sahin AW, Zannini E, Arendt EK 2021. Nutritional properties and health aspects of pulses and their use in plant-based yogurt alternatives. *Comprehensive Reviews in Food Science and Food Safety*, 20(4): 1-23.

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

- Boschin g, Arnoldi A 2011. Legumes are valuable sources of tocopherols. *Food Chemistry*, 127: 1199-1203.
- Erdemoglu N, Ozkan S, Tosun F 2007. Alkaloid profile and antimicrobial activity of *Lupinus angustifolius* L. alkaloid extract. *Phytochem Rev.* 6: 197-201.
- FAO 2021. *World Food and Agriculture - Statistical Yearbook 2021*. 353 pp. Rome.
- FAOSTAT 2022. "Lupin Production" data in "Crops and Livestock Products". Available at: <https://www.fao.org/faostat/en/#data/QCL> [12.03.22].
- Hejdysz M, Kaczmarek SA, Kubiś M, Jamroz D, Kasprowicz-Potocka M, Zaworska A, Rutkowski A 2018b. Effect of increasing levels of raw and extruded narrow-leafed lupin seeds in broiler diet on performance parameters, nutrient digestibility and AMEN value of diet. *Journal of Animal and Feed Sciences*, 27: 55-64.
- Hejdysz M, Kaczmarek SA, Rogiewicz A 2018a. Influence of graded dietary levels of melas from three lupin species on the excreta dry matter, intestinal viscosity, excretion of total and free sialic acids, and intestinal morphology of broiler chickens. *Animal Feed Science and Technology*, 241: 223-232.
- INRAE 2022a. Available at: https://www.feedtables.com/charts/main?feed_ch_id%5B%5D=12370&feed_ch_id%5B%5D=12442&feed_ch_id%5B%5D=12363&feed_ch_id%5B%5D=12493 [21.03.22].
- INRAE 2022b. Feed tables. Available at: <https://www.feedtables.com/content/table-as-fed>, [13.02.22].
- INRAE 2022c. Energy values (kcal/kg as fed). Available at: https://www.feedtables.com/charts/energy-kcal?feed_ch_id%5B%5D=12442&feed_ch_id%5B%5D=12363&feed_ch_id%5B%5D=12432&feed_ch_id%5B%5D=12493 [21.03.22].
- Jeroch H, Kozłowski K, Mikulski D, Jamaroz D, Schöne F, Zduńczyk Z 2016. Lupines (*Lupinus spp.*) as a protein feedstuff for poultry. 2) Results of poultry feeding trials and recommendations on diet formulation. *European Poultry Science*, 80.
- Konieczka P, Smulikowska S 2018. Viscosity negatively affects the nutritional value of blue lupin seeds for broilers. *Animal*, 12(6): 1144-1153.
- Kubiś M, Kaczmarek S, Hejdysz M, Miłucha R, Wiśniewska Z, Pruszyńska-Oszmałek E, Kołodziejki P, Sassek M, Rutkowski A 2020. Microbial phytase improves performance and bone traits in broilers fed diets based on soybean meal and white lupin (*Lupinus albus*) meal. *Ann. Anim. Sci.*, 20(4): 1378-1394.
- Martínez-Villaluenga C, Chicholloska J, Kliber A, Gulewicz K 2008. Raffinose family oligosaccharides of lupin (*Lupinus albus* L. cv *multolupa*) as a potential prebiotic. 1st International Immunonutrition Workshop, Valencia, 3-5 October 2007. *Proceedings of the Nutrition Society* (June 2008), 67 (OCE), E55, Valencia, Spain.
- Nalle CL, Ravindran V, Ravindran G 2011. Nutritional value of narrowleafed lupin (*Lupinus angustifolius*) for broilers. *British Poultry Science*, 52(6): 775-781.
- Petterson DS 2000. The use of lupins in feeding systems- Review. *Asian-Australasian Journal of Animal Sciences*, 13(6): 861-882.
- Rawal V, Navarro DK 2019. *The global economy of pulses*. 190 pp., Rome, FAO.
- Samtiya M, Aluko RE, Dhewa T 2020. Plant food anti-nutritional factors and their reduction strategies: an overview. *Food Production, Processing and Nutrition*, 2:6.
- Şenköylü N 2001. *Modern tavuk üretimi (gözden geçirilmiş ve genişletilmiş 3. baskı)*. 538 pp. Tekirdag, Turkey.

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

- Smulikowska S, Konieczka P, Czerwinski J, Mieczkowska A, Jankowiak J 2014. Feeding broiler chickens with practical diets containing lupin seeds (*L. angustifolius* or *L. luteus*): Effects of incorporation level and mannanase supplementation on growth performance, digesta viscosity, microbial fermentation and gut morphology. *Journal of Animal and Feed Sciences*, 23: 64-72.
- Viveros A, Centeno C, Arija I, Brenes A 2007. Cholesterol-lowering effects of dietary lupin (*Lupinus albus* var *Multolupa*) in chicken diets. *Poultry Science*, 86: 2631-2638.

INVESTIGATIONS ON NEW PATHOTYPES OF SUNFLOWER DOWNY MILDEW
(*Plasmopara halstedii*) IN TURKEY AND ON THE ROLE OF STOMA
MORPHOLOGY FOR RESISTANCE TO THE DISEASE

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Abstract

Sunflower (*Helianthus annuus* L.) is commonly cultivated in the Thrace region of Turkey. Downy mildew caused by *Plasmopara halstedii* (Farlow) Berl. Et de Toni) is the most destructive disease of this plant. The continuous emergence of new pathotypes of the pathogen limits the use of resistant or tolerant cultivars. Primary and secondary infections occur with the entry of the pathogen to the roots and through the stomata in the leaves, respectively. Secondary infections among these types of infections are especially important for the transmission of the pathogen to the seeds. The aims of the study were to determine possible new pathotypes in Thrace region and the relationships between stoma morphology and resistance.

The isolates of the pathogen were collected from Edirne, Kırklareli and Tekirdağ during 2016. The pathotypes were characterized with the differential sunflower set including nine different lines and were numbered using a three-digit code. Stoma morphology were determined by measuring length and width of stoma, and width of stomatal aperture in 12 sunflower lines. Nine of these lines were resistance based on the symptomatologic tests and have different resistance genes, whereas three of them were sensitive and lack resistance genes.

As a result of survey 3 new (705, 715 and 735) *P. halstedii* pathotypes were identified in Turkey. Additionally, no significant differences for stoma length and width were found between sunflower lines with or without having the resistance genes. However, it was determined that the stomatal apertures of sunflower lines possessing the resistance genes *Pl 6*, *Pl 6+Pl 2*, *Pl 8* and *Pl Arg* were significantly narrower than the sensitive lines with no resistance genes. It is thought that this morphological feature may play a role in resistance to sunflower downy mildew in the mentioned lines above.

Keywords: Sunflower downy mildew, *Plasmopara halsitedii*, stoma morphology and resistance, pathotype

TÜRKİYE’DE AYÇİÇEĞİ MİLDİYÖSÜ ETMENİNİN (*PLASMOPARA HALSTEDİİ*) YENİ PATOTİPLERİ VE HASTALIĞA KARŞI DAYANIKLILIKTA STOMA MORFOLOJİSİNİN ROLÜ ÜZERİNE ARAŞTIRMALAR

Özet

Türkiye’ de ayçiçeği (*Helianthus annuus* L.), yaygın olarak Trakya Bölgesi’nde yetiştirilmektedir. *Plasmopara halstedii* (Farl.) Berl. et de Toni tarafından oluşturulan mildiyö bu bitkinin en tahrip edici hastalığıdır. Patojenin yeni patotiplerinin sürekli ortaya çıkması, dayanıklı veya toleran çeşitlerin kullanımını kısıtlamaktadır. Patojenin köklerden girişi ile primer enfeksiyonlar, yapraklardaki stomadan girişi ile sekonder enfeksiyonlar meydana gelmektedir. Bu enfeksiyon tipleri arasında özellikle sekonder enfeksiyonlar, patojenin tohumla bulaşması açısından önemlidir. Çalışmanın amacı, Trakya Bölgesi’ndeki olası yeni patotipleri ve stoma morfolojisi ile dayanıklılık arasındaki ilişkileri belirlemektir.

Patojen izolatlar 2016 yılında Edirne, Kırklareli ve Tekirdağ’dan toplanmıştır. Patotipler, dokuz farklı hat içeren ırk ayırıcı set ile karakterize edilmiş ve üçlü kod sistemi kullanılarak numaralandırılmıştır. Stoma morfolojisi 12 ayçiçeği hattında stoma uzunluk ve genişliği ile stoma açıklığının genişliği ölçülerek belirlenmiştir. Bu hatların dokuzu semptomatolojik testlere göre dayanıklı ve farklı dayanıklılık genlerine sahipken, üçü hassas olup dayanıklılık genlerini içermemektedir.

Sörveyler sonucunda Türkiye’de 3 yeni (705, 715 ve 735) *P. halstedii* patotipi tanımlanmıştır. Ayrıca, dayanıklılık genleri olan veya olmayan ayçiçeği hatları arasında stoma uzunluğu ve genişliği açısından önemli bir farklılık bulunmamıştır. Bununla birlikte dayanıklılık genleri olarak bilinen *Pl 6*, *Pl 6+Pl 2*, *Pl 18* ve *Pl Arg'* a sahip ayçiçeği hatlarının stoma açıklıklarının, dayanıklılık genleri içermeyen hassas hatlara göre istatistiksel olarak önemli derecede daha dar olduğu belirlenmiştir. Bu morfolojik özelliğin belirtilen hatlarda ayçiçeği mildiyösüne karşı dayanıklılıkta rol oynayabileceği düşünülmektedir.

Anahtar kelimeler: Ayçiçeği mildiyösü, *Plasmopara halstedii*, stoma morfolojisi ve dayanıklılık, patotip

GİRİŞ

Ayçiçeğinin en önemli hastalığı, epidemiyeye neden olduğu yıllarda çok büyük ekonomik kayıplara neden olabilen ayçiçeği mildiyösüdür. Hastalık etmeni obligat bir fungal patojen olan *Plasmopara halstedii* (Farl.) Berlese et de Toni’dir. Etmen toprak ve tohum kökenli bir patojendir ve kışı oospor formunda geçirir. Uzun yıllar toprakta canlılığını koruma potansiyeline sahiptir.

Etmenin yaşam çemberi diploid karakterli ve kalın hücre duvarlı yapıya sahip bir dinlenme sporu olan oospor ile başlar. Oosporlar bir zoosporangium meydana getirirler ve zoosporangiumun içerisinde birbirinden bağımsız serbest halde hareket edebilen çift kamçılı zoosporlar meydana gelir. Ayçiçeği kökleri ile temas eden zoosporlar kamçılarını kaybederler, çimlenirler ve köke penetrasyon sırasında çim tüpünden apressorium ve ardından bölmesiz hif oluştururlar (Tülek, Hekimhan ve Akın, 2014). Etmenin köklerden gerçekleştirdiği primer enfeksiyonlar sistemik karakterde olup, çıkış öncesi ve çıkış sonrası ölüm ve küçelmeye neden olarak ekonomik kayıplara yol açarken, lokal karakterdeki sekonder enfeksiyonlarda (Şekil 1.) etmen yapraktan giriş yapar ve bitkiler sekonder

enfeksiyonlara uzun süre maruz kalmaları durumunda, uygun iklim koşullarında sistemik enfeksiyonlara nazaran daha fazla hassasiyet gösterebilmektedirler. Etmenin kullanılan fungusitlere karşı dayanıklılık kazanması nedeniyle, günümüzde hastalığın kontrolünde dayanıklı çeşit kullanımı halen geçerliliğini korumaktadır.



Şekil 1. Sekonder enfeksiyonun meydana getirdiği lokal yaprak lezyonları

Hastalıklara karşı dayanıklılık çalışmalarında daha ziyade dayanıklılık genlerine yönelik incelemeler yapılmaktadır. Ancak bitkilerde patojenlere karşı savunma mekanizması oldukça komplekstir. Bitkilerde gözlenen bu dayanıklılık, önceden var olan dayanıklılık (pasif) ve enfeksiyonun teşvik ettiği dayanıklılık (aktif) olarak iki gruba ayrılmaktadır (Dickinson ve Lucas, 1982). Enfeksiyon öncesi bulunan yapısal (pasif) dayanıklılıkta, bitkinin morfolojik ve kimyasal özellikleri önemli rol oynamaktadır. Fiziksel bariyerler olarak yapısal karakterler, patojenin girişine engel olmaktadır. Patojen ve konukçu bitki arasındaki ilk ilişki, çoğu zaman kutikula tabakasında sınırlanmaktadır. Epidermal hücre duvarlarını örten bu mumsu tabaka, belirli patojenlere karşı bitkinin dayanıklılığında önemli bir faktördür. Ayrıca ayçiçeği mildiyösü gibi stomalardan giriş yapan patojenlerde stomaların büyüklüğü, açık ya da kapalı oluşu etmenin girişinde dolayısıyla dayanıklılıkta önem taşımaktadır (Onoğur, 1996).

Ayçiçeği mildiyösü ayçiçeği tarımı yapılan tüm ülkelerde görülmekte ve etmenin 2006 yılına kadar bilinen 35 patotipi olduğu belirtilirken, 2014 yılında 41'e, 2018 yılında ise 50' ye yükseldiği bildirilmiştir (Gulya, 2007; Spring, 2019; Viranyi, Gulya ve Tourvielle, 2015). Sekonder enfeksiyonlar, patojenin tohumla bulaşması açısından önemlidir. Daha yüksek verim elde etmeyi hedefleyen çiftçiler tarafından yeni çeşitler veya gen havuzlarını genişletmek isteyen ıslahçılar tarafından ithal edilen tohumların kullanımı hastalığın tüm dünyaya yayılmasında etken olmuştur. Özellikle hibrit çeşit geliştirilme aşamasında iki generasyon atlatmak için yıl içerisinde kuzeyden güneye lokasyon değiştirilmesi alandan alana bulaşmayı önemli ölçüde hızlandırmıştır. Bu nedenle, hastalığın yayılması daha ziyade küresel pazarların gelişmesiyle birlikte gerçekleşmiştir (Delmotte vd., 2008). Bu durum kimyasal mücadeleyi zorlaştırmakta ve hastalığın mücadelesine yönelik çalışmalar özellikle dayanıklı çeşit elde etme yolunda olmaktadır (Evcı vd, 2011). Patojenin yeni patotiplerinin sürekli ortaya çıkması, dayanıklı çeşitlerin kullanımını da kısıtlamaktadır. Dolayısıyla yeni patotipleri ve stoma morfolojisi ile dayanıklılık arasındaki ilişkileri belirlemek hastalığın kontrol edilebilmesinde büyük önem taşımaktadır.

MATERYAL VE YÖNTEM

Trakya Tarımsal Araştırma Enstitüsü (TTAE) ayçiçeği ıslah programında kullanılan farklı dayanıklılık genlerine sahip bazı hatlar ile dayanıklılık geni bulunmayan hatlar, ayçiçeği mildiyösü etmeni *Plasmopara halstedii*' nin Trakya-Marmara Bölgesi'nden toplanan izolatları (doğal popülasyon halinde) ve uluslararası ırk ayırıcı set çalışmanın materyalini

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oluşturmuştur. Çalışmada yer alan hatlar ve bazı özellikleri Çizelge 1’de, patotip belirlemede kullanılan set ise Çizelge 2’de verilmiştir.

Çizelge 1. Denemede kullanılan ayçiçeği hatları ve özellikleri

NO	Hatlar	Dayanıklılık Geni	Kaynak
1	CL 217 R	<i>Pl 6</i>	TTAE
2	HAR 5	<i>Pl 13</i>	USDA
3	K5 R SN:11/2014	<i>Pl 6+Pl 2</i>	TTAE
4	K9 R SN:3/2014	<i>Pl 8</i>	TTAE
5	RHA 419	<i>PlArg</i>	USDA
6	RHA 437	<i>Pl 8</i>	USDA
7	RHA 443	<i>Pl 4</i>	USDA
8	RHA 447	<i>Pl 2</i>	USDA
9	YDRH SN:7/2014	Mutant MR	TTAE
10	HA 89	Dayanıklılık içermemektedir geni	TTAE
11	2517	Dayanıklılık içermemektedir geni	TTAE
12	9661	Dayanıklılık içermemektedir geni	TTAE

Çizelge 2. Tourvieille vd. (2000) tarafından bildirilen *Plasmoparahalstedii* uluslararası ırk ayırım seti

	Kod		Dayanıklılık geni	Dayanıklılık kaynağı
Set 1	D-1	HA 89	-	-
	D-2	RHA 265	<i>Pl₁</i>	953-102 (Kanada)
	D-3	RHA 274	<i>Pl₂/Pl₂₁</i>	953-88 (Kanada)
Set 2	D-4	DM 2	<i>Pl_{PM13}</i>	Novinka (Rusya)
	D-5	PM 17	<i>Pl₅</i>	? (İran)
	D-6	803-1	<i>Pl₅₊</i>	<i>H. tuberosus</i>
Set 3	D-7	HAR 4	<i>Pl₁₄/Pl₁₆</i>	? (Arjantin)
	D-8	HAR 5	<i>Pl₁₃</i>	Guayacan INRA (Arjantin)
	D-9	HA 335	<i>Pl₆</i>	Yabani <i>H. annuus</i>

İnokulumun Hazırlanması ve İnokulasyon

Mildiyö hastalık etmeni, 2016 yılı Mayıs ayında Tekirdağ, Kırklareli, Edirne illeri köylerinin farklı lokasyonlarından toplanmıştır. Enfekteli yapraklar 3-4 gün gölgede kurutulduktan sonra inokulasyon aşamasında kullanılmak üzere etiketlenerek -80 °C’de buzdolabında muhafaza edilmiştir. Solüsyon hazırlama aşamasında saf su içerisine fungal örtüde bulunan sporangiumlar fırça ile süpürülmüştür. Daha sonra sporangiumların yoğunluğu mikroskop ve thoma lamı yardımıyla belirlenerek, 1×10^5 sporangium/ ml olacak şekilde ayarlanmıştır (Gulya vd., 1991; Gulya vd.,1998; Viranyi, 1977). Çimlendirilen 0.5-1 cm kök uzunluğundaki tohumlar sporangium solüsyonuna yerleştirilmiş ve +16 °C’de 4-5 saat bekletilmiştir. Fidecikler içinde steril edilmiş kum + perlit karışımı (1/3 perlit+2/3 kum) bulunan saksılara ekilerek ortam sıcaklığı +24°C’ye ayarlanmış, 12 saat aydınlık ve 12 saat karanlık olacak şekilde iklim odasında kontrollü şartlarda büyümeye bırakılmıştır. İnokule edilmiş bu bitkilerin ilk gerçek yaprakları 2-3 mm büyüklüğüne ulaştığında, saksıların dolayısıyla bitkilerin üzeri hava geçirmeyecek şekilde, şeffaf naylon poşet ile kapatılmıştır ve +16 °C’de

24-48 saat inkübasyona bırakılmıştır. Toplanan sporangiumlar patotip karakterizasyonunda kullanılmıştır (Şekil 2).



Şekil 2. İnkübasyon sonrasında kotiledon yapraklarda oluşan sporulasyon

***Plasmopara halstedii* Patotiplerinin Belirlenmesi**

Patotiplerin belirlenmesi amacıyla uluslararası ırk ayırıcı set kullanılmıştır (Çizelge 2) (Tourvieille vd. 2000). Hassas ayçiçeği hattı üzerinde çoğaltılan *P. halstedii*'nin farklı izolatlarına ait sporangium konsantrasyonları thoma lamında belirlenerek ayırıcı hatlara ait ayçiçeklerinin inokulasyonu gerçekleştirilmiştir.

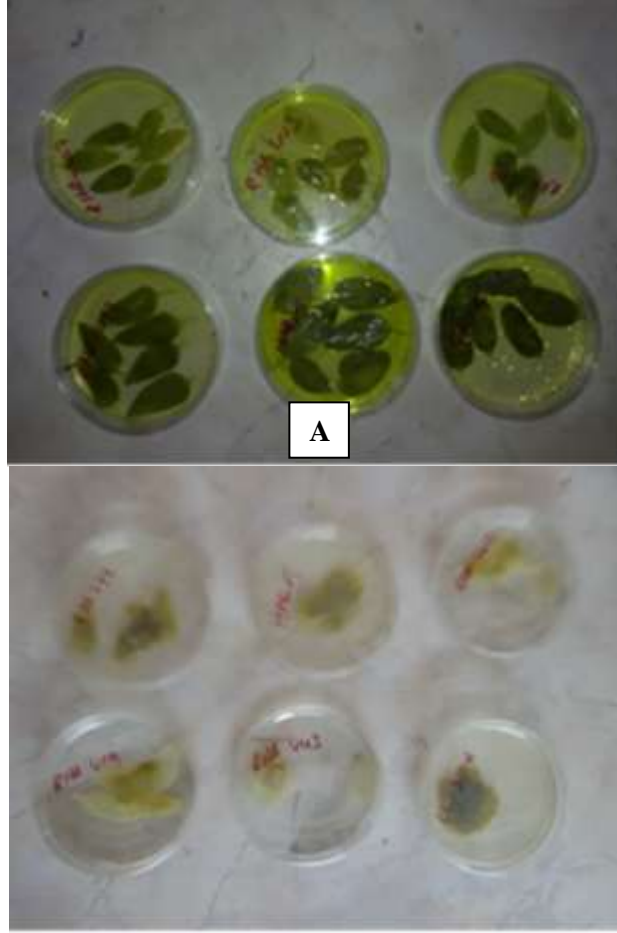
Hastalık değerlendirmesinde ilk gerçek yapraklar veya kotiledonlar üzerindeki sporulasyon oluşumu görülen bitkiler hassas (H), sporulasyon oluşumu görülmeyen bitkiler ise dayanıklı (D) olarak değerlendirilmiştir. İzolatların patotip ayırımı ise Tourvieille vd. (2000) tarafından bildirilen üçlü sınıflandırmaya (Çizelge 3) göre yapılmıştır.

Çizelge 3. Tourvieille vd., (2000) tarafından bildirilen üçlü kod sistemi ile patotip belirleme

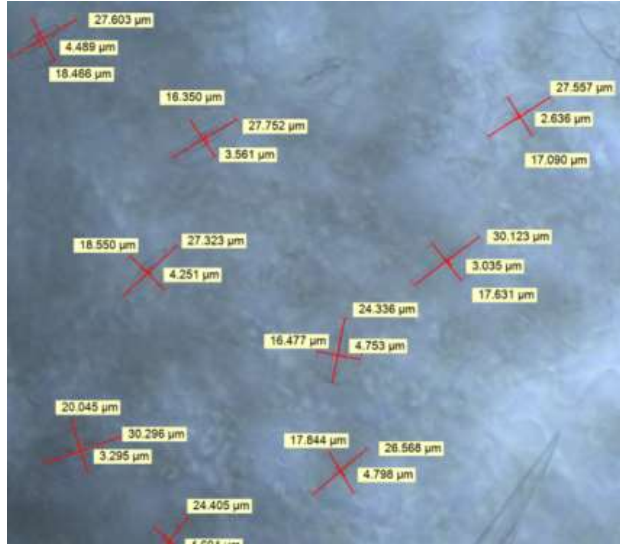
	1	2	3	Üçlü kod
İrk ayırıcı hatlar	D-1 D-2 D-3	D-4 D-5 D-6	D-7 D-8 D-9	
Değer	1 2 4	1 2 4	1 2 4	
Avrupa ırkı	H D D	D DD	D DD	100
	1 + 0 + 0=1	0 + 0 + 0=0	0 + 0 + 0=0	
Red River ırkı	H H D	D DD	D DD	300
	1 + 2 + 0=3	0 + 0 + 0=1	0 + 0 + 0=1	
İrk xyz	H HH	H D H	D H D	752
	1 + 2 + 4=7	1 + 0 + 4=5	0 + 2 + 0=2	
	X	Y	Z	XYZ

Morfolojik Dayanıklılık Mekanizması

Morfolojik dayanıklılık kapsamında, stomaların en, boy ve stoma açıklıklarının ölçülmüştür. Dayanıklı ve hassas çeşitlere ait yapraklarda (her çeşitten 5 yaprak ve aynı zamanda alınmış) stoma en boy ve stoma açıklığının büyüklüğü belirlenmiştir. Bu amaçla 1 cm²'lik yaprak diskleri etanol:asetic asit (3:1 v/v) karışımında klorofil giderilene kadar bekletilmiş (Şekil 3) ve daha sonra saf su içinde 4 saat tutulmuştur. Yaprak diskleri daha sonra laktik asit, gliserol ve su (1:1;1 v/v/v) karışımına aktarılmış, yaprak disklerinin her birinde 50 adet stomanın (Şekil 4) en boy ve açıklık ölçümleri (µm) yapılmıştır (Zhang ve Dickinson, 2001).



Şekil 3. Ethanol:Acetic Asit (3:1 v/v) karışımındaki yapraklar (A) ve 4 saat sonra klorofili kaybolmuş yapraklar (B)



Şekil 4. Stoma en, boy ve açıklık ölçümleri

BULGULAR

Plasmopara halstedii Patotiplerinin Belirlenmesi

Çalışmada kullanılmak üzere Edirne, Kırklareli ve Tekirdağ illerinden toplanan izolatların patotip tespiti yapılmış olup 5 patotip belirlenmiştir (Çizelge 4). Bunlardan 3'ü (705, 715, 735) Türkiye' de ilk defa tespit edilmiştir.

Çizelge 4. Denemede kullanılan *Plasmopara halstedii* izolatlarına ait patotipler

İzolat No	İl	İrk
1	Edirne	704
2	Edirne	705
3	Kırklareli	704
4	Kırklareli	715
5	Tekirdağ	774
6	Tekirdağ	735

Stoma Ölçümleri

Morfolojik dayanıklılık kapsamında etmenin stomalardan giriş yapması nedeniyle, ele alınan hatların yapraklarının stoma eni, boyu ve açıklığı ölçülmüştür. Çizelge 5’ te de görüldüğü gibi ayçiçeği mildiyösüne karşı dayanıklılık geni içeren ve içermeyen hatlarda stoma en ve boyu açısından çok önemli farklılıklar bulunmamıştır. En küçük stoma enine sahip dayanıklı hatlardan K9 R SN:3/14 dayanıklı olmayan 2517 ile aynı grupta yer almış, HA 89 ve 9661’ e göre aralarındaki farklılık önemli bulunmuştur. Bununla birlikte stoma açıklığı incelendiğinde dayanıklı hatlardan RHA 419, K9-R-SN 3/14, K5 R SN:11/2014 ve CL 217 R’nin stoma açıklığının hassas hatlara göre önemli derecede düşük olduğu görülmüştür.

Çizelge 5. Farklı hatlara ait yapraklarda stoma en, boy ve açıklık büyüklüğü (μm)

Hat	Dayanıklılık Geni	En*	Boy*	Açıklık*
CL 217 R	PI 6	18.72±0.23 abc **	32.79±0.37 a	2.00±0.09 e
HAR 5	PI 13	17.68±0.28 bcd	29.78±0.36 ab	2.64±0.15 c
K5 R SN:11/2014	PI 6+PI 2	18.57±0.27 abc	30.56±0.56 ab	2.11±0.13 de
K9 R SN:3/14	PI 8	16.74±0.31 d	27.65±1.68 b	2.04±0.03 de
RHA 419	PIArg	18.92±0.35 ab	29.50±0.80 ab	1.49±0.03 f
RHA 437	PI 8	17.86±0.37 abcd	29.61±0.65 ab	2.60±0.06 c
RHA 443	PI 4	19.04±.64 a	30.37±1.74 ab	3.81±0.27 a
RHA 447	PI 2	18.69±0.26 abc	30.23±1.33 ab	2.42±0.08 cd
YDRH SN:7/2014	Mutant MR	19.06±0.24 a	27.92±0.86 b	2.72±0.10 c
HA 89	-	18.12±0.45 abc	28.96±1.58 b	2.74±0.09 c
2517	-	17.58±0.43 cd	29.30±0.38 ab	3.21±0.13 b
9661	-	18.55±0.53 abc	28.90±1.21 b	2.85±0.23 bc

*Her bir değer 5 tekkerrürün ortalamasıdır.

**Her bir sütunda farklı harflerle gösterilen değerler arasındaki farklılıklar Duncan Çoklu Karşılaştırma testine göre önemlidir ($p=0.05$).

TARTIŞMA

Ayçiçeği mildiyösü (*P. halstedii*)’nün Türkiye’ de ve dünyada bulunan patotiplerinin çeşitliliği ile ilgili yapılan bir çalışmada, Türkiye’de 2007 yılından önce toplam 9 patotip tespit edildiği (300, 330, 700, 703, 710, 713, 730, 770 ve 774) belirtilmiştir (Viranyi vd., 2015). Türkiye’ de yapılan bir çalışmada ise yine 9 farklı patotipinin (100, 102, 110, 300, 500, 502, 510, 702 ve 712) varlığı tespit edilmiştir (Oksal, 2014). Farklı ülkelerden alınan ve aralarında Türkiye’nin de bulunduğu *P. halstedii* izolatlarının incelendiği bir başka patotip belirleme çalışmasında da 4 patotip daha tespit edilmiştir (334, 704, 714, 734) (Ban vd. 2021). Bu çalışmada ise Edirne, Kırklareli ve Tekirdağ illerine ait 2’şer lokasyondan toplanan ve inokulum kaynağı olarak kullanılan örnekler Gulya vd. (1998) ve Tourvielle vd. (2000) tarafından geliştirilen 3’lü kod sistemine göre değerlendirilmiş, 5 patotip (704, 705, 735, 715,

774) tespit edilmiştir. Bunlardan 3'ü Türkiye' de (705, 735, 715) yeni tespit edilen patotiplerdir.

Morfolojik dayanıklılık kapsamında; pasif dayanıklılıkta rol oynayan morfolojik özelliklerden stoma büyüklüğü (Onoğur, 1996)'un da belirttiği üzere ayçiçeği mildiyösü gibi stomalardan giriş yapan patojenlerde etmenin girişinde ve dolayısıyla dayanıklılıkta önemlidir. Bu amaçla dayanıklı ve hassas hatlara ait 12 farklı bitkiden alınan yaprak diskleri üzerinde stoma en, boy ve stoma açıklığı ölçümleri yapılmıştır. Yapılan ölçümler sonucunda en ve boy değerlerinde önemli bir farklılık görülmezken, dayanıklı hatlardan RHA 419, K9 R SN: 3/2014, K5 R SN-11/2014 ve CL 217 R stoma açıklığı değerleri bakımından diğer hatlara göre oldukça küçük olmuştur. Bu durumun söz konusu hatlarda etmenin stomalardan girişini güçleştireceği düşünülmektedir.

SONUÇ

Ayçiçeği mildiyösü Türkiye'de ve dünyada ayçiçeği bitkisinin en önemli fungal hastalığı olmakla birlikte günümüzde bilinen 50 adet patotip bulunması ve kimyasal mücadelesinde etkili maddeye karşı direnç oluşması, hastalıkla mücadelede zorluklar oluşturmaktadır. Bu çalışmada tespit edilen patotipler ile birlikte Türkiye'de toplam 24 patotip bulunduğu görülmektedir. Yeni patotiplerin ortaya çıkışının ve yayılma hızının artması hastalıkla mücadeleyi güçleştirirken, dayanıklılık ıslah çalışmalarının önemi artmıştır. Dolayısıyla ayçiçeği mildiyösüne karşı dayanıklılık ıslah çalışmalarına katkı oluşturması için patotip takibinin de yapılması gerekmektedir.

Yine bu çalışmada tespit edilen ve sırasıyla *PIArg*, *PI 8*, *PI 6+PI 2* ve *P6* dayanıklılık genlerine sahip bazı ayçiçeği hatlarının stoma açıklıklarının, dayanıklılık genleri içermeyen hassas hatlara göre istatistiksel olarak önemli derecede daha dar olduğu görülmekte, bu morfolojik özelliğin ise belirtilen hatlarda ayçiçeği mildiyösüne karşı dayanıklılıkta rol oynayabileceği düşünülmektedir.

KAYNAKLAR

- Bán R, Kovács A, Nisha N, Pálinkás Z, Zalai M, Yousif AIA and Körösi K 2021. New and high virulent pathotypes of sunflower downy mildew (*Plasmopara halstedii*) in seven countries in Europe. *Journal of Fungi*, 7: 549.
- Delmotte F, Giresse X, Richard-Cervera S, M'Baya J, Vear F, Tourvieille J, Walser P ve Tourvieille de Labrouhe D 2008. Single nucleotide polymorphisms reveal multiple introductions into France of *Plasmopara halstedii*, the plant pathogen causing sunflower downy mildew. *Infection, Genetics and Evolution*, 8(5): 534-540.
- Dickinson CH ve Lucas JA 1982. *Plant pathology and plant pathogens*. (2nd ed.). London: Blackwell Scientific Publication.
- Evcı G, Akın K, Kaya Y, Pekcan V ve Yılmaz Mİ 2011. Bazı ayçiçeği hatlarının Trakya Bölgesi' ndeki ayçiçeği mildiyösüne (*Plasmopara halstedii* (Farl.) Berl. & De Toni.) dayanıklılıklarının belirlenmesi. *Anadolu Journal of the Aegean Agricultural Research Institute*, 21(1): 36-43.
- Gulya TJ, Miler JF, Viranyi F ve Sackston WE 1991. Proposed internationally standardized method for race identification of *P. halstedii*. *Helia*, 14: 11-20.
- Gulya TJ, Tourvielle de la Brouhe D, Maširević S, Penaud A, Rashid K ve Viranyi F 1998. Proposal for standardized nomenclature and identification of races of *Plasmopara halstedii*

- (sunflower downy mildew). Paper presented at ISA Symposium III: Sunflower downy mildew, Fargo (ND, United State): 130-136.
- Gulya TJ 2007. Distribution of *Plasmopara halstedii* races from sunflower around the world. Paper presented at Second International Downy Mildew Symposium, July 2–6, 2007, Olomouc, Czech Republic: 121-134.
- Onoğur E 1996. Basılmamış Ders Notu.
- Oksal E 2014. Ayçiçeği mildiyösü etmeni *Plasmopara halstedii* (Farl.) Berl. & de Toni'nin Türkiye'deki ırklarının tespiti ve bazı ticari ayçiçeği çeşitlerinin bu ırklara karşı reaksiyonlarının belirlenmesi. (Doktora Tezi). Ankara: Ankara Üniversitesi Fen Bilimleri Enstitüsü, 77 syf.
- Spring O 2019. Spreading and global pathogenic diversity of sunflower downy mildew. *Plant Protection Science*,55(3): 149-158.
- Tourvieille LD, Gulya TJ, Masirevic S, Penaud A, Rashid KY ve Viranyi F 2000. New nomenclature of races of *Plasmopara halstedii* (sunflower downy mildew). Paper presented at fifteenth International Sunflower Conference, Toulouse, France.
- Tülek, A., Hekimhan, H. ve Akın, K. (2014). Ayçiçeği mildiyösü. Erişim adresi <http://arastirma.tarim.gov.tr/ttae/Sayfalar/Detay.aspx?SayfaId=76> [01.04.2022]
- Viranyi F 1977. An improved method for detecting systemic infection of sunflower seedlings caused by *Plasmopara halstedii*. *Acta Phytopathologica Acad. Scientiarum Hungaricae*:12(3-4): 263-267.
- Viranyi F, Gulya TJ ve Tourvielle DL 2015.Recent changes in the pathogenic variability of *Plasmopara halstedii* (sunflower downy mildew) populations in different continents. *Helia*, 38(63): 149–162.
- Zhang L ve Dickinson M. 2001. Fluorescence from rust fungi: a simple and effective method to monitor the dynamics of fungal growth in planta. *Physiological and Molecular Plant Pathology*, 59(3): 137-141.

**EFFECTS OF METABOLITES IN THE PERICARP AND SEEDS OF SOME
SUNFLOWER GENOTYPES SHOWING DIFFERENT TOLERANCE TO DOWNY
MILDEW DISEASE ON SEED-BORNE *Bipolaris cynodontis***

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Abstract

Seed-borne fungus, *Bipolaris cynodontis* in sunflower (*Helianthus annuus* L.) causes seedling rot in both sensitive and tolerant genotypes to downy mildew disease caused by *Plasmopara halstedii*. This case limits the use of tolerant genotypes. It is thought that the metabolites in seeds differ to the genotypes and that these metabolites are related to the growth of seed-borne fungi. The effects of metabolic extracts obtained from the pericarp and seeds of some sunflower genotypes with different tolerance to downy mildew on the growth of *B. cynodontis* were determined in this study. Tolerant and sensitive genotypes (5 genotypes for each) to sunflower mildew were tested in the study. Hexane, chloroform and methanol were used as solvents during extraction. The antifungal effect of the obtained extracts against *B. cynodontis* was evaluated by considering the criteria such as reduction in the colony growth, conidial germination, length of conidial germ tube of the pathogen and the increase in inhibition zone. The extracts were analyzed for their content in Gas Chromatography-Mass Spectrometry (GC/MS) after derivatization. As a result of the study, especially the extracts obtained with chloroform showed antifungal effects at varying rates according to the genotypes and the parts. Among them, the seed extracts of TTAE 1319, one of the tolerant genotypes, exhibited the highest rates of reduction in colony diameter (31.98%), conidial germination (31.85%) and conidial germ tube length (27.28%) of *B. cynodontis*. It was determined that 3-Ethyl-3-methylheptane (Alkane), 1-Benzoyl-3-methyl-2-indolinol (indole derivative) and 3- β -Myristoylolean-12-en-28-ol (Terpene) among the detected compounds were specialized (which were not present in seed or pericarp extracts of other genotypes) to the seed part of this genotype. It will be useful to examine the genotypes to be obtained during breeding studies against sunflower downy mildew in terms of these compounds.

Keywords: Sunflower, *Bipolaris cynodontis*, metabolites from seed and pericarp, antifungal effect

MİLDİYÖ HASTALIĞINA KARŞI FARKLI TOLERANS GÖSTEREN BAZI
AYÇİÇEĞİ GENOTİPLERİNİN PERİKARP VE TOHUMLARINDAKİ
METABOLİTLERİN TOHUM KÖKENLİ *BIPOLARIS CYNODONTIS* ÜZERİNE
ETKİLERİ

Özet

Ayçiçeği (*Helianthus annuus* L.) bitkisinde tohum kökenli fungus *Bipolaris cynodontis*, *Plasmopara halstedii* tarafından oluşturulan mildiyö hastalığına karşı hem hassas hem de tolerant genotiplerde fide çürüklüğüne neden olmaktadır. Bu durum tolerant genotiplerin kullanımını kısıtlamaktadır. Tohumlarda bulunan metabolitler genotiplere göre farklılık gösterdiği ve bu metabolitlerle tohum kökenli fungusların gelişiminin ilişkili olduğu düşünülmektedir. Bu çalışmada ayçiçeği mildiyösüne karşı farklı toleransa sahip genotiplerin perikarp ve tohumlarından elde edilen metabolik ekstraktların *B. cynodontis*'in gelişimi üzerine etkileri belirlenmiştir.

Çalışmada ayçiçeği mildiyösüne karşı tolerant ve hassas genotipler (her biri için 5 genotip) test edilmiştir. Ekstraksiyon süresince çözücü olarak hekzan, kloroform ve metanol kullanılmıştır. Elde edilen ekstraktların *B. cynodontis*'e karşı antifungal etkisi koloni gelişimi, konidi çimlenmesi, konidi çim tüpü uzunluğunda azalma ve inhibisyon zonunda artış kriterleri dikkate alınarak değerlendirilmiştir. Ekstraktlar derivatizasyon işleminden sonra Gaz Kromatografi-Kütle Spektrometresi (GC/MS)'de içeriği açısından analiz edilmiştir. Çalışma sonucunda özellikle kloroform ile elde edilen ekstraktlar genotiplere ve kısımlara göre değişen oranlarda antifungal etki göstermiştir. Bunlar arasında tolerant genotiplerden TTAE 1319'un tohum ekstraktları *B. cynodontis*'in koloni çapında (%31.98), konidi çimlenmesinde (%31.85) ve konidi çim tüpü uzunluğunda (%27.28) azalma yönünden en yüksek oranları sergilemiştir. Tespit edilen bileşiklerden 3-Etil-3-metilheptan (Alkan), 1-Benzoil-3-metil-2-indolinol (indol türevi) ve 3- β -Miristololean-12-en-28-ol'ün bu genotipin tohum kısmına özelleştiği (diğer genotiplerin tohum ve perikarp ekstraktlarında bulunmayan) tespit edilmiştir. Ayçiçeği mildiyösüne karşı ıslah çalışmaları süresince elde edilecek genotiplerin bu bileşikler açısından incelenmesi yararlı olacaktır.

Anahtar kelimeler: Ayçiçeği, *Bipolaris cynodontis*, perikarp ve tohumdan metabolitler, antifungal etki

GİRİŞ

Ayçiçeği (*Helianthus annuus* L.) bitkisel yağın hammaddesi durumundadır ve diğer endüstri bitkileri arasında ekonomik değeri oldukça yüksek bir bitkidir. Yüksek oranda yağ içermesi nedeniyle (%40-60) tarımsal üretimdeki yeri oldukça büyüktür. Ayçiçeği tohumları perikarp içinde yer almaktadır. Perikarp düz ya da çizgili gri siyah renkte olup, perikarbin iç yüzeyi ve tohum üzerindeki zar mum açısından zengin bir yapıya sahiptir (Kayahan, 2006). *Plasmopara halstedii* (Farl.) Berlet ve Toni tarafından oluşturulan mildiyö hastalığı ayçiçeğinde sorun olan en önemli fungal hastalıktır. Etmenin çok sayıda ırkları olması nedeniyle fungusitlere karşı dayanıklılık kazanma durumu söz konusudur (Oros ve Virányi, 1984; Delen et al., 1985; Lafon et al., 1996; Albourie et al., 1998; Gulya et al., 1999; Molinero-Ruiz et al., 2008). Bu bağlamda dayanıklı genotip kullanımı ve dayanıklı hatların geliştirilmesi hastalığın kontrolünde önemli bir yer tutmaktadır. Ancak geliştirilen tolerant hatlarda tohum kökenli fungal hastalık etmenleri çıkış öncesi ve sonrası ölümlere neden olabilmektedir. Daha önce yapılan bir çalışmada farklı ayçiçeği genotiplerinin tohum ve perikarplarından izole edilen fungus türlerinden *Bipolaris cynodontis*'in varlığının genotiplere, perikarp ve tohum kısımlarına göre farklılık gösterdiği bildirilmiştir (Arap, 2018). Aynı çalışmada

gerçekleştirilen patojenisite testleri sonucunda *B. cynodontis*'in %19.37-30.7 arasında değişen oranlarda hastalık şiddeti oluşturduğu belirlenmiştir.

Tohumlarda bulunan metabolitler çeşit ya da genotiplere göre farklı olabilmektedir. Tohum kökenli fungal etmenlere karşı dayanıklılık tohum kabuğu rengi, hücrelerin sık ve homojen olması, tohumların içerdiği antifungal metabolitlerin varlığı gibi bazı fiziksel ve kimyasal özelliklere göre değişiklik göstermektedir (Neergaard, 1979; Erkan, 1998). Dış ülkelerde farklı bitkilere ait tohumlarda bulunan metabolitlerin, tohum kökenli fungal etmenlerin gelişimi üzerine engelleyici veya teşvik edici etkileri olduğunu ileri süren bazı çalışmalar bulunmaktadır. Bunlar arasında Grzywacz ve Rosochacha (1977), deve tüyü rengindeki çam tohumu kabuklarında miristik asid, palmitik asid, stearik asid, araşidik asid, behenik asid, palmito-oleik asid'in, siyah renkli tohumlarda oleik asid, linoleik asid, eikosonik asid ve erusik asid'in daha yüksek oranda bulunduğunu belirtmişlerdir. Belirlenen yağ asitleri arasında erusik asid'in %2'lik konsantrasyonda tohumlara uygulanması halinde *Cylindrocarpon didymium*, *Alternaria tenuis*, *Fusarium oxysporum* ve *Rhizoctonia solani*'nin koloni gelişimini sırasıyla %100, %43.6, %37.4 ve %24.8 oranında engellediğini, palmitik asid ve oleik asid'in ise aynı fungusların koloni gelişimini teşvik ettiğini tespit etmişlerdir. Garcia et al. (1997) Uruguay'da 7 farklı çeşide ait arpa tohumlarından kloroform ile ekstraksiyon yaparak elde ettikleri ekstraktlarda alkilresorsinol'ü belirlemişler ve bu bileşiğin Bowman çeşidinde en yüksek oranda bulunduğunu ileri sürmüşlerdir. Çalışmada alkilresorsinol'ün depo patojenleri olan *Aspergillus niger* ve *Penicillium crysogenum*'un gelişmesinin engellendiği minimum engelleme konsantrasyonu 5.6-10 µg/cm² olarak belirtilmiştir. Rutlenge ve Nelson (1997), bir pamuk çeşidi (Akala SJ2) tohumlarından aseton ile elde ettikleri ekstraktlarda tespit ettikleri kaprilik asid'in düşük oranda, miristoleik asid, palmitoleik asid, cis-10-nonadecenoik asid, linoleik asid, linolenik asid'in yüksek oranda tohum çürümesine neden olan *Pythium ultimum*'un sporangium çimlenmesine uyarıcı etki yaptığını tespit etmişlerdir. Gembeh et al. (2001), *Aspergillus flavus* gelişimine ve aflatoksin oluşumuna dayanıklı ve hassas olduğu bilinen farklı mısır genotiplerinin tohumlarından kloroform ile elde edilen ekstraktlarda tespit edilen antifungal özellikteki bileşiklerden bir alkilresorsinol olan 5-metil resorsinol'ün *A. flavus*'un koloni gelişimini engellediğini, bu bileşiğin aflatoksin üretiminin engellenmesinde de önemli rolü olduğunu belirtmektedirler. El-Hady Aly et al. (2011), 12 pamuk genopine ait tohumlarda bulunan yağ asidi içeriğini belirlemişler ve tohum kökenli fungusların bulunma oranı ile yağ asidi içeriği arasındaki ilişkileri ortaya koymuşlardır. Çalışmada özellikle *Cladosporium* sp.'nin bulunma oranı ile kaproik asid, kaprilik asid ve linoleik asid asit miktarı ile pozitif önemli bir ilişki, palmitik asid ile negatif önemli bir ilişki olduğu belirlenmiştir. Bununla birlikte palmitik asid ile *F. oxysporum* arasında pozitif bir ilişki tespit etmişler, tohumlardaki belli yağ asitlerinin tohum kökenli fungusların pamuk tohumlarını kolonize etmesinde düzenleyici bir etkiye sahip olduğunu ve tohumlardaki yağ asitleri miktarının değiştirilmesi ile bu durumun kontrol edilebileceği fikrini öngörmüşlerdir. Subashini ve Rakshitha (2012) çeşidi belli olmayan ayçiçeği tohumlarından metanol ile elde ettikleri ekstraktların, insanlarda patojen olan ve kültür koleksiyonundan alınan *Aspergillus fumigatus*, *Rhizopus stolonifer* ve *Fusarium oxysporum*'a karşı oluşan inhibisyon zonuna olan etkilerini belirlemişlerdir. Araştırmacılar en yüksek inhibisyon zonunun *Aspergillus flavus*'a karşı oluştuğunu, bunu *Rhizopus stolonifer*, *Candida albicans* ve *Fusarium oxysporum*'un izlediğini ve bu ekstraktlarda tanin, saponin, flavanoid, karbonhidrat, steroid ve yağ bileşiklerinin bulunduğunu belirtmişlerdir. Ayçiçeği tohum kısımlarında bulunan metabolitlerle ayçiçeğinde tohum kökenli funguslar arasındaki ilişkilere yönelik yapılmış bir çalışma ile karşılaşılmamıştır. Bu çalışmada ayçiçeğinde tohum kökenli patojen olan *B. cynodontis*'in gelişimi üzerine mildiyö hastalığına karşı farklı toleransa sahip genotiplerin perikarp ve tohumlarından elde edilen metabolik ekstraktların etkisinin ve antifungal özellikteki ekstraktların kimyasal içeriğinin belirlenmesi amaçlanmıştır.

MATERYAL VE METOT

Bu çalışmada Trakya Tarımsal Araştırma Enstitüsü'nden alınan ayçiçeği mildiyösüne yüksek derecede tolerant (TTAE 1319, 13 TR009, TTAE-13-9, 11 TR015 CL, 13 TR 001) ve hassas (2453 A, 9728 A, 9725 A, 2517 A, 9178 A) olan toplam 10 genotip kullanılmıştır. Testlerde aynı genotiplerden elde edilen, fidelerde %30.7 oranında hastalık şiddetine neden olan ve moleküler olarak da tanısı doğrulanmış olan *Bipolaris cynodontis*'e ait 8 nolu izolat (Arap 2018) değerlendirmeye alınmıştır. Söz konusu izolat Patates Dekstroz Agar (PDA) besi ortamında 23°C'de 7 gün süre ile soğutmalı inkübatörde (Binder) geliştirilmiştir. Ekstraksiyon işlemi Chen et al. (2016)'nın kullandığı yöntem dikkate alınarak yapılmıştır. Bu amaçla önce perikarp ve tohumlar ayrı ayrı havanda ezilerek toz haline getirilmiş, 6.5 mg örnek için 0.75 ml oranında çözücü kullanılmıştır. Ekstraksiyon işlemi, hekzan, kloroform ve metanol olmak üzere 3 farklı çözücü ile ayrı ayrı gerçekleştirilmiştir. Ekstraksiyon işlemi 2 grup olarak yapılmış, gruplardan birisi patojen türler üzerine antifungal etkilerin belirlenmesine yönelik testlerde, diğeri ise GC/MS (gas chromatography/mass spectrometry) ölçümlerinde kullanılmıştır. GC/MS analizinde kullanılacak kurutulmuş ekstraktlarda türevlendirme (Schnee, 2008; Özer et al., 2017) işlemi yapılmıştır. GC/MS analizlerinde Shimadzu QP-2010 Ultra mass seçici detektörü bulunan Shimadzu QP-2010-Ultra model gaz kromatografi (Shimadzu, Kyoto, Japan) kullanılmıştır. Örnekler Teknokroma TRB-5MS kolon (30 m 0.25 mm i.d., 0.25 µm film kalınlığı, Sant Cugat del Vallés, Spain) kullanılarak ve Chen et al. (2016) tarafından önerilen sıcaklık ve süreler dikkate alınarak analiz edilmiştir. Bileşiklerin tanımlanması NIST27, NIST107, NIST147 ve WILEY7 veri tabanları kullanılarak gerçekleştirilmiştir. Çalışmada farklı ayçiçeği genotiplerinin tohum ve perikarplarından üç ayrı çözücü kullanılarak elde edilen metabolik ekstraktların *B. cynodontis*'in gelişimi üzerine antifungal etkisini belirlemek için, ekstraktların uygulanması halinde patojenin koloni gelişimi, konidi çimlenmesi, çim tüpü uzunluğu ve inhibisyon zonu ölçümleri yapılmıştır. Bu amaçla kurutulmuş örnekler tartılarak üzerine hangi çözücü kullanılmış ise, aynı çözücünden 1 ml/mg oranında eklenmiş ve ilgili testlerde kullanılmıştır. Metabolik ekstraktların patojen fungusun koloni gelişimine etkisini belirlemek amacıyla ekstrakt (250µl) petri kaplarında bulunan PDA besi ortamına yayılmış ve yaklaşık 2 saat süre ile kurutulduktan sonra (Gembeh et al., 2001) *B. cynodontis* izolatının PDA besi ortamında geliştirilmiş kolonilerinden 0.5 cm çapında agar diski alınarak metabolitin bulunduğu yere yerleştirilmiştir. Petri kapaklarının etrafı parafilm ile çevrilerek 23°C'de inkübasyona bırakılmış ve 7 gün sonra koloni çapları ölçülmüştür. Kontrol petrilere sadece ilgili çözücü (250µl) yayılmıştır.

Ekstraktların konidi çimlenmesine etkilerini belirlemek amacıyla içinde steril su ile ıslatılmış steril kurutma kağıtları bulunan petri kapları hazırlanmış ve içerisine steril lam yerleştirilmiştir. Lam üzerine 75 µl ekstrakt damlatılmış ve yaklaşık 2 saat süre ile kuruması beklenmiştir. Daha sonra kuruyan ekstrakt üzerine patojen izolatın PDA besi ortamında 10 gün süre ile geliştirilmiş kültürlerinden 1×10^5 konidi/ml konsantrasyonunda (Zhang et al., 2017) hazırlanan konidi süspansiyonundan 25 µl damlatılmıştır. Konidi çimlenmesini teşvik etmek amacıyla konidi süspansiyonuna 10 µl %1'lik sükröz eklenmiş. Kontrol petrilere lam üzerine aynı miktarda sadece ilgili çözücü (75 µl) ve 25 µl steril destile su damlatılmıştır. Petri kapaklarının etrafı parafilm ile çevrilerek 23°C'de 3 saat (%90-100 çimlenmeye ulaşmak için yeterli süre) inkübasyona bırakıldıktan sonra 10 µl laktofenol mavisi ilavesi ile çimlenme durdurulmuş ve mikroskop altında çimlenme oranları sayılmış ve çim tüpü uzunlukları ölçülmüştür (Özer et al., 1999; Özer et al., 2004; Özer, 2011). Her tekrarda 50 konidinin çimlenme oranı ve 25 konidinin de çim tüpü uzunluğu ölçülmüştür. İnhibisyon zonunun ölçülmesinde Subashini ve Rakshitha (2012) tarafından önerilen yöntem modifiye edilerek kullanılmıştır. Önce içinde PDA bulunan petri kaplarının orta kısmına 2 katlı steril kurutma kâğıdı diski (0.5 cm) yerleştirilerek, disk üzerine 75 µl ekstrakt damlatılmış ve etrafına eşit mesafede 3 adet fungus diski (0.5 cm) yerleştirilmiştir. Petri kapaklarının etrafı parafilm ile

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çevrilerek 23°C’de inkübasyona bırakılmış ve 1 hafta sonra oluşan ihibisyon zonları ölçülmüştür. Kontrol petrielerde ekstrakt yerine aynı miktarda ilgili çözücü kullanılmıştır. Denemeler sonucunda kontrol petrielerdeki gelişimler dikkate alınarak koloni gelişimi, konidi çimlenmesi ve çim tüpü uzunluğundaki yüzde azalmalar [Kontrol petrideki koloni çapı (veya konidi çimlenme oranı veya çim tüpü uzunluğu) — ekstrakt uygulamasındaki karşılık gelen değerler / kontrol değerleri] hesaplanmıştır. Kontrol uygulamalarında ilgili çözücü kullanıldığında düşük de olsa inhibisyon zonu oluşmuştur. Bu nedenle inhibisyon zonu değerlendirmeleri inhibisyon zonundaki yüzde artış şeklinde gerçekleştirilmiştir. Tüm testler 4 tekrarlı olarak yürütülmüştür. Elde edilen veriler 10 genotip, 2 genotip kısmı (Perikarp ve tohum), 3 çözücü (hekzan, kloroform ve metanol) dikkate alınarak ve açıcı değerleri kullanılarak (Karman 1970) SPSS (Statistical Package for Social Sciences, 2001, version 11.0; Chicago, IL, USA) programı ile varyans analizine tabii tutulmuş ve ortalamalar Duncan Çoklu Karşılaştırma Testi ile ($p<0.01$) karşılaştırılmıştır.

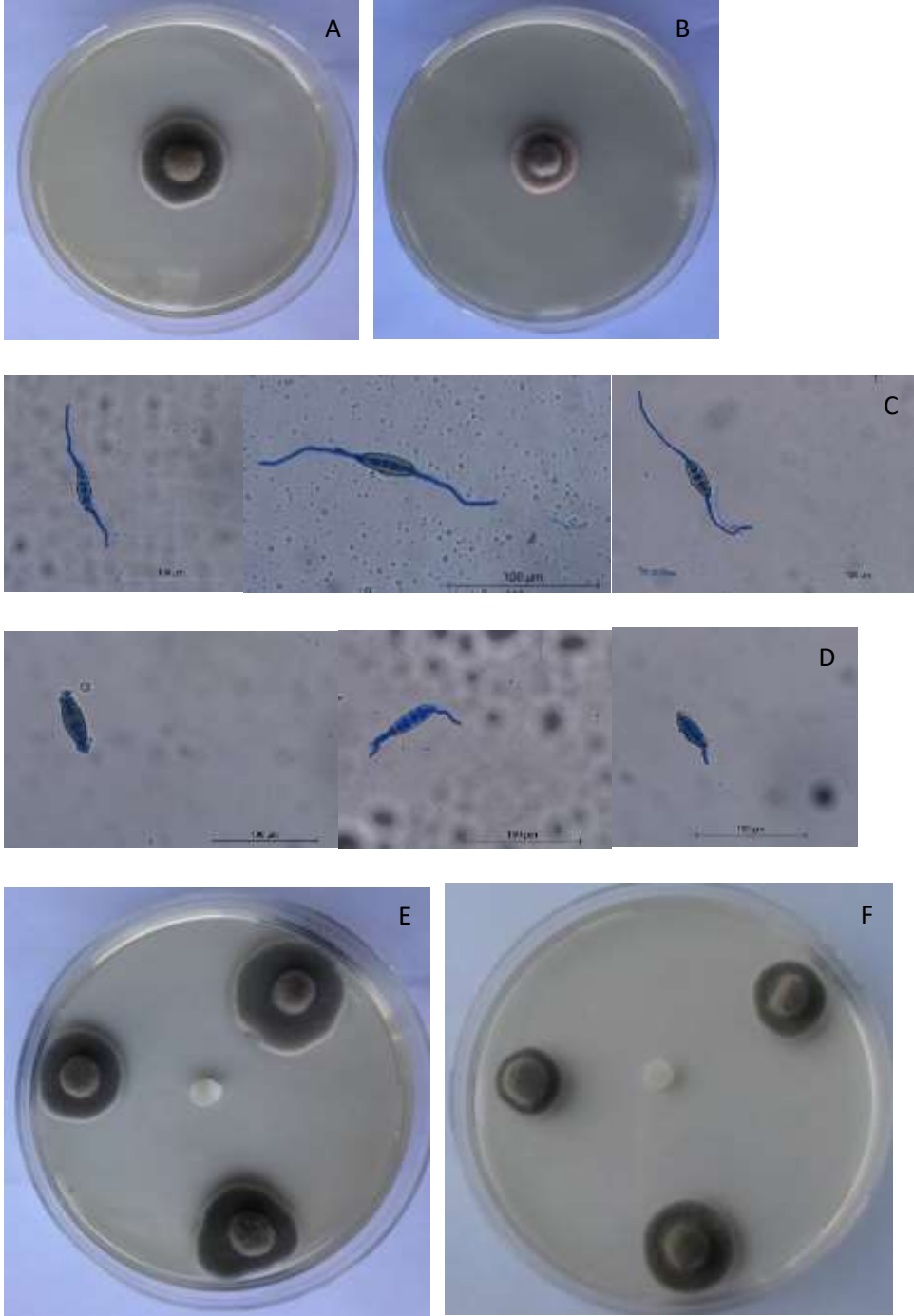
SONUÇLAR

Genotipler arasında TTAE 1319’un tohumundan kloroform kullanılarak elde edilen ekstrakt *B. cynodontis*’in koloni çapını, konidi çimlenmesini, çim tüpü uzunluğunu en yüksek oranda azaltmış, inhibisyon zonunda artışa neden olmuştur (Çizelge 1, Şekil 1). Patojen üzerine yüksek antifungal etki gösteren (çim tüpü uzunluğu hariç) diğer ekstrakt 2453’ün tohumlarından elde edilmiştir. 13 TR009’un tohumundan elde edilen ekstrakt koloni çapını azaltmada 2453 A’nın tohum ekstraktı ile aynı istatistiki grupta yer alsa da, çim tüpü uzunluğunu azaltmada daha etkili olmuştur. 56 ekstraktta patojene karşı herhangi bir antifungal etki gözlenmemiştir. TTAE 1319’un tohum ekstraktı incelendiğinde (Çizelge 2), 3-Etil-3-metilheptan (Alkan), 1-Benzoil-3-metil-2-indolinol (Indol türevi) ve 3-β-Miristoilolean-12-en-28-ol (Terpen)’ün, diğer genotiplerin tohum ya da perikarp ekstraktlarında bulunmadığı sadece bu genotipin tohum kısmına özelleştiği tespit edilmiştir. 2453 nolu genotipin tohum kısmına özelleşmiş bileşiklerin Miristol oleat (Ester), Erusik asid (yağ asidi), 1-(2-Isopropil-5-metil-sikloheksiloksi)-3-piperidin-1-il-propan-2-ol (Heterosiklik bileşik) ve 2-ter-Butilsikloheksanon (keton)’yi olduğu belirlenmiştir. 13 TR001’in perikarbindan elde edilen ve en düşük antifungal etkiye sahip olan ekstraktta ise genotipe özelleşmiş bir alkanın (2,3,5,8-Tetrametildekan) olduğu görülmüştür. Etmenin koloni çapı ($r=+0.814$), konidi çimlenmesi ($r=+0.850$), konidi çim tüpü uzunluğunda azalma ($r=+0.825$) ve inhibisyon zonundaki artış ($r=+0.828$) ile bileşiklerin miktarı arasında en yüksek pozitif önemli ($p<0.01$) ilişkiler Bombikol (Alkol) arasında olmuştur [Detaylı bilgiler Proje raporunda (Özer ve Şabudak, 2020) mevcuttur].

Çizelge 1. Farklı ayçiçeği genotiplerinin iki farklı kısmından elde edilen metabolik ekstraktların *B. cynodontis*’in koloni çapı, konidi çimlenmesi, çim tüpü uzunluğu ve inhibisyon zonu üzerine etkileri (%±Standart hata)

Genotip	G.K. ¹	Çö. ²	Koloni çapında azalma	Konidi çimlenmesinde azalma	Konidi çim tüpü uzunluğunda azalma	İnhibisyon zonunda artış
TTAE 1319	T	C	31.98±1.11 a ³	31.85±0.50 a	27.28±0.68 a	26.61±0.23 b
13 TR009	T	C	25.00±0.58 b	14.88±0.59 c	24.52±0.70 b	25.54±0.12 c
13 TR001	P	C	21.51±0.58 c	10.68±0.73 d	15.79±0.34 d	20.00±0.09 d
2453 A	T	C	25.12±0.46 b	26.23±0.47 b	17.58±0.52 c	31.61±0.68 a
Diğer tüm genotip, tohum kısmı ve çözücü için (56 adet)			0.00±0.00 d	0.00±0.00 e	0.00±0.00 e	0.00±0.00 e

¹ G.K.: Genotip kısmı, perikarp (P), tohum (T), ² Çö.: Çözücü, Kloroform (C), ³ Her bir sütunda birbirinden farklı harflerle gösterilen değerler arasındaki farklılıklar Duncan Çoklu Karşılaştırma testine göre önemlidir ($P<0.01$).



Şekil 1. *B. cynodontis*'in koloni gelişimi, çimlenme ve çim tüpü uzunluğunda azalma inhibisyon zonunda artış. A: Kontrol petride koloni gelişimi, B. Metabolik ekstrakt uygulanan petride koloni gelişimi, C: Kontrolde konidi çimlenmesi ve çim tüpü, D: Metabolik ekstrakt uygulamasında çimlenmeyen ve kısa çim tüplü konidiler, E: Kontrol petride inhibisyon zonu, F. Metabolik ekstrakt uygulamasında inhibisyon zonu (Kontrol uygulamalarında kloroform kullanılmıştır.)

Çizelge 2. *B. cynodontis* üzerine antifungal etki gösteren ekstraktların ait olduğu genotip kısımları ve genotip kısmına özelleşmiş bileşikler

Genotip	G.K. ¹	Çö. ²	Genotip kısmına özelleşmiş bileşikler [Grubu ve miktarı (mg/tohum veya perikarp)]
TTAE 1319	T	C	3-Etil-3-metilheptan (Alkan, 0.33), 1-Benzoil-3-metil-2-indolinol (Indol türevi, 0.56) ve 3-β-Miristoilolean-12-en-28-ol (Terpen, 0.65)
13 TR009	T	C	Etil pentakontanoat (Ester, 0.23), Trans-9,10-Epoksistearik asid (Yağ asidi, 0.14), 22,23-Dihidroergosterol (Steroid, 0.23)
13 TR001	P	C	2,3,5,8-Tetrametildekan (Alkan, 0.11)
2453 A	T	C	Miristol oleat (Ester, 0.90), Erusik asid (Yağ asidi, 0.11), 1-(2-Isopropil-5-metil-sikloheksiloksi)-3-piperidin-1-il-propan-2-ol (Heterosiklik bileşik, 0.90), 2-ter-Butilsikloheksanon (Keton, 0.11)

¹ G.K.: Genotip kısmı, perikarp (P), tohum (T)

² Çö.: Çözücü; C: Kloroform

TARTIŞMA

Tohumların kimyasal yapısı ile tohum kökenli funguslar arasındaki ilişkiler farklı bitkilerde incelenmiş olmakla birlikte, ayçiçeğinde bu tür bir çalışma ile karşılaşılmamıştır. Mildiyö hastalığına karşı tolerant olan genotiplerden, kloroform kullanılarak elde edilen TTAE 1319'un tohum ekstraktının *B. cynodontis* üzerine yüksek oranda antifungal etki gösterdiği belirlenmiştir. Daha önce farklı bitkilerle yapılan çalışmalarda, çam tohumu kabuklarında bulunan yağ asitlerinden erusik asid'in *A. tenuis* ve *F. oxysporum*'un koloni gelişimini engellediği, oleik asid ve palmitik asid'in aynı fungal etmenlerin gelişimini teşvik ettiği bildirilmektedir (Grzywacz ve Rosochacka, 1977). Başka bir çalışmada ise pamuk tohumlarında bulunan linoleik asid'in *P. ultimum*'un sporangium çimlenmesini teşvik ettiği belirtilmektedir (Rutlenge ve Nelson, 1997). Araştırmamızda söz konusu yağ asitlerinden erusik asid *B. cynodontis*'in koloni çapı, konidi çimlenmesi, çim tüpü uzunluğu ve inhibisyon zonu üzerine antifungal etki gösteren 2453 A'nın tohumlarından kloroform ile ekstraksiyon yapıldığında tespit edilmekle birlikte aynı funguslara daha yüksek oranda etki gösteren diğer genotip ekstraktlarında bulunmamıştır. Ekstraktların antifungal etkisi ile, ekstraktlarda bulunan her bir bileşik arasındaki ilişkilerin incelenmesi sonucunda, en yüksek düzeyde pozitif ilişkilerin bombikol ile *B. cynodontis*'in konidi çimlenmesinde azalma arasında olduğu belirlenmiştir.

Sonuç olarak ayçiçeğinde tohum kökenli fungal etmen olan *B. cynodontis*'in gelişiminin engelleyen genotip ekstraktlarının diğer ekstraktlarda bulunmayan bileşikler içerdiği belirlenmiştir. Ayrıca tespit edilen bileşiklerden bombikol etmeninin gelişimindeki azalma ile yüksek düzeyde ilişkili bulunmuştur. Tüm bu bileşiklerin ayçiçeğinde mildiyö hastalığına karşı tolerant genotiplerin elde edilmesinde dikkate alınabileceği, ayrıca söz konusu patojenin engellenmesine yönelik çalışmalarda kullanılabilir olmasının olduğu düşünülmektedir. Ancak öncelikle bu bileşiklerin tohum çimlenmesine ve fide gelişimine herhangi bir olumsuz etkisinin bulunup bulunmadığının araştırılması gereklidir.

TEŞEKKÜR

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KAYNAKLAR

- Albourie JM, Tourvieille J, De Labrouhe DT 1998. Resistance to metalaxyl in isolates of the sunflower pathogen *Plasmopara halstedii*. European Journal of Plant Pathology, 104(3): 235–242.
- Arap, M. 2018. Mildiyö Hastalığına Karşı Farklı Tolerans Derecelerindeki Bazı Ayçiçeği Genotiplerinde Tohum Kökenli Fungusların Belirlenmesi. Tekirdağ Namık Kemal Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi.
- Chen M, Rao RSP, Zhang Y, Zhong C, Thelen JJ 2016. Metabolite variation in hybrid corn grain from a large-scale multisite study. The Crop Journal, 4(3): 177-187.
- Delen N, Onoğur E, Yıldız M 1985. Sensitivity levels to metalaxyl in six *Plasmopara helianthi* Novot. isolates. The Journal of Turkish Phytopathology, 14(1): 31-36.
- El-Hady Aly, AA., Hussein E, Omar M, El-Abbasi I, Abd-Elsalam K 2011. Effect of fatty acid content on the level of cottonseed colonization by fungi. Biological Letters, 48(2): 125-137.
- Erkan S, 1998. Tohum Patolojisi. İzmir: Gözdem Ofis,. 275 s.
- Garcia S, Garcia C, Heinzen H, Moyna P 1997. Chemical basis of the resistance of barley seeds to pathogenic fungi. Phytochemistry, 44(3): 415-418.
- Gembah SV, Brown RL, Grimm C, Cleveland TE 2001. Identification of chemical components of corn kernel pericarp wax associated with resistance to *Aspergillus flavus* infection and aflatoxin production. Journal of Agriculture and Food Chemistry, 49(10): 4635-4641.
- Grzywacz A, Rosochacha J 1977. Attempt at elucidation of the role of fatty acids in the resistance of *Pinus silvestris* L. seeds to infection by damping-off fungi in dependence on the colour of their seed shells. Acta Societatis Botanicorum Poloniae. 46(4): 569-575.
- Kayahan M 2006. Yağlı Tohumlardan Ham Yağ Üretim Teknolojisi. Ankara: TMMOB Gıda mühendisleri odası, Kitap seri:7, 2-4.
- Gulya T, Draper M, Harbour J, Holen C, Knodel J, Lamely A, Manson P. 1999. Metalaxyl resistance in sunflower downy mildew in North America. Proceedings of the 21st NSA Sunflower Research Workshop pp. 118-123, Bismarck, ND
- Lafon S, Penaud A, Walser P, De Guenin MCH, Molinero V, Mestres R, Tourvieille D. 1996. Le mildiou du tournesol toujours sous surveillance. Phytoma, 484: 35-36
- Molinero-Luiz MR, Condon-Torres MM, Martinez-Aguilar J, Melero-Vara JM, Dominguez J 2008. Resistance to metalaxyl and to metalaxyl-M in populations of *Plasmopara halstedii* causing downy mildew in sunflower. Canadian Journal of Plant Pathology, 30(1): 97-105.
- Neergaard P. 1979. Seed Pathology. The Macmillan Pres Ltd. 1025 pp.
- Oros G, Virányi F 1984. Resistance of *Plasmopara halstedii* to metalaxyl in the greenhouse. Temperate Downy Mildews Newsletter, 3: 22-23.
- Özer N 2011. Screening for fungal antagonists to control black mold disease and to induce the accumulation of antifungal compounds in onion after seed treatment. BioControl, 56(2): 237-247.

Özer N, Chilosi G, Magro P 1999. Differential accumulation of antifungal compounds during onion seed germination and upon infection by *Aspergillus niger* van Tieghem. Journal of Plant Pathology, 81(3): 201-204.

Özer N, Köycü ND, Chilosi G, Magro P 2004. Resistance to Fusarium basal rot of onion in greenhouse and field and associated expression of antifungal compounds. Phytoparasitica, 32(4): 388-394.

Özer N, Şabudak T 2020. Farklı ayçiçeği genotiplerinin perikarp ve tohumlarında bulunan fungal etmenler ile metabolitler arasındaki ilişkiler üzerinde Araştırmalar. Proje raporu (Project report)
<https://app.trdizin.gov.tr/ara?from=1960&to=2022&database=Proje&query=defaultSearchField-AND-Ay%C3%A7i%C3%A7e%C4%9Fi%20metabolit&order=score-DESC>

Özer N, Şabudak T, Özer C, Gindro K, Schnee S, Solak E 2017. Investigations on the role of cuticular wax in resistance to powdery mildew in grapevine. Journal of General Plant Pathology, 83(5): 316-328.

Ruttledge TR, Nelson EB 1997. Extracted fatty acids from *Gossypium hirsutum* stimulatory to the seed-rotting fungus, *Pythium ultimum*. Phytochemistry, 46 (1): 77-82.

Schnee S 2008. Facteurs de résistance à l'oïdium (*Erysiphe necator* Schwein.) chez la vigne (*Vitis vinifera* L.). Ph.D. Thesis, Neuchatel University.

Subashini R, Rakshitha SU 2012. Phytochemical screening, antimicrobial activity and in vitro antioxidant investigation of methanolic extract of seeds from *Helianthus annuus* L. Chemical Science Review and Letter, 1(1): 30-34.

Zhang W, Liu J, Huo P, Zhang T, Nan Z 2017. Characterization and pathogenicity of *Bipolaris peregianensis*: the causal organism for leaf spot of hybrid bermudagrass in China. European Journal of Plant Pathology, 148(3): 551–555.

RESTORATION, REHABILITATION, CREATION AND ENHANCEMENT
METHODS TO WETLANDS AND APPLICATION EXAMPLES

Bahriye Gülgün

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Abstract

Water is one of the most important resources for sustainable development and the continuity of living life. Water, which we know cannot be replaced by anything else and which is the most important cycle of life; It has been under the pressure of rapid population growth, industrialization, agricultural activities and polluting factors and has faced the danger of extinction due to various reasons.

Wetlands are one of the most valuable natural water resources in the world. Wetlands need to be protected and managed because they are the richest and most productive ecosystems on earth, as well as providing a transition between terrestrial and aquatic ecosystems. Since the beginning of the 20th century, many habitats, especially wetlands, have been severely damaged due to the industrialization movements that started all over the world and the destruction of ecological systems. These damages also endanger many ecosystem services of wetlands provide, including maintaining water quantity and quality, providing habitat for a variety of plants and animals, and balancing climate change. While the protection of undamaged wetlands is of critical importance for environmental health, restoring (reforming), creation, rehabilitation and enhance of destroyed wetlands are also necessary methods to improve the quality of wetlands.

In this study, the importance of wetlands and rehabilitation, restoration, creation and enhancement techniques for the degraded or damaged wetlands are explained using national and international literature. In addition, in this context, Weiliu Wetland Park, Hong Kong Wetland Park, Tianjin Qiaoyuan Wetland Park and Minghu Wetland Park have been examined in detail.

Keywords: Wetland restoration, Wetland rehabilitation, Wetland creation and enhancement.

PEYZAJ MİMARLIĞI PERSPEKTİFİYLE TARİHSEL SÜREÇTE DÜNYA BAHÇELERİ VE TASARIM ÖRNEKLERİ

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Özet

İnsan eliyle oluşturulmuş kültürel yapılar, doğal varlıklar ve insan varlığının kendisiyle doğrudan bir bağ kuran peyzaj mimarlığı mesleği, günün koşulları ve teknolojiyle yoğrulmuş, geçmişte dini ve tarihi metinlere atıf yaparak “cennet parçaları” olarak adlandırılabilir bahçeleri ve çevreleri oluşturan, bu çerçevede küçük ölçeklerde mekansal tasarım kararları alırken büyük ölçeklerde, ekolojik-sosyolojik ve ekonomik kurguları gözeterek planlama kararları alan bir meslek dalıdır.

Tüm meslek dallarında olduğu gibi peyzaj mimarlığı mesleği de gelişen teknoloji, ihtiyaçlar ve yaklaşımlar nedeniyle zamanla birlikte evrilen, gelişen, değişen bir yapıya sahiptir. Bu değişim, geçmişten günümüze ulaşan çeşitli eser ve kaynaklardan elde edilen bilgilerden de izlenebilmektedir. İlkçağlardaki mağara resimlerinde betimlenerek ifade edilen insan-doğa ilişkisi, ürün tabanlı tarımsal peyzajlarla ilerlemiş, gücün sembolü olarak saray bahçelerinde göze çarpmış, rekreasyonel alanlar, parklar ve açık yeşil alanlarla kent yaşamına entegre olmuş ve günümüzde kırsal, kentsel her mekanda görselliği, işlevselliği ve sunduğu ekosistem servisleriyle tanımlanmıştır. Bugün doğa-insan ilişkisini mevcut koşullar ve ihtiyaçlar çerçevesinde tanımlamak, geçmişten günümüze değişim gösteren bu mekanların ve yaşanan değişimlerin irdelenmesiyle daha doğru, kolay ve anlaşılır hale gelebilmektedir.

Çalışmada, tarihsel süreçte dünya bahçeleri ve tasarım örnekleri irdelenerek, insan-doğa ilişkisinin değişimi ve gelişimi peyzaj mimarlığı meslek disiplini perspektifiyle ilkçağdan itibaren, Mezopotamya bahçeleri, Eski Yunan, Roma ve İran bahçeleri, orta çağ Bizans, İngiliz ve Rönesans bahçeleri, uzak doğu bahçeleri ve Türk-İslam bahçelerine ait tasarım örnekleriyle incelenmiştir. Tarihsel süreçte, bahçe sanatında yaşanan gelişim ve değişimlerin günümüz çalışmalarına yansımaları, yaklaşımlardaki değişimler ve peyzaj mimarlığı mesleğine olan yansımaları ortaya konulmuştur. Çalışmanın bahsi geçen mekanlardaki tarihsel değişimler ışığında, peyzaj mimarlığı disiplinin geleceğine ışık tutması, mesleğin gelecekteki yönelimlerine yol göstermesi ve peyzaj mimarlığı perspektifiyle insan-doğa ilişkisinin kurgusal boyutunun yeniden şekillendirmesine destek olması ve değerlendirilmesi arzu edilmiştir.

Anahtar Kelimeler: Peyzaj mimarlığı, sanat tarihi, bahçe sanatı, peyzaj tasarımı, mekansal tasarım

THE HISTORICAL PROCESS OF WORLD GARDENS DESIGN EXAMPLES
FROM THE LANDSCAPE ARCHITECTURE PERSPECTIVES

Abstract

The "human-nature" relationship is expressed by depicting in cave paintings in ancient times foremost, advanced with product-based agricultural landscapes, stood out in the palace gardens as a symbol of power, integrated into urban life with recreational areas and open green spaces. Today, this relationship can be considered by nature's esthetical visualization, functionality, and the ecosystem services offered in every rural and urban area.

The profession of landscape architecture, which establishes a direct connection with human-made cultural structures, natural assets, and human existence itself; creates gardens and environments with the current approaches and techniques. Within this framework, landscape architecture can be considered as a profession that works on spatial designing at small scales and which takes planning decisions on large scales by considering natural, ecological, sociological, and economic constructs. Like all professions, the profession of landscape architecture has a structure that evolves, develops, and changes over time due to human needs and approaches. This change can also be followed by various landscape architecture designs and works from the past to the present.

In this study, the changes, and developments of the "human-nature" relationship, from the landscape architecture perspective were examined with the historical world gardens and design examples from antiquity to today's landscape designs. On the historical process, the reflections of the developments and changes in the garden art on today's studies, the changes in the approaches and their reflections on the landscape architecture profession have been revealed. In the light of these historical changes, it is desired that the study sheds light on the future of the discipline of landscape architecture, guides the future trends of the profession, and supports and evaluates the reshaping of the fictional dimension of the "human-nature" relationship, with the perspective of landscape architecture.

Keywords: Landscape architecture, art history, garden art, landscape design, spatial design

GİRİŞ

Yaşadıkları çevreyi, var olduğu günden bu yana etkileyerek değişikliğe uğratan insan, bahçeleri cennetin yeryüzündeki yansıması olarak imgelemesi nedeniyle, hayal ettiği ve ulaşmayı arzuladığı cennet kavramını ve onu çağrıştıran tüm güzelliği ve estetiği, bahçelerinde yaratma ve toplama tutkusu içinde olmuştur (Demiröz, 2003). Doğa sahip olduğu tüm güzelliklerle cenneti çağrıştıran her daim bir ilham kaynağı olmuş, çağlar boyunca sanat eserlerinde de çeşitli şekillerde kendini göstermiştir (Şekil 1).



Şekil 1. Maurice Denis 'in Cennet isimli tablosu (Anonim, 2022a).

Kutsal kitaplarda genellikle cennetin bir bahçe mekanı olarak tasvir edilmesi, insanların dünyadaki yaşamlarında da birer cennet bahçesine sahip olma arzusunun oluşmasına neden olmuştur. İnsanların dünya hakkındaki idealleri bahçe mekanında somutlaşmıştır (Shepherd, and Jellicoe, 1953). Batı kültüründeki bahçe yapılarında ve temalarında bu görüşün yansımaları bulunmaktadır. Bu fikir “bahçe” ve “cennet” kelimelerinin ortak dilbilim kökenine dayanması gerçeği ile daha da önem kazanmaktadır (Macdoughall and Ettinghausen, 1976). Farsça’da “Küçük Bağ” anlamına gelen bahçe, görsel niteliğin yüksek olduğu ve süs bitkilerinin, sebzelerin, tıbbi aromatik bitkilerin yetiştiriciliğinin yapıldığı, doğanın sahip olduğu maddi ve manevi etkilerin insan eli ile şekillendirilerek yansıtıldığı toprak parçası olarak tanımlanması mümkündür (Yerli ve Kaya, 2015; Demiröz, 2003).

Kültür, mekan ve doğa arasında bir bağ yaratan peyzaj tasarımı, bu tasarımı kullanacak olan kişilere ve mekanın özelliklerine göre oluşturulmaktadır. Ancak her kültür ve topluma göre farklı mimari ve biçimsel özellikler gösteren peyzaj sanatında da kültürler arası etkileşim ve geçişler görülmektedir. Aynı şekilde tarihsel süreçlerde gelişen teknoloji, değişen sanat akımları hatta sosyal ve kültürel yapılar, bahçe tasarımlarını etkilemiş, her dönem kendine özgü bahçe tarzını ve yaklaşımını oluşturarak peyzaj mimarlığı tarihine katkıda bulunmuştur. Çalışmada, peyzaj mimarlığı mesleği çerçevesinde bahçe sanatında tarihsel süreç boyunca ortaya çıkan değişimler ve etkileri kısaca incelenerek, günümüz peyzaj mimarlığı çalışmalarındaki yaklaşımlar ortaya konulmuştur.

BAHÇE SANATININ ETKİLEŞİM VE GELİŞİM SÜRECİ

Tarihsel süreçte bahçe kavramına ve bahçe mimarisine yaklaşımlar, değişim ve gelişim gösterdiği evreler, tarihler ve mekanlarla incelenebilir. Çeşitli kaynaklardan elde edilen bilgileri irdelendiğinde ilk çağlardan günümüze kadar, açık alanların, mekan kullanımlarının ve bahçelerin çeşitli dönemlerden geçerek evrildiği göze çarpmaktadır.

İlkçağ Bahçeleri

Prehistorik dönemlere bakıldığında; insanların mağara duvarına çizmiş oldukları figürler, kendi yaşantıları ve doğa ile olan etkileşimlerini oldukça açık bir şekilde temsil etmekte; bu insanların çağımız insanıyla sanatta, resim ve heykelde ortak bir dil ve ifade kullandıklarını göstermektedir. Ancak bu dönemin bahçe sanatı ile ilgili kaynak günümüzde maalesef bulunmamaktadır. Buna karşın Eski çağ sanat tarihi incelendiğinde, tarihi yazınların, minyatürlerin, rölyef ve gravürlerin işlemler ile duvar fresklerinin yardımıyla peyzaj sanat tarihi hakkında bilgi bulunabilmektedir (Demiröz, 2003). Bu çağ kapsamında yer alan bahçe sanatı mekansal konumlarına ve ait oldukları uygarlıklara göre sınıflandırılarak incelenmiştir.

a.) *Mezopotamya Bahçeleri*

Van gölünden İran Körfezine kadar uzanan Dicle ve Fırat nehirlerini içine alan geniş topraklar üzerinde yaşamış olan Sümer, Asur ve Babil uygarlıklarından bazı sanat yapıları günümüze kadar ulaşabilmiştir. Genel olarak, bataklık olan güney Mezopotamya'yı M.Ö 5000 yıllarında Sümerler imar etmiştir. Mezopotamya'da M.Ö 4000 yıllarından M.Ö 539 yıllarına kadar devam eden Sümer, Akad, Birinci Babil, Asur ve İkinci Babil uygarlıklarının mimari karakterlerinde benzerlikler görülmektedir. Çok teraslı yapılar, kubbeli ve kemerli mezar yapıları ve merkezi bir avlu etrafında sıralanmış evler ortak özellikleridir. Bina ve bahçe yapımında taş yerine kerpiç tuğlalar kullanmaları, bu yapıtların günümüze kadar ulaşmalarını sağlamıştır (Köroğlu, 2012). Mezopotamya mimarisinde ve dönemin bahçe mimarisinde önemli olan unsur saray yapılarıdır. Saraylar, genellikle 30 m kadar yükseklikteki, topraktan yatay setler üzerine inşa edilmiştir. Yüksek duvarlarla korunan, dikdörtgen plan kalıplı dönemin sarayların ortalarında kare şeklinde büyük avlular bulunur ve bahçe şeklinde düzenlenirdi (Akdoğan, 1974, Köroğlu, 2012).

Tarihi kayıtlar, Asur krallarına ait geniş tabii orman parklarından ve yapay olarak oluşturulmuş park koruluklarından bahseder. Saraylarının etrafında, başka ülkelerden getirdikleri palmye, servi ve meyve ağaçları ile korular oluşturdukları, içinde su bitkilerinin de yetiştirildiği havuzlar inşa ettikleri bilinmektedir (Macdoughall and Ettinghausen, 1976). Av parkları ve park koruluklarının, bayram şenliklerinin, siyasi törenlerin, ticari ve siyasi anlaşmaların yapıldığı açık alanlar olarak Asur bahçe sanatında önemli yerleri vardır (Akdoğan, 1974). İlkçağ Mezopotamya Uygarlıkları içinde en çok bilinen ve dünyaca tanınan bahçeler, Babil kralı Nabukodonesar tarafından İranlı karısı için MÖ.605 yılında yaptırdığı tahmin edilen ve dünyanın yedi harikasından biri olarak bilinen, Babil'in Asma Bahçeleridir (Köroğlu, 2012). Babil'in Asma Bahçeleri, birbirinden 2,5 m yükseklikte kot farkları bulunan teraslardan oluşmaktadır (Şekil 2). Çevresinde yer alan çölden yaklaşık 100 m kadar yükseklikte bir tepe üzerinde ve 16.000 m²'lik bir alanda kurulmuş olan bahçe, sanki "çatı bahçesi" olarak düşünülmüş, büyük bir kısmında ise tuğla kullanılarak bölmeler yapılmış ve pergolalarla bütünlük tamamlanmıştır (Anonim, 2022b).

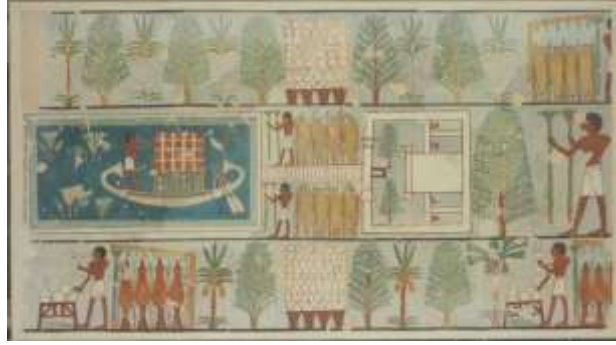
Formal bir plana sahip olduğu düşünülen teras bahçelerinde, eğlence için ayrılmış serin köşeler, hareketli suları ile fiskiyeli havuzlar, gölge veren ağaçlar ve dekoratif çiçekler bulunmaktadır. Akdoğan'ın (1974) tarifıyla harikulade bir görünüşe sahip olan bu bahçeler uzaktan yemyeşil bir tepeyi andırmaktadır (Düzenli, vd. 2019).



Şekil 2. Babil'in Asma Bahçeleri Görselleri (Anonim, 2022b).

b.) *Antik Mısır Bahçeleri*

M.Ö 4000-2000 arasında yaşayan Antik Mısır uygarlığı, sahip oldukları medeniyet düzeyi ile bahçe düzenleme sanatının doğmasında ve gelişmesinde büyük paya sahip olmuşlardır. Bahçe düzenleme fikri esas olarak Mısır Kraliyet bahçelerinde ve malikanelerinde gelişme göstermiştir. Firavunların gücünün ve iktidarının simgesi olan bahçeler simetrik ve geometrik formalizm etkisiyle oluşturulmaktaydı. Antik Mısır Bahçelerinde; dışa kapalı yüksek duvarlar, su ögesi ve formal bitkilendirme stili olmak üzere başlıca 3 ana unsur bulunmaktadır (Şekil3) (Anonim, 2022c).



Şekil 3. Eski Mısır'da papirüslere çizilmiş bahçeler (Anonim, 2022d)

c.) *Eski İnan Bahçeleri*

İnan'da avcılık ile geçinen insanların, yavaş yavaş dağlardan aşağılara, yüksek İnan platosunun vadilerine inmeleri ve tarımsal faaliyetlerde bulunmaları, M. Ö. 4000 yıllarına kadar uzanır. Bu eski devirlere ait yaşayış ve inanışların izlerini toprak vazoların süslerinde bulmak mümkün olmuştur. Bahçelerin hayat veren bir özelliğe sahip olduğu inancının izleri de bu toprak vazolarda görülür.

Bahçeler bu eserlerin üzerinde, bir havuzu saran hayat ağacı ile birbirini kesen iki aksın oluşturduğu dört bahçe ile resmedilmiştir. Mekanı dörde bölen bu tavır, ilerleyen yıllarda İnan bahçelerinin temel unsur haline gelmiştir. Buna Farsça'da Çahar Bağ, yani Dört Bahçe denilmektedir (Aryanpur 1986, Pouya, ve Demirel, 2016).

c.) *Yunan ve Roma Bahçeleri*

Antik Yunan'da, kentlerin temel öğeleri olan Agora (toplanma yeri, halk meydanı), Gynamsyum (spor aktivitelerinin gerçekleştirildiği yer), Odeion (sahne, tiyatro), Stadyum (spor karşılaşmalarının gerçekleştiği yer), Tapınak (ibadet yeri) gibi bölümlerinde bahçe düzenlemeleri yapılmıştır (Özkurt, 2017).

Genelde işlevselliği yüksek olan Antik Yunan bahçeleri, bağlar ve meyve ağaçları ile donatılarak, ürün temelli tasarlanmıştır. Ancak, bu dönemde, meyve ağaçları, sebzeler ve faydalı bitkilerin yanında sulama amaçlı çeşmeler ve havuzlar da bahçelerde yer almışlardır. Dini temaların baskın geldiği bu bahçeler sonraki zamanlarda daha çok keyfe ve sefaya yönelik bahçeler haline dönüşmüşlerdir. Helenistik aristokratlar, doğu bahçelerini örnek almışlar ve bahçelerini grotto ve havuzlar ile süslemişlerdir. Bu dönemde dönemde çeşmeler aktif hale getirilmiştir. Su gücü insan ve hayvan figürlerini canlandırmak için kullanılmıştır. Filozoflara ait bahçeler sonradan halka açık park haline gelmiş ve klasik peyzaj ile bütünleşecek nitelikler içermiştir. (Cendere,1998; Düzenli, vd. 2019).

Antik Yunan bahçelerinin tasarımında dönemin ünlü komutanı İskender'in fetihler sırasında gördü bahçelerden, özellikle İnan bahçelerinden etkilendiği düşünülmektedir. Büyü için otlarla

ve bitkilerle ilgilenen İskender, yaptığı fetihlerle farklı bir botanik merakı geliştirmiş, yıllar sonra ülkesine orduları beraberlerinde egzotik bitki ve otlar getirmişlerdir. Bu merak tarihin ilk botanik bahçesinin doğuşuna neden olmuştur. Atina Lyceum'unda, dönemin en bilinen botanik bahçesi bulunmakta ve bu bahçede egzotik Doğu bitkilerinin yanında, gül, menekşe, glayöl, gelincik, nergis, gibi çiçekler de yetiştirilmekteydi. (Aslanoğlu Evyapan, 1974).

Roma' da ise ilk genel erişimli, halka açık park, “Lukul” tarafından yaptırılmıştır. Bu mekan ve ona erişen yollar büyük teraslardan, geniş merdivenlerden ve gölgeli bulvarlardan oluşmaktaydı. Yol boyunca yer alan ağaçlar arasına heykel ve vazolar yerleştirilmiş, gövdelerine, sütunlara ve pergolalara çeşitli sarmaşıklar sardırılmıştır Romalılar, oluşturdukları mekanlarda ağaçlardan da yararlanmışlar, bahçelerinde gül, menekşe, haşhaş, zambak, susam gibi çiçekler yetiştirmişlerdir (Pamay,1979; Yiğit 2006).

Ortaçağ Bahçeleri

Orta çağın en belirgin özelliği dışa olan kapanıklığıdır. Konutlar nasıl sokağa kapatılmışsa, kentler de çevre kırlara kapatılmıştır. Kentler, dış dünyadan kontrol kuleleriyle donatılmış duvarlarla ayrılarak, düşmana karşı korunmaya çalışılmıştır (Aslanoğlu Evyapan, 1974, Yiğit, 2006). Ortaçağda manastırlar, birer bilim yuvası olarak üniversite kavramının temelini oluşturmuşlar ve sanatın geliştiği yerler olmuşlardır. Manastırların bir diğer yönü de tarım merkezi olarak kullanılmalarıdır. Bu nedenle orta çağ boyunca doğa uğraşısı, bahçecilik, manastırdaki yaşama kavramı olarak karşımıza çıkmaktadır (Yiğit, 2006).

a.) Bizans Bahçeleri

Bizans bahçe sanatı doğu ve batının bir sentezini yaparak, gerek Greko-Romen, gerekse Doğu' dan etkilenmiş, sanatın o çağa kadar ki gelişiminin nerdeyse bir özetini yapmıştır. Gösterişin ve bezemelerin bolca yer aldığı dönemde, dönem bahçelerin yer alan havuz ve benzeri su tesislerinin içlerinin altın ve gümüş gibi kıymetli madenlerle kaplı olduğu rivayet edilmektedir. Bizans 'ta saray bahçeleri gibi diğer bahçelerde de oryantalist bahçe sanatı etkisi ile su tesislerinin süslemelerine dikkat edilmiş, su tesislerinde kıymetli taşlar ve madenler kullanmak bir gelenek haline gelmiştir (Cezar, 1984)

b.) Rönesans Bahçeleri

Rönesans ve Barok sanat eserlerinin büyük bir kısmının fikrinde doğadan söz edilmektedir. Dönemin bahçe anlayışında sorgulamalar başlamıştır. Mimarlar, sanatçılar, filozoflar, bilim adamları ya da bahçıvanlar meydana getirdikleri eserlerinde, "Bahçe dünyevi bir cennet mi olmalıdır yoksa faydacı bir görev mi yüklenmelidir? Her iki görünümü de tek tip bahçede toplamak mümkün müdür?" sorularına cevap aramışlardır (Kluckert, 2000).

Bu dönemde bahçelerde gösterişli yapılar, merdivenler çağlayanlar hakim olmuş, bahçeler, gücün ve ihtişamın sergilendiği alanlar, adeta birer sanat eseri olmuşlardır. Budama sanatı ile bitkilere şekil verilmeye başlanmış, bahçelerin tasarımında geometrik şekiller ve simetri ön plana çıkmış, bulvarlar, pergolalar, labirentler ihtişamlı bir şekilde dönemin saray bahçelerinde ve evlerinde yer almaya başlamışlardır (Şekil 4). Bu dönem bahçelerine Villa d'Este, Boboli bahçesi, Villa Gamberaia, Villa Capra Rola, Villa Lante örnek olarak verilebilir.



Şekil 4. Rönesans dönemi simetrisinin en etkileyici örneklerinden biri olan Tivoli'deki Villa

c.) Barok Bahçeler

Rönesans döneminde Fransa'da bahçe tasarımı ve bahçecilik, büyük bir gelişme göstermiş ve özel Fransız bahçe stili ortaya çıkmıştır. Rönesans'ın getirdiği hümanizm rüzgârı her yerde hakim olmuş , Tıpkı İtalya'da olduğu gibi klasik Latin sanatı Fransa da etkisi göstermeye başlayarak, İtalyan bahçelerinin benzerlerinin Fransa'da da ortaya çıkmasına neden olmuştur. Bu devirde uzun bir barışa kavuşmuş olan Fransa' da devlet, yalnız politika değil, mali yönden de en yüksek seviyesine ulaşmıştır. Özellikle aristokrat sınıf, lüks ve görkem yarışı içinde bahçeleri yeşil elemanlarla ve çiçeklerle bezemişlerdir (Yiğit, 2006). Bu dönemde Le Notre tarafından tasarlanan Versailles Sarayı bahçesi- Verailles Parkı bu stile öncülük etmiştir. (Şekil 5). Bu şekilde, bir devre adını veren Barok bahçesi ve stili ortaya çıkmıştır (Pamay, 1979).



Şekil 5. Versailles Sarayı bahçesinden bir görüntü (Uyaroğlu, 2021)

İngiliz Bahçeleri

Avrupa'da devrim yaratmış olan naturalizm düşüncesinin İngiltere'de doğuşunun en önemli sebebi olarak, İngilizlerin kır ve tabiat içinde yürümeye olan aşırı merakı gösterilebilir. Bir İngiliz için bahçe, her zaman içinde bazı sportif oyunların oynandığı, uzun uzun yürünebilen açık alanlar olarak önem kazanmıştır. Hiçbir zaman bahçe, içinde oturlan, baloların ve partilerin verildiği, tiyatro oyunlarının sergilendiği bir yer olarak düşünülmemiştir ki bunun ana sebebi doğal şartlar, özellikle iklimsel faktörlerdir (Cezar, 1984). İngiliz Naturalist Bahçeleri, Roma ve Ortaçağ bahçelerinden, İtalyan Rönesans bahçelerinden, Fransız Barok bahçelerinden etkilenmiş ve naturalizm etkisiyle kendine ait bir üslup geliştirmiştir. Arazi şekli, iklim şartları gibi doğal peyzajın bütün hammaddelerinin İngiltere'de bulunuşu, İngilizler Naturalist Bahçelerinin şekillenmesi için son derece uygun olmuştur. Yuvarlak, yumuşak formlu tepeleri, küçük ormanları ve bunlara tezat olarak muhteşem doku ve renkteki meraları ile çevre arazisinin bütününü, parkın bir devamı olarak görmek mümkündür.

Naturalist bahçe planlarının bütün kısımları arasında tam bir uyum görülür. Mimari öğelerin bahçe içine yerleştirilmelerinde, su elemanlarının ve bitkilerin kullanımında, doğal çevreye uyum, tasarımda etkili olmuş temel prensiptir. Bahçe düzenlemelerinde özel formlar ortaya çıkana kadar diğer Avrupa ülkelerindeki gelişmelerin paralelinde ilerleme gösterilmiştir (Akdoğan, 1974, Yiğit, 2006).

Uzakdoğu Bahçeleri

Uzakdoğu bahçe sanatı, sembollere dayanan, dinsel felsefeye uygun bir bahçe sanatıdır. Bu bahçelerde hemen her şey doğaldır. Bahçelerde, tepeler, taşlar, su, kiremit çatılı gösterişli evler ve dramatik formlu ya da minyatür bitkilerin kullanımları sergilenmektedir. Bitkiler rastgele yerleştirilmeyip, Budizm felsefesine uygun bir düzenleme içinde yerleştirilirler. Japonya'ya bahçe düzenleme anlayışı 6. yüzyılda Çinli Budist misyonerler aracılığıyla gelmiştir. Japon stili doğayı minyatürize ederek sembolleştirmiştir. Aynı zamanda doğanın ideal bir şekli olmuştur (Şekil 6). Bu sanatın Japonya'ya Çin'den ve Kore yoluyla geldiği belirlenmiştir. Japon bahçesinde kaya ve taş en önemli peyzaj öğeleridir. (Demiröz, 2003).



Şekil 6. Japon bahçesi örneği (Anonim, 2022e)

Türk-İslam Bahçeleri

Yaratılmış her şey, gök, dağ, taş ve ağaç ne varsa, Türk inancına göre; yaratanın tecellisidir ve dolayısıyla kutsaldır. Bu inanış, tüm sosyo kültürel alanlarda karşılık bulduğu gibi, Türk bahçe sanatına da yansımış ve bahçelerin şekillenmesinde ön plana çıkmıştır (Tazebay ve Akpınar, 2010).

Türk bahçelerinde su, sebiller, su çanakları, durgun ve akan sular gibi zengin formlarda karşımıza çıkmaktadır. Havuzlar, Türk bahçe kültüründe havuzlar, sıklıkla kullanılan öğelerdir. Döneme ait minyatürler incelendiğinde; önemli tarihî olaylarda, tarihî mekânlarda, eğlencelerde vb. yaşam kültürünün içinde her yerde havuzlar göze çarpmaktadır. Geleneksel Türk bahçelerinde suyun durgun kullanılmadığı, genellikle suya çeşitli şekillerde hareket kazandırıldığı görülmektedir. Havuzlar, önce köşeli olarak kullanılmasına rağmen 18.yy. da yuvarlak havuzlar ve 19. yy. da suni göl şekillerinde bahçelerde az da olsa yer almaya başlamıştır. Havuz etrafı genellikle taş ya da mermer kaldırımlı yollar ile çevrilmiştir (Turgut, 2012).



Şekil 7 ve 8. Anadolu medreseleri iç avlu örneği (Anonim, 2022f) ve Topkapı sarayı görseli (Anonim, 2022g)

Nurlu ve Erdem (1994)'ya göre Selçuklu ve Osmanlı dönemlerindeki minyatürlerde bahçe genellikle bir havuz, pergola, çiçeklik ve birkaç ağaç ile canlandırılmıştır. Akdoğan (1995); Türk bahçelerinde dinlenmek ve müzik için suyun, serinlemek için gölgenin, renk ve koku için de çiçeğin kullanılmasının Türk-İslam bahçelerinin ortak temel ilkeleri olduğunu vurgulamaktadır (Turgut, 2012). Selçuklu döneminde ise, sur içlerinde tarımsal üretim devam etmektedir. Selçuklulardan sonra Osmanlı sanat anlayışı hâkim olsa da, Osmanlı Devletinin kuruluşundan İstanbul'un fethine kadar olan dönemde bahçelerde Selçuklu sanatının izleri görülmektedir (Gültekin, 1988). Sonrasında Osmanlı İmparatorluğunun saraylara ve bahçelere yansıyan gücü ve ihtişamı bahçelere de yansımış, Lale devrine kadar sadeliğin hüküm sürdüğü bahçelerde, barok sanat akımının görülebildiği simetrik aksın ve geometrik tasarımların bulunduğu bahçeler ortaya çıkmıştır (Şekil 7 ve 8).

Modern Bahçe/Peyzaj Tasarımları

Özellikle endüstri devrimi sonrasında gelişen, Bauhause ekolü, Art-Nouveau, Art-Deco gibi akımlar, minimalist ve post modern yaklaşımlar, peyzaj mekanlarını da etkileyerek farklı tasarımlarla, farklı arayışlara cevap veren mekanlar olarak kurgulanmışlardır.

Günümüzde, özellikle iklim krizinin her geçen gün etkisini daha da büyük afetlerle göstermesiyle, açık yeşil alanlar, sadece estetik ve rekreasyonel amaçlarla değil, gri altyapıya destek olarak kullanılmaya başlanmış, ekolojik döngülerin kullanılarak çözüm önerileri sunan yeşil altyapılar veya bu sistemlerin parçaları olarak karşımıza çıkmaya başlamışlardır. Yeşil altyapı sistemlerin kullanıldığı, Sünger Kent'ler, yenilikçi peyzaj tasarımlarıyla, yağmur hasat sistemleri, bitkisel artıma havuzları/yapay sulak alanlar ile afete dirençli, geleceğin kentleri olarak yapılanmaya başlamıştır (Şekil 9 ve 10).



Şekil 9 ve 10. Yeşil Altyapı (Anonim,2022h) ve Sünger Kent tasarım örnekleri (Anonim, 2022i).

SONUÇ

Sonuç olarak, çağın gereksinimleri ve sosyo-kültürel altyapısı nedeniyle değişen yaklaşımlar, sanat akımları, kullanım biçimleri, mekansal formasyonlar, nüfus yoğunluğu ve teknolojik imkanlar, tüm mimarlık alanlarında olduğu gibi, peyzaj mimarlığı çalışmalarında; açık yeşil

mekânlarda, bahçelerde, parklarda, rekreasyonel alanlarda da etkisini göstermiş, estetik kaygılardan, işlevselliğe uzanan süreçte yol almıştır.

Geçmişte, görselliğin ön planda olduğu bu mekânların başta insan olmak üzere, tüm canlı yaşamının sürmesinde ana unsur olduğu, doğal yapının bozulmasının etkilerinin büyüklüğü ve korumanın ne denli önemli olduğu artık anlaşılmıştır. Kullanım şeklindeki, tasarımsal değişimler artık daha ekolojik tabanlı ve doğa dostu formlarda kaşımız çıkmaktadır. Bu değişimin gelecek nesillerin doğal yapıya duyacakları farklı ihtiyaçları nedeniyle devam edeceği açıktır.

KAYNAKLAR

- Akdoğan, G., 1974. Bahçe ve Peyzaj Sanatı Tarihi, Ankara Üniversitesi Ziraat Fakültesi Yayınları: 528 Ders Kit abı: 173, Ankara
- Akdoğan, G. 1995. Dünden bugüne bahçe kültürümüz. Bahçe Kültürü Dergisi. 58: 7-14. İstanbul.
- Anonim, 2002a. Maurice Denis 'in Cennet isimli tablosu, Erişim:<https://www.freeart.com/gallery/d/denis/denis34.html>
- Anonim, 2022b. Babilin Asma Bahçeleri. Erişim: <https://peyzax.com/babilin-asma-bahceleri/>
- Anonim, 2022c. Yakın Doğu Üniversitesi, Mimarlık Fakültesi, Peyzaj Mimarlığı Bölümü, PM 204 Peyzaj Mimarlığı Tarihi Ders Notları Dr. Buket Asilsoy, Erişim: http://docs.neu.edu.tr/staff/buket.asilsoy/PM%20204_3.pdf
- Anonim, 2022d. Eski Mısır'da Bahçe Sanatı. Erişim: <https://peyzajist.wordpress.com/2014/10/02/eski-misirda-bahce-sanati/>
- Anonim, 2022e. Bir Rönesans Şovu; İtalyan Bahçeleri <https://yolvemacera.com/bir-ronesans-sovu-italyan-bahceleri>
- Anonim, 2022e. Japon Bahçeleri Tasarım Örneği. <https://peyzax.com/japon-bahceleri-tasarim-ozellikleri/>
- Anonim, 2022f. Anadolu Medreseleri İç avlu örneği. <https://www.dunyabizim.com/kitap/osmanli-medreseleri-selcuklu-ve-anadolu-beylikleri-devri-muesseselerinin-bir-devamidir-h32862.html>
- Anonim, 2022g. Topkapı Sarayı Erişim: <https://www.millisaraylar.gov.tr/saraylar/topkapi-sarayi?detay=mimari>
- Anonim, 2022h. Yeşil Altyapı tasarım Örneği. <https://icem.com.au/adb-releases-publication-on-green-infrastructure/climate-change-1/>
- Anonim, 2022i. Sünger Kent Tasarım Örneği. <https://www.arabiaweather.com/en/content/sponge-cities-china39s-weapon-against-floods>
- Aryanpur A. 1986. İran ve Şiraz bahçelerinin tanınması için araştırmalar. Ferheng Sera Yayınları.
- Aslanoğlu Evyapan, G., 1974, Tarih İçinde Formal Bahçelerin Gelişimi ve Türk Bahçelerine Etkileri, Odtü Mimarlık Fakültesi, Mimarlık Bölümü Yayınları: 21, Ankara
- Cendere, A. 1998. Su elemanlarının kentsel mekânlarda ve yeşil alanlarda kullanımı. Yüksek lisans tezi (basılmamış). İstanbul Teknik Üniversitesi, 203 s., İstanbul.
- Cezar, M., 1984. Sanatta Batı" ya Açılıştta Saray Yapıları ve Kültürün Yeri, T. B. M. M. Milli

- Demiröz, Z. 2003. Tarihsel Süreç İçinde İslam Bahçe Sanatı Hint-Moğol Bahçeleri Örneği ve İslam Bahçelerinin Türk Bahçe Sanatına Etkileri, İstanbul
- Düzenli, T., Alpak, E. M. & Akyol, D. (2019). Peyzaj Mimarlığında Su Ögesinin Tarihsel Süreçteki Kullanım Amaçları. Sanat ve Tasarım Dergisi, 9 (1), 20-35 . DOI: 10.20488/sanattasarim.599987
- Ekşioğlu, A., 2001. Rönesans ve Barok Bahçe Sanatı" nın İstanbul Saraylarındaki Etkileri Dolmabahçe ve Beylerbeyi Sarayı Örneği, Yüksek Lisans Tezi, İ. T.Ü. Fen Bilimleri Enstitüsü, İstanbul
- Gültekin, E. 1988. Bahçe ve Peyzaj Sanatı Tarihi, Çukurova Üniversitesi Ziraat Fakültesi Ders Kitabı No: 94, Adana.
- Harman, M., 2015. Osmanlı Sanatında Cennet İmgesi Bahçe Tasarım İlişkisi. İstanbul Üniversitesi Sosyal Bilimler Enstitüsü Sanat Tarihi Anabilim Dalı Doktora Tezi, İstanbul.
- Kluckert, E., 2000, European Garden Design : From Classical Antiquity To The Present Day, Könnemann Veri Agsgesellschaft Mbh, GerMany
- Köroğlu, K. 2012.Eski Mezopotamya Tarihi, Başlangıcından Perslere kadar. İletişim Yayınevi İstanbul.
- Macdoughall, B., Ettinghausen, R., 1976. The Islamic Garden, Dumbarton Oaks Trustees for Harvard University, Washington DC.
- Nurlu, E. ve Erdem, Ü. 1994. Peyzaj Sanat Tarihi. Ege Üniversitesi Ziraat Fakültesi Ders Kitabı, İzmir
- Özkurt, S. 2017. Eski Yunanda Bahçe Sanatı, Erişim: <https://peyzax.com/eski-yunanda-bahce-sanati-yesim-ozkurt/>
- Pamay, B., 1979. Park, Bahçe ve Peyzaj Mimarisi, İ.Ü. Orman Fakültesi Yayınları: 536, Ankara.
- Pouya, S. Demirel, Ö. 2016. İran bahçe sanatının ve tasarım özelliklerinin araştırılması, Artvin Çoruh Üniversitesi Orman Fakültesi Dergisi, Yıl: 2016, Cilt: 17, Sayı:1, Sayfa: 96-105
- Tazebay, İ ve Akpınar, N. 2010.. Türk Kültüründe Bahçe. BİLİG. sayı:54:243-253.
- Turgut, H., 2012, Tarihi Türk Bahçelerinde Havuz Yapıları, Tarih Kültür ve Sanat Araştırmaları Dergisi (ISSN: 2147-0626)
- Uyaroğlu, S. 2021. Bahçecilik'in zirve yaptığı yer: Versailles Sarayı. Plant dergisi <https://www.plantdergisi.com/ogr-gor-selin-uyaroglu/bahcecilik-in-zirve-yaptigi-yer-versailles-sarayi.html>
- Yerli, Ö. Kaya, S., 2015. Bahçe Sanatının Tarihsel Gelişimi, Çukurova Üniversitesi, Uluslararası I. Sanat Araştırmaları Sempozyumu.
- Yiğit, P. 2006. İhlamur Kasrı'nın Peyzaj Mimarisi Değerlerinin Tarihi Süreç İçinde İncelenmesi, İstanbul Üniversitesi Fen Bilimleri Enstitüsü, Yüksek lisans Tezi. Danışman: Prof. Dr. Ahmet Cengiz Yıldızcı. İstanbul.

**SYNTHESIS AND CHARACTERIZATION OF SUBSTITUTED CARBOXAMIDE
LIGAND AND SOME METAL COMPLEXES**

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Abstract

Carboxamide ligands have *N* and *O* donor atoms and therefore they can form a complex very easily. In the last two decades, studies on the binding of metal ions to carboxamide groups have been increasing day by day. Because these reactions provide very important examples for enzymes and metal-peptide complexes. These compounds generally contain many medicinal activities such as antibacterial, antifungal, antiviral and antitumor. Using these medicines as metal complexes improves their pharmacological characteristics highly. In this study, dibenzoylaceticacid-*N*-carboxyethylamide, which used as output substance, was synthesized according to the literature. Some metal complexes have been synthesized from the reaction of transition metal salts of Cu (II), Co (II) and Ni (II) as well as the ligand synthesized. The structures of synthesized compounds were determined using methods such as UV-Vis, FT IR, ¹H NMR, ¹³C NMR, TGA spectroscopic and analysis. In addition to spectroscopy techniques used structure determination of compounds elemental analysis (C, H, N, S), magnetic susceptibility and electrolytic conductivity was used.

Keywords: Carboxamide ligand, metal complexes, spectroscopic characterization

REMOVAL OF RADIOACTIVE SUBSTANCES IN THE LIQUID NUCLEAR
WASTE WITH DIFFERENT SPECIES OF CLAY

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Abstract

Uranium radioactive material is extracted from underground and converted into fuel by various chemical methods. The nuclear fuel cycle is the series of processes from the storage of uranium converted into fuel, the treatment of spent fuel as waste or the disposal of the wastes resulting from reuse by reprocessing processes. Nuclear technology in our world in recent years, it is appears in almost every field of life such as medicine, agriculture, energy and industry. As a result of nuclear technology studies, different radioactive substances are produced and used. Substances containing radioactive material in the activity above the legal limit values determined by the competent authorities or contaminated by these radionuclides are considered as radioactive waste. Radioactive wastes emerges in different activity, physical and chemical conditions in different application field such as medicine, industry and research. Radioactive waste must be management in a safe, economical and environmentally acceptable behavior. In order to facilitate waste management, radioactive wastes are classified according to different criteria. Many different countries have developed different waste classification systems depending on the characteristics required by the waste management to be application. Wastes are processed and removal of as required by their class. Radioactive wastes are generally classified according to the level of radiation and their active time. Recommended by the International Atomic Energy Agency (IAEA) radioactive waste by classification; exempt waste, very short lived waste, very low level waste, low level waste, intermediate level waste and high level waste is divided into 6 different groups. The sources of radioactive waste can be specified as follows; uranium extraction and purification, uranium enrichment, processes of nuclear reactors, plutonium production, waste resulting from recycling, deactivation of nuclear power facilities, thorium industry, radium industry, production of artificial radionuclides, hospitals and industrial establishments. Since zeolite minerals have high ion exchange and adsorption capacities, they are increasingly used in the environmental pollution control. For this purpose, zeolites are used in the removal of radioactive wastes in wastewater, in the treatment of wastes in nuclear power facilities and in the adsorption of metal ions and nitrogen compounds in the wastewater.

Keywords: Radioactive Waste, Liquid Nuclear Waste, Adsorption, Waste Management, Zeolite Clay.

INTRODUCTION

Nuclear technology in our world in recent years, it is encountered in almost every field of life such as medicine, agriculture, energy and weapon industry and many radioactive materials are produced and used in these areas (Dai et al., 2019). Substances containing radionuclides in activity above the legal limit values determined by the competent authorities or contaminated by these radionuclides are considered as radioactive waste (Li et al., 2018; Mishra and Tiwari, 2002). Wastes during the purification, enrichment, fueling and combustion of uranium radioactive material in nuclear power reactors and reprocessing are the main sources of the radioactive waste (Kademani et al., 2013; Zhang et al., 2020). Fission products are formed as a result of reactions in nuclear reactors (Gunathilake et al., 2015). An estimated 600 fission products are formed and the vast majority of these fission products are radionuclides with short half lives. Since Cs-137 and Sr-90 are long lived radionuclides, they remain as unstable nuclei (Balarama Krishna et al., 2004; Wen et al., 2021).

Radioactive wastes are substances formed as a result of physical and chemical processes in different application areas such as medicine, industry and research (Valsala et al., 2009). Radioactive waste must be management in a safety and environmentally sound manner. In order to facilitate waste management, radioactive wastes are classified by applying different criteria (Mansy et al., 2017; Sayed et al., 2016). Many different countries have developed different waste classification systems depending on the characteristics required by the waste management to be applied. Radioactive waste is handled and disposed of properly (Osmanlioglu, 2002). In the nuclear fuel cycle, uranium mining, uranium enrichment, nuclear fuel making, reprocessing of spent fuel materials and storage of radioactive products, decommissioning of nuclear fuel cycle facilities are the waste sources of nuclear power facilities (Liu et al., 2019; Song et al., 2019). Radioactive wastes are formed as a result of the fuel cycle during the operation of nuclear reactors. More than about 95% is in liquid form. Then 99% of this liquid waste is converted into solid waste and stored (Bai et al., 2020; Duan et al., 2020). Removal of radioactive materials is an unsolved problem and the most preferred method in this respect is to cover and to store radioactive materials with low permeability materials (Yang et al., 2020).

MATERIALS AND METHODS

Crystal Structure of the Clay Minerals

Clay minerals have a layered structure. Each of the clay layers consists of two, three or four tetrahedral and octahedral (Yariv and Cros, 2002). Tetrahedrals occur of four oxygen anions arranged around a silicon cation. Octahedrals occur of six oxygen anions located around an aluminum cation (Paiva et al., 2008; Xu et al., 2007). A layered structure is formed as a result of tetrahedrals and octahedrals being overlapped and connected to each other by oxygen bridges between them. Clay minerals are formed by the overlapping of layers (Wang et al., 2008). The general chemical composition of allophane group clay minerals is $x\text{Al}_2\text{O}_3 \cdot y\text{SiO}_2 \cdot z\text{H}_2\text{O}$. $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio varies between 0.5-1.8. This ratio is smaller than other clay minerals (Pan et al., 2005). While it is transparent and colorless when pure, it becomes blue, green, yellow and brown when mixed with foreign matter. In addition, alkali and alkaline earth content of allophane group clay minerals is much less than other clays (Naidu et al., 2011; Stathi et al., 2007). Important members of the group are kaolinite and nacrite. Its chemical composition is $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ ($\text{Al}_2\text{Si}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$). Its density is 2.61-2.68 gr/cm^3 and its hardness according to the Mohs hardness scale varies between 2-2.5 white, light red, brown (Xu et al., 2007; Yavuz et al., 2003). The horizontal (a,b) axis dimensions of the kaolinite

mineral are 0.3-4 mm, the vertical dimension (c-axis) is 0.05-2 mm (Wu et al., 2013). Tetrahedral and octahedral crystal forms in the structure of the clay mineral are shown in Figure 1.

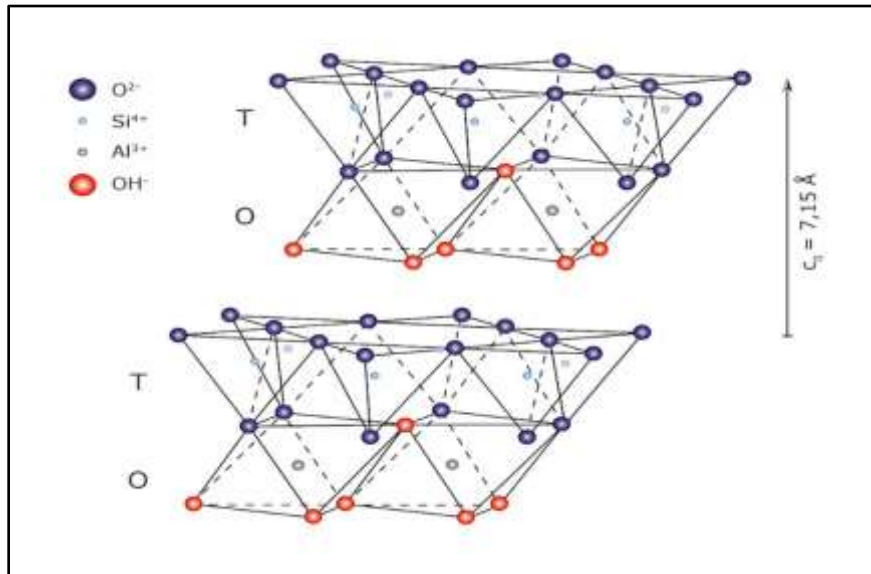


Figure 1. Tetrahedral and octahedral crystal forms in the structure of the clay mineral (Paiva et al., 2008; Ray and Okamoto, 2003; Shanwan and Erten, 2002; Sheng et al., 1997).

The structural properties of illite minerals are generally similar to those of mica minerals. These structures are in the form of aluminum octahedrals located between two silica tetrahedral layers as in the smectite group (Vejsada et al., 2005; Ye et al., 2016). The differences between illite and mica minerals are that illite contains less K^+ than mica minerals (Turan et al., 2011). Micas are large in size and the grain size of illite crystals is 0.1-0.3 mm. Illite minerals do not swell compared to smectite and contain K^+ (Shanwan and Erten, 2002; Siroux et al., 2018).

Clay minerals named to montmorillonite group are also named to smectite group. Smectite structural units occur of two outer silica tetrahedral layers and an aluminum octahedral layer between them (Ray and Okamoto, 2003; Zhang et al., 2018). Important smectite group minerals are montmorillonite, baydellite, nontronite, hectorite, saponite. The density of minerals in this group is 2-3 g/cm^3 (Shin et al., 2011; Zhang et al., 2013). Zeolites are microporous structures containing aluminum, silica and oxygen in their lattice structures their pores contain cations and water (Stylianou et al., 2007). The silica and aluminum atoms are tetrahedral bonded to each other by a common oxygen atom. There are wide gaps forming grooves in the zeolite structure (Khanday et al., 2017; Lin and Zhan, 2012). These grooves allow ions and molecules to easily pass through the zeolite structure. (Weckhuysen and Yu, 2015). The basic structural unit in the structure of zeolite is SiO_4 or AlO_4 tetrahedron. In this unit, there are Si or Al atoms that can replace it in the center and O atoms at the corners (Zanin et al., 2017).

RESULTS AND DISCUSSION

Classification of the Radioactive Waste

Radioactive wastes are generally classified according to the level of radiation and their active time. According to the classification proposed by the International Atomic Energy Agency (IAEA), radioactive wastes:

- Exempt waste,
- Very short-lived waste,

- Very low level waste,
- Low level waste,
- Intermediate level waste,
- It is divided into 6 different groups as high-level wastes (Mishra and Tiwary, 2002; Raj et al., 2006).

Exempt Wastes:

They are wastes that we cannot classify as radioactive because they contain very little radioactive substance and are exempt from nuclear regulation controls. The activity concentrations recommended by the IAEA depend on the type of radionuclide and range from 0.1 Bq/g to 104 Bq/g (Inan et al., 2006). Used materials (stone, plaster, brick, metal and piping) from repaired or dismantled nuclear facilities, wastes from natural radioactivity in the various minerals used in production in the chemical and steel industries are examples of free waste (Berner, 1992; Eskander et al., 2013).

Very Short Lived Wastes:

Waste that is stored for up to several years to decompose and is exempt from control for disposal, use and discharge. It mainly includes radionuclides with short half lives used for research and medical purposes (Elizondo et al., 2000; Simnad, 2003).

Very Low Level Wastes:

These are wastes that do not meet the free waste criteria but do not require high level protection and isolation and are suitable for storage on nearby surfaces. Wastes in this class include low activity soil and gravel (Ambashta and Sillanpaa, 2012; Rosson et al., 2001).

Low Level Wastes:

It includes short half life radionuclides with high activity level and long lived radionuclides with low activity. Normally items and tools that have come into contact with small and short lived radioactive materials such as clothing, gloves, syringes are classified as low level waste (Jevremovic, 2009; Zhao et al., 2017). It is possible to touch low level waste using plastic gloves, does not require shielding during processing and handling due to its low radioactive content (Swift et al., 2013; Wang and Zhuang, 2020).

Intermediate Level Wastes:

It occurs mostly in the industrial sector. Equipment used with nuclear materials or ion exchange resins used to clean radioactive liquids are in this class (Shi and Fernandez-Jimenez, 2006). Intermediate levels of waste generally produce negligible heat, but spread enough radiation to require the use of armor to protect those around them (Kononenko et al., 2021). During the reprocessing of spent fuels, the remaining structural metal parts from the fuel are also classified as intermediate level waste (Fang et al., 2017).

High Level Wastes:

Unprocessed spent nuclear fuels and reprocessing facility wastes are in this class. Although these two types of waste are in different shapes and forms, they are managed in the same way in many respects (Jia et al., 2018; Yeotikar, 2007). It basically has a very high radiation level and generally remains radioactive for very long periods of time. These wastes constitute 3% of all radioactive wastes by volume and 95% in terms of radioactivity (Chen and Wang, 2012; Rahman and Zaki, 2020). Radioactive waste removal studies with the support of different clay types are given in Table 1.

Table 1. Radioactive waste removal studies with the support of different clay types.

Adsorbent	Radioactive Element	References
Clinoptilolite	Cesium (Cs) Strontium (Sr)	(Dyer et al., 2006)
Clinoptilolite	Europium (Eu) Samarium (Sm)	(Mosai et al., 2019)
Montmorillonite and Other Minerals	Uranium (U)	(Ames et al., 1983)
Mordenite	Cesium (Cs)	(Johan et al., 2015)
Nanocrystalline mordenite	Europium (Eu)	(Sharma and Tomar, 2011)
Natural Zeolite and Other Minerals	Cesium (Cs) Strontium (Sr)	(Abdollahi et al., 2020)
Synthetic Zeolite	Plutonium (Pu) Americium (Am)	(Rajec et al., 1999)
Chabacite	Cesium (Cs) Strontium (Sr)	Nakai et al. (2013)
Claystone and Analcime	Cobalt	Sipos et al. (2010)

In addition, the adsorption of different species of clay is preferred in the removal of the radioactive wastes. Clays such as montmorillonite, zeolite, clinoptilolite, bentonite are generally preferred for the removal of the radioactive wastes (Dyer et al., 2006; Mosai et al., 2019; Nakai et al., 2013).

CONCLUSION

This review shows that different types of clay have a wide range of applications in the removal of radioactive liquid waste. Different types of clay are versatile materials for the treatment of nuclear waste and have been used to removal many metals of nuclear importance that can cause important harm to human health and the environment.

Modification of clay minerals can be an important application to improve their adsorption capacity and selectively. Also, the regeneration of clay minerals and the recovery or safe disposal of nuclear waste materials is a very important step.

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REFERENCES

- Abdollahi T, Towfighi J, Rezaei-Vahidian H 2020. Sorption of cesium and strontium ions by natural zeolite and management of produced secondary waste. *Environ. Technol. Innov.*, 17: 100592.
- Ambashta RD, Sillanpaa MET 2012. Membrane purification in radioactive waste management: a short review. *J. Environ. Radioact.*, 105: 76-84.
- Ames LL, McGarrah JE, Walker BA 1983. Sorption of trace constituents from aqueous solutions onto secondary minerals. I. Uranium. *Clay Clay Miner.*, 31(5): 321-334.
- Bai Z, Liu Q, Zhang H et al., 2020. Anti-biofouling and water-stable balanced charged metal organic framework-based polyelectrolyte hydrogels for extracting uranium from seawater. *ACS Appl. Mater. Interfaces*, 12: 18012-18022.
- Balarama Krishna MV, Rao SV, Arunachalam J, Murali MS, Kumar S, Manchanda VK 2004. Removal of ^{137}Cs and ^{90}Sr from actual low level radioactive waste solutions using moss as a phyto-sorbent. *Sep. Purif. Technol.*, 38(2): 149-161.
- Berner UR 1992. Evolution of pore water chemistry during degradation of cement in a radioactive waste repository environment. *Waste Manag.*, 12: 201-219.
- Chen YW, Wang JL 2012. Removal of radionuclide Sr^{2+} ions from aqueous solution using synthesized magnetic chitosan beads. *Nucl. Eng. Des.*, 242: 445-451.
- Dai Z, Sun Y, Zhang H et al., 2019. Rational synthesis of polyamidoxime/ polydopamine-decorated graphene oxide composites for efficient uranium(VI) removal from mine radioactive wastewater. *Ind. Eng. Chem. Res.*, 58: 19280-19291.
- Duan C, Zhang Y, Li J et al., 2020. Rapid room-temperature preparation of hierarchically porous metal-organic frameworks for efficient uranium removal from aqueous solutions. *Nanomaterials*, 10: 1539.
- Dyer A, Chimedtsogzol A, Campbell L, Williams C 2006. Uptake of caesium and strontium radio isotopes by natural zeolites from Mongolia. *Microporous Mesoporous Mater.*, 95(1-3): 172-175.
- Elizondo NV, Ballesteros E, Kharisov BI 2000. Cleaning of liquid radioactive wastes using natural zeolites. *Appl. Radiat. Isot.*, 52 (1): 27-30.
- Eskander SB, Bayoumi TA, Saleh HM 2013. Leaching behaviour of cement-natural clay composite incorporating real spent radioactive liquid scintillator. *Prog. Nucl. Energy*, 67: 1-6.
- Fang XH, Fang F, Lu CH, Zheng L 2017. Removal of Cs^+ , Sr^{2+} , and Co^{2+} ions from the mixture of organics and suspended solids aqueous solutions by zeolites. *Nuclear Eng. Technol.*, 49: 556-561.
- Gunathilake C, Gorka J, Dai S et al., 2015. Amidoxime-modified mesoporous silica for uranium adsorption under seawater conditions. *J. Mater. Chem.*, 3: 11650-11659.
- Inan S, Tel H, Altas Y. 2006. Sorption studies of strontium on hydrous zirconium dioxide. *Journal of Radioanalytical and Nuclear Chemistry*, 267(3): 615-621.
- Jevremovic T 2009. Nuclear reactor control BT- nuclear principles in engineering. In: Jevremovic, T. (Ed.). Springer US, pp. 491-518.

- Jia F, Yin YN, Wang JL 2018. Removal of cobalt ions from simulated radioactive wastewater by vacuum membrane distillation. *Prog. Nucl. Energy*, 103: 20-27.
- Johan E, Yamada T, Munthali MW, Kabwadza-Corner P, Aono H, Matsue N 2015. Natural zeolites as potential materials for decontamination of radioactive cesium. *Procedia Environ. Sci.*, 28: 52-56.
- Kademani B, Surwase G, Sagar A, Mohan L, Bhanumurthy K 2013. Research trends in radioactive waste management: A global perspective. *Int. J. Low Radiat.*, 9(1): 59-94.
- Khanday WA, Marrakchi F, Asif M, Hameed BH 2017. Mesoporous zeolite-activated carbon composite from oil palm ash as an effective adsorbent for methylene blue. *J. Taiwan Inst. Chem. Eng.*, 70: 32-41.
- Kononenko AO, Milyutin VV, Makarenkov IV, Kozlitsin AE 2021. Immobilization of NPP evaporator bottom high salt-bearing liquid radioactive waste into struvitebased phosphate matrices. *J. Hazard. Mater.*, 416: 125902.
- Li J, Wang X, Zhao G et al., 2018. Metal-organic framework-based materials: superior adsorbents for the capture of toxic and radioactive metal ions. *Chem. Soc. Rev.*, 47: 2322-2356.
- Lin J, Zhan Y 2012. Adsorption of humic acid from aqueous solution onto unmodified and surfactant-modified chitosan/zeolite composites. *Chem. Eng. J.*, 200: 202-213.
- Liu X, Wu J, Zhang S et al., 2019. Amidoxime-functionalized hollow carbon spheres for efficient removal of uranium from wastewater. *ACS Sustain. Chem. Eng.*, 7: 10800-10807.
- Mansy MS, Hassan RS, Selim YT, Kenawy SH 2017. Evaluation of synthetic aluminum silicate modified by magnesia for the removal of Cs¹³⁷, Co⁶⁰ and Eu¹⁵²⁺¹⁵⁴ from low-level radioactive waste. *Appl. Radiat. Isot.*, 130: 198-205.
- Mishra SP, Tiwary D 2002. Inorganic ion exchangers in radioactive waste management. Part XII. Removal behavior of stannic and zirconium phosphates for strontium. *Journal of Radioanalytical and Nuclear Chemistry*, 253(3): 421-426.
- Mosai AK, Chimuka L, Cukrowska EM, Kotze IA, Tutu H 2019. The recovery of rare earth elements (REEs) from aqueous solutions using natural zeolite and bentonite. *Water Air Soil Pollut.*, 230(8): 188.
- Naidu R, Sarkar B, Xi Y, Megharaj M 2011. Orange II adsorption on palygorskites modified with alkyl trimethylammonium and dialkyl dimethylammonium bromide an isothermal and kinetic study. *Applied Clay Science*, 51: 370-374.
- Nakai T, Wakabayashi S, Mimura H, Niibori Y, Kurosaki F, Matsukura M, Ishizaki E 2013. Evaluation of adsorption properties for Cs and Sr selective adsorbents-13171. *WM Symposia*, 1628 E. Southern Avenue, Suite 9-332, Tempe, AZ 85282 (United States).
- Osmanlioglu AE 2002. Immobilization of radioactive waste by cementation with purified kaolin clay. *Waste Manag.*, 22: 481-483.
- Paiva LB, Morales AR, Dias, FRV 2008. Organoclays: Properties, preparation and applications. *Applied Clay Science*, 42: 8-24.
- Pan B, Yue Q, Ren J, Wang H, Jian L, Zhang J, Yang S 2005. A study on attapulgite reinforced PA6 composites. *Polymer Testing*, 25: 384-391.

- Rahman ROA, Zaki AA 2020. Comparative analysis of nuclear waste solidification performance models: spent ion exchanger-cement based waste forms. *Process Saf. Environ. Protect.*, 136: 115-125.
- Raj K, Prasad KK, Bansal NK 2006. Radioactive waste management practices in India. *Nuclear Engineering and Design*, 236: 914-930.
- Rajec P, Macasek F, Misaelides P 1999. Sorption of heavy metals and radionuclides on zeolites and clays. *Natural Microp. Mater. Environ. Technol.*, 362: 353-363.
- Ray SS, Okamoto M 2003. Polymer/Layered silicate nanocomposites: A review from preparation to processing. *Progress Polymer Science*, 28: 1539-1641.
- Rosson R, Lahr J, Garcia R, Blackman C, Kahn B 2001. Radionuclides in sediments at nuclear facilities in Georgia. Proceedings of the 2001 Georgia water resources conference, held march 26-27, at the University of Georgia. In: Hatcher, K.J. (Ed.), Institute of Ecology, the University of Georgia. Georgia, Athens.
- Sayed MS, Salama TM, Bakr MF, El Dakrory AM, Maree RM, Ibrahim IA 2016. Synthesis of graphene functionalized with (SDS) for removal of $^{137}\text{Cs(I)}$ and Ce(III) ions from radioactive waste. *J. Int. Environ. Appl. Sci.*, 11: 110-123.
- Simnad MT 2003. Nuclear reactor materials and fuels (R. A. B. T.-E. Of P. S. and T. In: Meyers, Third E. (Ed.). Academic Press, pp. 775-815.
- Shanwan T, Erten HN 2002. Thermodynamic parameters of Cs^+ sorption on natural clays. *Journal of Radioanalytical and Nuclear Chemistry*, 253: 115-120.
- Sharma, P., Tomar, R., 2011. Sorption behaviour of nanocrystalline MOR type zeolite for Th(IV) and Eu(III) removal from aqueous waste by batch treatment. *J. Colloid Interface Sci.*, 362(1): 144-156.
- Sheng G, Xu S, Boyd S 1997. Surface heterogeneity of trimethylphenylammonium smectite as revealed by adsorption of aromatic hydrocarbons from water. *Clays and Clay Minerals*, 45(5): 659-669.
- Shi CJ, Fernandez-Jimenez A 2006. Stabilization/solidification of hazardous and radioactive wastes with alkali-activated cements. *J. Hazard Mater.*, 137: 1656-1663.
- Shin SW, Sanghwa O, Choi S, Ma B 2011. Removal of Co^{2+} , Sr^{2+} and Cs^+ from aqueous solution by phosphate-modified montmorillonite (PMM). *Desalination*, 276: 336-346.
- Sipos P, Nemeth T, Mathe Z 2010. Preliminary results on the Co, Sr and Cs sorption properties of the analcime-containing rock type of the Boda Siltstone Formation. *Central Eur. Geol.*, 53: 67-78.
- Siroux B, Wissocq A, Beaucaire C, Latrille C, Petcut C, Calvaire J, Tabarant M, Benedetti MF, Reiller PE 2018. Adsorption of strontium and cesium onto an Na-illite and Na-illite/Na-smectite mixtures: implementation and application of a multisite ion-exchange model. *Appl. Geochem.*, 99: 65-74.
- Song S, Huang Q, Cheng G et al., 2019. Immobilization of U(VI) on hierarchical NiSiO@MgAl and NiSiO@NiAl nanocomposites from wastewater. *ACS Sustain. Chem. Eng.*, 7: 3475-3486.
- Stathi P, Litina K, Gournis D, Giannopoulos TS, Deliginnakis Y 2007. Physicochemical study of noval organoclays as heavy metal ion adsorbents for environmental remediation. *Journal of Colloid and Interface Science*, 150: 511-516.

- Stylianou MA, Inglezakis VJ, Moustakas KG, Malamis SP, Loizidou MD 2007. Removal of Cu(II) in fixed bed and batch reactors using natural zeolite and exfoliated vermiculite as adsorbents. *Desalination*, 215: 133-142.
- Swift P, Kinoshita H, Collier NC, Utton CA 2013. Phosphate modified calcium aluminate cement for radioactive waste encapsulation. *Adv. Appl. Ceram.*, 112, 1-8.
- Turan NG, Elevli S, Mesci B 2011. Adsorption of copper and zinc ions on illite: determination of the optimal conditions by the statistical design of experiments. *Appl. Clay Sci.*, 52: 392-399.
- Valsala TP, Roy SC, Shah JG, Gabriel J, Raj K, Venugopal V 2009. Removal of radioactive cesium from low level radioactive waste (LLW) streams using cobalt ferro cyanide impregnated organic anion exchanger. *J. Hazard. Mater.*, 166: 1148-1153.
- Vejsada J, Hradil D, Randa Z, Jelinek E, Stulik K 2005. Adsorption of cesium on Czech smectite-rich clays- A comparative study. *Appl. Clay Sci.*, 30: 53-66.
- Wang X, Huang J, Liu Y 2008. Selective adsorption of tannin from flavonoids by organically modified attapulgite clay. *Journal of Hazardous Materials*, 160: 382-387.
- Wang JL, Zhuang ST 2020. Cesium separation from radioactive waste by extraction and adsorption based on crown ethers and calixarenes. *Nucl. Eng. Technol.*, 52: 328-336.
- Weckhuysen BM, Yu J 2015. Recent advances in zeolite chemistry and catalysis. *Chemical Society Reviews*, 44: 7022-7024.
- Wen S, Sun Y, Liu R et al., 2021. Supramolecularly poly(amidoxime)-loaded macroporous resin for fast uranium recovery from seawater and uranium-containing wastewater. *ACS Appl. Mater. Interfaces*, 13: 3246-3258.
- Wu Q, Li Z, Hong H 2013. Adsorption of the quinolone antibiotic nalidixic acid onto montmorillonite and kaolinite. *Appl. Clay Sci.*, 74: 66-73.
- Xu JM, Li W, Yin QF, Zhu YL 2007. Direct on natural attapulgite clay modified electrode and its electrocatalytic reduction for H₂O₂. *Electrochimica Acta*, 52: 3601-3606.
- Yang J, Shi K, Gao X, Hou X, Wu W, Shi W 2020. Hexadecylpyridinium (HDPy) modified bentonite for efficient and selective removal of ⁹⁹Tc from wastewater. *Chem. Eng. J.*, 382: 122894.
- Yariv S, Cros H 2002. *Organo-clay complexes and interactions*. CRC Press, Newyork, 688p.
- Yavuz O, Altunkaynak Y, Guzel F 2003. Removal of copper, nickel, cobalt and manganese from aqueous solution by kaolinite. *Water Research*, 37: 948-952.
- Ye WM, He Y, Chen YG, Chen B, Cui YJ 2016. Thermochemical effects on the smectite alteration of GMZ bentonite for deep geological repository. *Environ. Earth Sci.*, 75: 96.
- Yeotikar SRG 2007. High level liquid radioactive waste, their characterization & quality Assurance. *IANCAS Bulletin*, 205.
- Zanin E, Scapinello J, de Oliveira M, Rambo CL, Franscescon F, Freitas L, Dal Magro J 2017. Adsorption of heavy metals from wastewater graphic industry using clinoptilolite zeolite as adsorbent. *Process Safety and Environmental Protection*, 105: 194-200.
- Zhang S, Li H, Wang S 2020. Construction of an ion pathway boosts uranium extraction from seawater. *Inside Chem.*, 6: 1504-1519.

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EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

Zhang J, Lu M, Wan J, Sun Y, Lan H, Deng X 2018. Effects of pH, dissolved humic acid and Cu^{2+} on the adsorption of norfloxacin on montmorillonite-biochar composite derived from wheat straw. *Biochem. Eng. J.*, 130: 104-112.

Zhang Z, Zhang J, Liao L, Xia Z 2013. Synergistic effect of cationic and anionic surfactants for the modification of Ca-montmorillonite. *Mater. Res. Bull.*, 48: 1811-1816.

Zhao LF, Zhang Y, Xiong BW, Pan Y 2017. A preliminary study on the solidification of simulated radioactive waste ion exchange resin with Portland cement. *Atomic Energy Sci. Technol.*, 51: 1742-1748.

**APPLICATIONS OF ELECTRO-FENTON PROCESSES: DEGRADATION OF THE
DISPERSE DYES IN THE INDUSTRIAL WASTEWATER**

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Abstract

With the development of industry and technology, there has been a great increase in the use of chemicals and toxic substances, especially in the last 30 years. The harmful effects of industrial wastewater, which are formed as a result of the use of these materials as raw materials and by products in many technology branches, seriously threaten the environment. Classical treatment methods are quite insufficient in the treatment of these industrial wastewaters. Water pollution is one of the most important environmental problems encountered today. Water is an indispensable resource for the continuation of life, as it is the most basic need of living things and is a source for major economic activities. Disperse dyestuffs, which are insoluble in the aqueous solutions and are nonionic, are used to dye hydrophobic fibers that do not like water. In the textile industry, disperse dyes are mostly preferred for dyeing polyester fibers. After the dyestuff is produced, it is finely ground and turned into a very fine powder. Disperse dyes are low molecular weight compounds containing NH_2 and OH groups. Since disperse dyes are insoluble in the water, they are applied to the fiber as dispersions in the water. Disperse dyes pass through the dispersion medium on the fiber by the diffusion process during the dyeing process. Dyeing takes place by dissolving the dyestuff in the fiber. They are used for dyeing polyester, polyamide and acrylic fiber. Different chemical, physical and biological processes such as chlorination, ozonation, adsorption and microfiltration are widely used in cleaning the environments where industrial wastes are present. However, in all of these methods organic substance can be removal by transferring it from one phase to another. However, due to increasing environmental pollution, the treatment process has changed to develop new methods that can decompose organic substances into CO_2 and H_2O instead of transferring them from one phase to another. Hybrid systems in which different oxidation processes are applied simultaneously in the same electrochemical cell, are widely used today in order to increase the efficiency of the electrochemical methods.

Keywords: Disperse Dyes, Electro-Fenton Processes, Dye Degradation, Hydrophobic Fibers, Non-ionic.

INTRODUCTION

Today, water pollution has become one of the most serious environmental problems all over the world. Great amounts of wastewater are produced and released into the aquatic medium every year in many industrial processes (Ozyonar and Karagozoglu, 2014; Verma et al., 2012). Synthetic dyes are one of the most important pollutants located in the industrial wastewater. Different types of synthetic dyes are used to color products produced in many industrial areas such as food, textile, paper, plastic, medicine, cosmetics, rubber and leather (Giannakis et al., 2021). Great amounts of the synthetic dye pollutants in produced industrial wastewater pose a great risk to environmental health and human health (Ajiboye et al., 2021; Ghanbari et al., 2014). Pollutants in water have different properties according to their sources. As a general pollutant indicator, biological and chemical oxygen demand (COD) values are monitored (Badawy et al., 2006). Especially, dye containing wastewater has high chemical oxygen demand concentrations. Therefore, it is not legally appropriate to give it directly in the receiving environment. This type of wastewater needs to be treatment appropriately (Xu et al., 2009; Zhang et al., 2014). Treatment processes include different applications according to the type of the pollutant components (Shen et al., 2017). Many synthetic dyes have allergenic, toxic, mutagenic and carcinogenic effects on humans and other organisms (Martinez-Huitle and Brillas, 2009; Nunez et al., 2019). In general, their synthetic origins and complex structures make dyes into permanent compounds that cannot be degradation (Liu et al., 2014). For this reason, wastewater containing synthetic dyes is difficult to treatment (Poyatos et al., 2010).

Wastewater generated as a result of industrial processes must be purified by ensuring discharge standards before being discharged to the receiving environment (Robinson et al., 2002). When textile industry wastewater is discharged to the receiving environment, it causes negative environmental problems even at very low dyestuff concentration (Daneshvar et al., 2006; Le et al., 2016). Colored complex compounds in the dyestuff structure absorb sunlight and prevent the photosynthesis process in the receiving environment and cause a decrease in the dissolved oxygen value in the environment. Therefore, it causes the extinction of living things in the receiving environment (Aravind et al., 2016; Chang et al., 2009). Due to the high water consumption of the textile industry, wastewater generation is higher than in other industries. Dye production facilities are one of the most important parts of the textile industry (Hassani et al., 2016; Kıranşan et al., 2014). Chemical added for intense color and dyeing process it is very difficult to purify as it contains substances (Khataee et al., 2016). Disperse dyes are non ionic, small particle, aqueous dispersions that are insoluble in water at room temperature and have hydrophobic properties. Low molecular weight with amino and hydroxyl groups in their structure are compounds (Kıranşan et al., 2015; Phalakornkule et al., 2010). Disperse dyes are applied as small particulate aqueous dispersions containing a small amount of the dissolved dye. The solubility of disperse dyes is determined by the formulation and chemical structure of the dye (Merzouk et al., 2011).

Today, various process technologies are used both individually and as hybrid systems for the degradation of disperse dyes in industrial wastewater (Tian et al., 2018). Hybrid biological, chemical and physical processes it can be used in advanced oxidation and electro-chemical treatment processes to minimize environmental problems that may occur in the wastewater (Sun and Chen, 2016). Electro-fenton process, which is one of the electrochemical advanced oxidation processes, can be easily applied in the treatment of wastewater such as domestic waste, agricultural waste, dye industry and pharmaceutical industry wastes (Zhang et al.,

2008). In this method, Fe^{2+} and H_2O_2 , which play an active role in the fenton process, can be obtained electrochemically from catalytic Fe^{3+} and cathodic reduction of dissolved oxygen (Si et al., 2018; Wang et al., 2008).

MATERIALS AND METHODS

Electro-Oxidation Processes

Electro-oxidation method is also one of the electrochemical methods and in this process, insoluble inert electrodes such as Ti, Pt, Ru, Au, stainless steel are preferred. In the electro-oxidation process, the desired oxidation is provided by the O_2 and H_2 gases formed as a result of the oxidation and reduction reactions of these electrodes (Boye et al., 2003; George et al., 2014). Complex dye pollutants are difficult to removal in a classical oxidation process. With the electro-oxidation process, the substances that are desired to be degradation in the receiving environment are subjected to oxidation, while the compounds that are difficult to biodegrade are converted into final products, which are H_2O and CO_2 (Kang and Hwang, 2000; Mollah et al., 2001).

It is the electrode type anode that performs active reactions in the electro-oxidation process. The parameter effective in the process is the catalytic activity of the anode (Yavuz and Shahbazi, 2012). In addition, current, temperature, pH, diffusion rate of organic compounds and other oxidants are also effective parameters in the electro-oxidation process. It is estimated that the chemical oxygen demand in the electro-oxidation process provides 90% removal efficiency (Oturán and Aaron, 2014). This rate varies according to the type of wastewater treated. The form of purification in which the oxidative reactions occurring in the anode region of the electrochemical degradation are more dominant than the cathode region is expressed as electro-oxidation (Ahmadzadeh and Dolatabadi, 2018; Zhang et al., 2011).

RESULTS AND DISCUSSION

Electro-Fenton ($e^-/\text{H}_2\text{O}_2/\text{Fe}^{2+}$) Oxidation Process

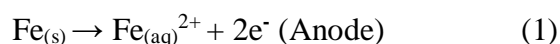
Unlike, H_2O_2 added to the reaction medium in the fenton method, H_2O_2 is produced electrochemically in the reaction medium in the electro-fenton method (Ozcan et al., 2009). In the electro-fenton process, hydrogen peroxide is formed by the reduction of O_2 on the cathode surface in the acidic medium. The resulting H_2O_2 reacts with Fe^{2+} to form hydroxyl radicals with high oxidation power (Sires et al., 2007; Zhao et al., 2012). Hybrid systems in which different oxidation processes are applied simultaneously in the electrochemical cell, are widely used today in order to increase the efficiency of electrochemical processes (Huang et al., 2008). In recent years, electrochemical technologies and their applications have been significantly preferred in water and wastewater treatment (Brillas et al., 2009). Especially, the use of direct electrochemical methods that provide anodic or cathodic conversion of the pollutant or electrochemical methods that cause the formation of strong oxidants such as the electrochemically produced hydroxyl radical ($\bullet\text{OH}$) are gaining more importance (Dirany et al., 2012; Kourdali et al., 2014).

The selection of anode and cathode electrodes with suitable properties is very important in the electro-fenton process. With the support of a suitable anode material, hydroxyl ($\bullet\text{OH}$) radicals are also formed by the hydrolysis of H_2O in the environment on the anode surface (Nidheesh and Gandhimathi, 2012; Sopaj et al., 2016). In this way, both the cathode and the anode can contribute to the production of hydroxyl ($\bullet\text{OH}$) radical at the same time. In this case, the main purpose is very effective in the degradation of dyestuffs with a complex structure (Mededovic

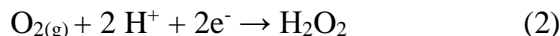
and Locke, 2007; Panizza and Cerisola, 2001). Platinum (Pt), graphite and various metal oxides are generally used as anodes in the electro-fenton process (Shwe et al., 2015). Among these electrodes, Pt electrode has been highly preferred in recent years. Pt electrode is preferred because of its advantages such as high chemical stability and resistance to corrosion (Labiadh et al., 2015; Moreira et al., 2017). However in recent years, boron-doped diamond electrodes have been preferred more because of their high potential to produce hydroxyl radicals (Lan et al., 2017; Panizza and Oturan, 2011). The efficiency of a cathode material can be determined by its ability to produce H₂O₂. Therefore, cathode materials with high H₂O₂ produce ability are very important for effective removal of pollutants (Zhou et al., 2007). Carbon containing materials are widely used as cathodes. The reasons for this are that they have a very low catalytic activity for H₂O₂ degradation, have a chemically resistant and stable structure, are nontoxic and have high conductivity (Desoky et al., 2010; Ganiyu et al., 2018).

Reactions Occurring in the Electro-Fenton (e⁻/H₂O₂/Fe²⁺) Oxidation Process

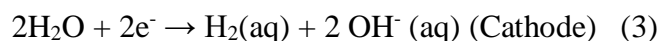
The reactions that occur with the addition of Fe²⁺ ions in the electro-fenton process are different from the classical fenton process. While Fe²⁺ ions are applied externally in the classical fenton process, Fe²⁺ ions are provided from the iron anodes in the electro-fenton process (Ramirez-Pereda et al., 2018; Xia et al., 2015a). While Fe²⁺ ions are transmitted to the iron anode solution, hydrolysis reactions of water occur at the cathode at the same time. When Fe is used at the anode in the electro-fenton oxidation process, the oxidation reaction of Fe occur (Eqs. (1)) (Nidheesh et al., 2018).



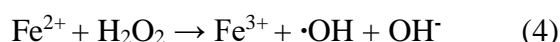
Hydrogen peroxide (H₂O₂) is formed as a result of the reaction of oxygen gas with hydrogen ion by taking 2e⁻ under acidic conditions at the cathode (Eqs. (2)) (Nidheesh et al., 2018).



In a neutral or basic environment, the direct reduction reaction of water can occur with the formation of H₂ and OH⁻ (Eqs. (3)).



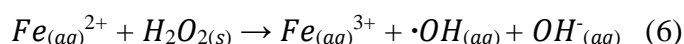
In the solution, hydroxyl radicals ($\cdot\text{OH}$) are produced by the reaction of Fe²⁺ which is oxidized at the anode and H₂O₂ which occurs at the cathode (Eqs. (4)) (Brillas and Garcia-Segura, 2020).



Fe³⁺ formed in the solution medium can be reduced to Fe²⁺ at the cathode (Eqs. (5)) (Brillas and Garcia-Segura, 2020).



Hydrogen peroxide conditions with the support of fenton reactions and Fe²⁺ can be continuously renewed at the cathode, depending on the electrolytic cell medium (Eqs. (6)) (Martins et al., 2006).



As a result, the amount of hydroxyl radicals ($\cdot\text{OH}$) in the electro-fenton reactor will be higher than in the fenton oxidation process. This process is the most efficient method that increases the efficiency of the electro-fenton method is one of the important factors (Pereira et al., 2016; Yang et al., 2018). In the system, Fe³⁺ formed as a result of fenton reactions ions can be reduced to Fe²⁺ on the cathode surface. Since this reduction activates the fenton chain reactions, higher removal and degradation efficiencies are achieved in electro-fenton systems

compared to classical fenton oxidation (Murrieta et al., 2020). The schematic representation of the main reactions occurring during the electro-fenton process shown in Figure 1.

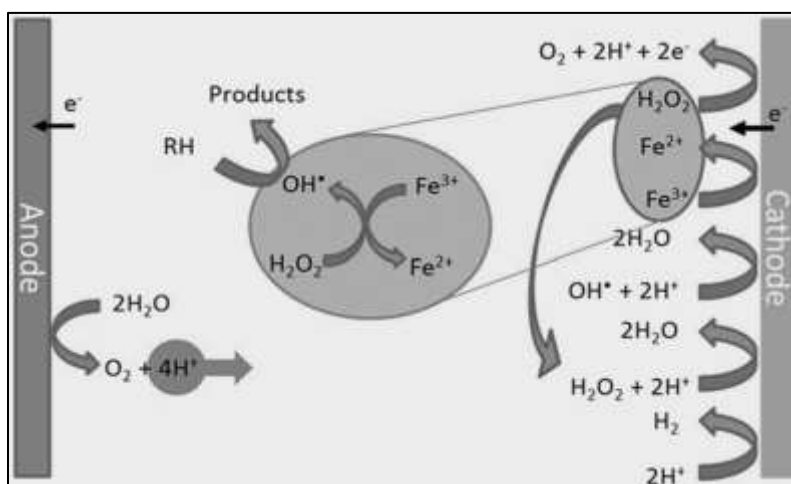


Figure 1. Schematic representation of the main reactions occurring during the electro-fenton process (Hong et al., 2007; Xia et al., 2015b; Yasri and Gunasekaran, 2017).

Advantage and Disadvantages of the Electro-Fenton ($e^-/H_2O_2/Fe^{2+}$) Oxidation Process

The most important advantage of the electro-fenton process is that hydrogen peroxide can be produced insitu and continuously. In addition, diluted hydrogen peroxide solution increases safety during process operations (Lanzalco et al., 2017). Hydroxyl radicals can be produced simply at the appropriate temperature and pressure (Lou et al., 2020). Another advantage of the electro-fenton process is the continuous regeneration of Fe^{2+} ion on the cathode surface, which enables more oxidation of organic pollutants and keeps the precipitate formation to a minimum (Lu et al., 2019). In addition, oxidation kinetics control for mechanistic studies can be achieved. By optimizing the experimental conditions, full mineralization of disperse dyes is achieved at lower costs. Hydroxyl radicals are produced in a controlled process (Zhang et al., 2017).

The disadvantage of electro-fenton oxidation processes is that hydrogen peroxide can accumulate at the cathode interface and partially can be degradation. Protons compete with electrons in high concentrations and hydrogen gas is the released (Jaafarzadeh et al., 2016). In addition, other disadvantages of the process are that hydrogen peroxide production causes a decrease in current efficiency. Because of this, in acidic solutions the cathodic potential and solution pH are important in controlling the current efficiency (Akbari et al., 2016; Sun et al., 2015). Potential corrosion mediums can be occur. Gas bubbles formed at the anode and cathode increase the sedimentation time of the formed sludge (Bashir et al., 2019).

Degradation of Disperse Dyes in the Wastewaters

Disperse dyes are colloidal and have very low water solubility. Most of these dyes are used for polyester, nylon, acetate and triacetate fibers (Neamtu et al., 2004). Disperse dyes are applied as dispersions by colloidal adsorption directly from a dyebath. In recent years, only disperse dyestuffs have been used in polyester dyeing (Ugur, 2007). More than 70% of disperse dyes are monoazo dyes. As synthetic monoazo dyes are synthesized, the ratio of anthraquinone type disperse azo dyes is rapidly decreasing. The most important factor affecting this change is the economic conditions (Szyrkowicz et al., 2001). Azo dyes are characterized by the ($-N=N-$) group in their structure. Azo group dyes give especially yellow, orange and red colors. Disperse dyestuff containing very few azo groups gives purple and blue color (Merzouk et al., 2011).

About 10% of disperse azo dyes are diazo and 50% are monoazo dyes. Monoazo dyes are low molecular weight and nonionic in the nature. Disperse dyes are hydrophobic and very little soluble in water (Nuralin, 2006). Oxyethyl groups in the structure of their molecules show dispersion properties. In order for the disperse dyestuff, which is in the form of micro disperse granules, to dissolve colloiddally in water it must contain approximately 45-55% dispersant in the dyebath structure (Paydak, 2006). Disperse dyes are very sensitive to medium pH. Under normal conditions, the best dyeing is done in a neutral or weakly acidic medium. When the pH of the medium starts to shift from neutral to alkaline, the dyestuff begins to hydrolyze (Kim et al., 2004; Leaver et al., 1992).

CONCLUSION

The formation of Fe^{3+} during the fenton process results in the production of iron sludge. In order to overcome these reversals, the electro-fenton process was developed by taking the electrochemical oxidation method fenton one step further. The electro-fenton oxidation process is a combination of electrocoagulation and fenton processes, with the advantages of both processes and more hydroxyl radicals ($\bullet\text{OH}$) are produced under the electric current assisted fenton reaction.

As a result, the amount of hydroxyl radicals ($\bullet\text{OH}$) in the electro-fenton reactor will be higher than in the fenton oxidation system. This system is one of the most important elements that increase the efficiency of the electro-fenton process. In the system, it is possible for Fe^{3+} ions formed as a result of fenton reactions to be reduced to Fe^{2+} on the cathode surface. Since this situation initiates fenton chain reactions, higher treatment efficiencies are achieved in electro-fenton systems compared to classical fenton oxidation

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REFERENCES

- Ahmadzadeh S, Dolatabadi M 2018. Modeling and kinetics study of electrochemical peroxidation process for mineralization of bisphenol A; a new paradigm for groundwater treatment. *J. Mol. Liq.*, 254: 76-82.
- Ajiboye TO, Oyewo OA, Onwudiwe DC 2021. Simultaneous removal of organics and heavy metals from industrial wastewater: A review. *Chemosphere*, 262: 128379.
- Akbari S, Ghanbari F, Moradi M. 2016. Bisphenol A degradation in aqueous solutions by electrogenerated ferrous ion activated ozone, hydrogen peroxide and persulfate: Applying low current density for oxidation mechanism. *Chem. Eng. J.*, 294: 298-307.
- Aravind P, Selvaraj H, Ferro S, Sundaram M 2016. An integrated (electro- and bio-oxidation) approach for remediation of industrial wastewater containing azo-dyes: Understanding the degradation mechanism and toxicity assessment. *J. Hazard. Mater.*, 318: 203-215.
- Badawy MI, Ghaly MY, Gad-allah TA 2006. Advanced oxidation processes for the removal of organo- phosphorus pesticides from wastewater. *Desalination*, 194: 166-175.
- Bashir MJK, Lim JH, Amr SSA, Wong LP, Sim YL 2019. Post treatment of palm oil mill effluent using electro-coagulation-peroxidation (ECP) technique. *J. Clean Prod.*, 208: 716-727.

Boye B, Dieng MM, Brillas E 2003. Anodic oxidation, electro-fenton and photo-electro-fenton treatments of 2,4,5-Trichlorophenoxyacetic acid. *Journal of Electroanalytical Chemistry*, 557: 135-146.

Brillas E, Garcia-Segura S 2020. Benchmarking recent advances and innovative technology approaches of fenton, photo-fenton, electro-fenton, and related processes: A review on the relevance of phenol as model molecule. *Sep. Purif. Technol.*, 237: 116337.

Brillas E, Sires I, Oturan MA 2009. Electro-fenton process and related electrochemical technologies based on Fenton's reaction chemistry. *Chemical reviews*, 109(12): 6570-6631.

Chang SH, Wang KS, Chao SJ, Peng TH, Huang LC 2009. Degradation of azo and anthraquinone dyes by a low-cost Fe^0 /air process. *J. Hazard. Mater.*, 166: 1127-1133.

Daneshvar N, Oladegaragoze A, Djafarzadeh N 2006. Decolorization of basic dye solutions by electrocoagulation: An investigation of the effect of operational parameters. *J. Hazard. Mater.*, 129: 116-122.

Dirany A, Sires I, Oturan N, Özcan A, Oturan MA 2012. Electrochemical treatment of the antibiotic sulfachloropyridazine: Kinetics, reaction pathways, and toxicity evolution. *Environ. Sci. Technol.*, 46: 4074-4082.

Ganiyu SO, Huong Le TX, Bechelany M, Oturan N, Papirio S, Esposito G, van Hullebusch E, Cretin M, Oturan MA 2018. Electrochemical mineralization of sulfamethoxazole over wide pH range using Fe(II) Fe(III) LDH modified carbon felt cathode: Degradation pathway, toxicity and reusability of the modified cathode. *Chem. Eng. J.*, 350: 844-855.

George SJ, Gandhimathi R, Nidheesh P, Srekrishnaperumal V, Rmaesh T 2014. Electro-fenton oxidation of salicylic acid from aqueous solution: Batch Studies and degradation pathway. *Clean Soil Air Water*, 42(12): 1701-1711.

Ghanbari F, Moradi M, Manshouri M 2014. Textile wastewater decolorization by zero valent iron activated peroxymonosulfate: Compared with zero valent copper. *J. Environ. Chem. Eng.*, 2: 1846-1851,

Giannakis S, Lin KYA, Ghanbari F 2021. A review of the recent advances on the treatment of industrial wastewaters by sulfate radical-based advanced oxidation processes (SR-AOPs). *Chem. Eng. J.*, 406: 127083.

Hassani A, Soltani RDC, Kıranşan M, Karaca S, Karaca C, Khataee AR 2016. Ultrasound-assisted adsorption of textile dyes using modified nanoclay: Central composite design optimization. *Korean Journal of Chemical Engineering*, 33(1), 178-188.

Hong L, Wang C, Li X, Xuan X, Jiang C, Cui HN 2007. A novel electro-fenton process for water treatment: Reaction-controlled pH adjustment and performance assessment. *Environ. Sci. Technol.*, 41: 2937-2942.

Huang YH, Huang YF, Chang PS, Chen CY 2008. Comparative study of oxidation of dye-Reactive Black B by different advanced oxidation processes: fenton, electro-fenton and photo-fenton. *J. Hazard. Mater.*, 154: 655-662.

Jaafarzadeh N, Omidinasab M, Ghanbari F 2016. Combined electrocoagulation and UV-based sulfate radical oxidation processes for treatment of pulp and paper wastewater. *Process Saf. Environ.*, 102: 462-472.

Kang YW, Hwang KY 2000. Effects of reaction conditions on the oxidation efficiency in the fenton process. *Water Research*, 34(10): 2786-2790.

Khataee A, Gholami P, Sheydaei M 2016. Heterogeneous fenton process by natural pyrite for removal of a textile dye from water: Effect of parameters and intermediate identification. *J. Taiwan Inst. Chem. Eng.*, 58: 366-373.

Kıranşan M, Khataee AR, Karaca S, Sheydaei M 2015. Artificial neural network modeling of photocatalytic removal of a disperse dye using synthesized ZnO nanoparticles on montmorillonite. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 140: 465-473.

Kıranşan M, Soltani RDC, Hassani A, Karaca S, Khataee AR 2014. Preparation of cetyltrimethylammonium bromide modified montmorillonite nanomaterial for adsorption of a textile dye. *Journal of the Taiwan Institute of Chemical Engineers*, 45(5): 2565-2577.

Kim TH, Park C, Yang J, Kim S 2004. Comparison of disperse and reactive dye removals by chemical coagulation and fenton oxidation. *Journal of Hazardous Materials*, 112: 95-103.

Kourdali S, Badis A, Boucherit A 2014. Degradation of direct yellow 9 by electro-fenton: process study and optimization and, monitoring of treated water toxicity using catalase. *Ecotoxicol. Environ. Saf.*, 110: 110-120.

Labiadh L, Oturan MA, Panizza M, Hamadi NB, Ammar S 2015. Complete removal of AHPS synthetic dye from water using new electro-fenton oxidation catalyzed by natural pyrite as heterogeneous catalyst. *J. Hazard. Mater.*, 297: 34-41.

Lan Y, Coetsier C, Causserand C, Groenen Serrano K 2017. On the role of salts for the treatment of wastewaters containing pharmaceuticals by electrochemical oxidation using a boron doped diamond anode. *Electrochim. Acta*, 231: 309-318.

Lanzalco S, Sires I, Sabatino MA, Dispenza C, Scialdone O, Galia A 2017. Synthesis of polymer nanogels by electro-fenton process: Investigation of the effect of main operation parameters. *Electrochim. Acta*, 246: 812-822.

Le TXH, Nguyen TV, Yacouba ZA, Zoungrana L, Avril F, Petit E, Mendret J, Bonniol V, Bechelany M, Lacour S, Lesage G, Cretin M 2016. Toxicity removal assessments related to degradation pathways of azo dyes: Toward an optimization of electro-fenton treatment. *Chemosphere*, 161: 308-318.

Leaver AT, Glover B, Leadbetter P 1992. Recent advances in disperse dye development and applications. *Textile Chemist and Colorist*, 26(5): 30-34.

Liu Y, Wang XK, Chen B, Wang C, Shen TT 2014. Degradation of Azo Dye C.I. Reactive blue 194 in water by sponge iron in the presence of ultrasound. *Environ. Eng. Sci.*, 31: 541-547.

Lou YY, Geneste F, Soutrel I, Amrane A, Fourcade F 2020. Alachlor dechlorination prior to an electro-fenton process: Influence on the biodegradability of the treated solution. *Sep. Purif. Technol.*, 232: 115936.

Lu X, Zhou M, Li Y, Su P, Cai J, Pan Y 2019. Improving the yield of hydrogen peroxide on gas diffusion electrode modified with tert-butyl-anthraquinone on different carbon support. *Electrochim. Acta*, 320: 134552.

Martinez-Huitle C, Brillas E 2009. Decontamination of wastewaters containing synthetic organic dyes by electrochemical methods. An updated review. *Applied Catalysis B: Environmental*, 87(3): 105-145.

Martins A, Wilde ML, Vasconcelos TG, Henriques DM 2006. Nonylphenol polyethoxylate degradation by means of electrocoagulation and electrochemical fenton. *Sep. Purif. Technol.*, 50(20): 249-255.

Mededovic S, Locke BR 2007. The role of platinum as the high voltage electrode in the enhancement of Fenton's reaction in liquid phase electrical discharge. *Applied Catalysis B: Environmental*, 72(3-4): 342-350.

Merzouk B, Gourich B, Madani K, Vial CH, Sekki A 2011. Removal of a disperse red dye from synthetic wastewater by chemical coagulation and continuous electrocoagulation. A comparative study. *Desalination*, 272(1-3): 246-253.

Mollah MYA, Schennach R, Parga JR, Cocke DL 2001. Electrocoagulation (ec) -science and applications. *Journal of Hazardous Materials*, 84: 29-41.

Murrieta MF, Sires I, Brillas E, Nava JL 2020. Mineralization of acid red 1 azo dye by solar photoelectro-fenton-like process using electrogenerated HClO and photoregenerated Fe(II). *Chemosphere*, 246: 125697.

Neamtu M, Yediler A, Siminiceanu I, Macoveanu M, Kettrup A 2004. Decolorization of disperse red 354 azo dye in water by several oxidation processes e a comparative study. *Dyes and Pigments*, 60(1): 61-68.

Nidheesh PV, Gandhimathi R 2012. Trends in electro-fenton process for water and wastewater treatment: An overview. *Desalination*, 299: 1-15.

Nidheesh PV, Zhou MM, Oturan A 2018. An overview on the removal of synthetic dyes from water by electrochemical advanced oxidation processes. *Chemosphere*, 197: 210-227.

Nunez J, Yeber M, Cisternas N, Thibaut R, Medina P, Carrasco C 2019. Application of electrocoagulation for the efficient pollutants removal to reuse the treated wastewater in the dyeing process of the textile industry. *J. Hazard. Mater.* 371: 705-711.

Nuralın F 2006. Bazı dispers azo boyarmaddelerinin sentezi, absorpsiyon spektrumlarının ve boyama özelliklerinin incelenmesi. Doktora Tezi, Gazi Üniversitesi Fen Bilimleri Enstitüsü, Ankara.

Oturan A, Aaron JJ 2014. Advanced oxidation processes in water/wastewater treatment: Principles and applications. A review. *Critical Reviews in Environmental Science and Technology*, 44: 2577- 2641.

Ozcan A, Oturan MA, Oturan N, Sahin Y 2009. Removal of Acid Orange 7 from water by electrochemically generated fenton's reagent. *Journal of Hazardous Materials*, 163(2-3): 1213-1220.

Ozyonar F, Karagozoglul B 2014. Investigation of technical and economic analysis of electrocoagulation process for the treatment of great and small cattle slaughterhouse wastewater. *Desalination and Water Treatment*, 52: 74-87.

Panizza M, Cerisola G 2001. Removal of organic pollutants from industrial wastewater by electro-generated fenton's reagent. *Water Research*, 35: 3987-3992.

Panizza M, Oturan MA 2011. Degradation of Alizarin Red by electro-fenton process using a graphite-felt cathode. *Electrochim. Acta*, 56: 7084-7087.

Paydak ME 2006. Dispers boyama reçetelerinin işlem koşullarına olan renk hassasiyetlerinin araştırılması. Yüksek Lisans Tezi, Uludağ Üniversitesi Fen Bilimleri Enstitüsü, Bursa.

Pereira GF, El-Ghenymy A, Thiam A, Carlesi C, Eguiluz KIB, Salazar-Banda GR, Brillas E 2016. Effective removal of Orange-G azo dye from water by electro-fenton and photoelectro-fenton processes using a boron-doped diamond anode. *Separ. Purif. Technol.*, 160: 145-151.

Phalakornkule C, Polgumhang S, Tongdaung W, Karakat B, Nuyut T 2010. Electrocoagulation of blue reactive, red disperse and mixed dyes, and application in treating textile effluent. *Journal of Environmental Management*, 91: 918-926.

Poyatos JM, Munio MM, Almecija MC, Torres JC, Hontoria E, Osorio F 2010. Advanced oxidation processes for wastewater treatment: State of the art. *Water, Air, and Soil Pollution*, 205(1-4): 187-204.

Ramirez-Pereda B, Alvarez-Gallegos A, Rangel-Peraza JG, Bustos-Terrones YA 2018. Kinetics of Acid Orange 7 oxidation by using carbon fiber and reticulated vitreous carbon in an electro-fenton process. *J. Environ. Manage.*, 213: 279-287.

Robinson T, Chandran B, Nigam P 2002. Removal of dyes from an artificial textile dye effluent by two agricultural waste residues, corncob and barley husk. *Environment International*, 28: 29-33.

Shen Y, Xu Q, Wei R, Ma J, Wang Y 2017. Mechanism and dynamic study of reactive red X-3B dye degradation by ultrasonic-assisted ozone oxidation process. *Ultrason Sonochem.* 38: 681-692.

Shwe MT, Dimaculangan MM, De Luna MDG 2015. Decolourization of simulated dye wastewater containing Reactive Blue 19 (RB19) by the electro-fenton reaction in the presence of metal oxide-coated electrodes. *Adv. Mater. Res.*, 19: 1-8.

Si Y, Li G, Wu Y, Zhang H, Yuan Y, Zhang H, Liu B, Zhang F 2018. Tradeoff between groundwater arsenite removal efficiency and current production in the self-powered air cathode electrocoagulation with different oxygen reduction pathways. *J. Hazard. Mater.*, 357: 138-145.

Sires I, Garrido JA, Rodríguez RM, Brillas E, Oturan N, Oturan MA 2007. Catalytic behavior of the Fe^{3+}/Fe^{2+} system in the electro-fenton degradation of the antimicrobial chlorophene. *Applied Catalysis B: Environmental*, 72(3-4): 382-394.

Sopaj F, Oturan N, Pinson J, Podvorica F, Oturan MA 2016. Effect of the anode materials on the efficiency of the electro-fenton process for the mineralization of the antibiotic sulfamethazine. *Applied Catal. B, Environ.* 199: 331-341.

Sun P, Chen D 2016. Electrochemical degradation of reactive brilliant red X-3B with the $(CeO_2/C)-\beta-PbO_2$ -PTFE composite electrode. *J. Rare Earths*, 34: 507-520.

Sun M, Chen F, Qu J, Liu H, Liu R 2015. Optimization and control of electro-fenton process by pH inflection points: A case of treating acrylic fiber manufacturing wastewater. *Chem. Eng. J.*, 269: 399-407.

Szpyrkowicz L, Juzzolino C, Kaul SN 2001. A comparative study on oxidation of disperse dyes by electrochemical processes, ozone, hypochlorite and fenton reagent. *Water Research*, 35(9): 2129-2136.

Tian J, Sharshar MM, Yang M, Mu T, Xing J 2018. Degradation of Rhodamine B at neutral pH using modified sponge iron as a heterogeneous electro-fenton catalyst. *Environ. Progress Sustain. Energy*, 37: 989-995.

Ugur SS 2007. Dispers boyarmaddeler ile poliester liflerinin boyanma mekanizması. *Tekstil Teknolojileri Elektronik Dergisi*, 1(1): 33-39.

Verma AK, Dash RR, Bhunia P 2012. A review on chemical coagulation/flocculation technologies for removal of colour from textile wastewaters. *Journal of Environmental Management*, 93: 154-168.

Wang CT, Hu JL, Chou WL, Kuo YM 2008. Removal of color from real dyeing wastewater by electro-fenton technology using a three-dimensional graphite cathode. *Journal of Hazardous Materials*, 152: 601-606.

Xia G, Lu Y, Xu H 2015a. An energy-saving production of hydrogen peroxide via oxygen reduction for electro-fenton using electrochemically modified polyacrylonitrile based carbon fiber brush cathode. *Sep. Purif. Technol.*, 156: 553-560.

Xia G, Lu Y, Xu H 2015b. Electro-generation of hydrogen peroxide for electro-fenton via oxygen reduction using polyacrylonitrile-based carbon fiber brush cathode. *Electrochim. Acta*, 158: 390-396.

Xu GR, Zhang YP, Li GB 2009. Degradation of azo dye active brilliant red X-3B by composite ferrate solution. *J. Hazard Mater.*, 161: 1299-1305.

Yang H, Zhou M, Yang W, Ren G, Ma L 2018. Rolling-made gas diffusion electrode with carbon nanotube for electro-fenton degradation of acetylsalicylic acid. *Chemosphere*, 206: 439-446.

Yasri NG, Gunasekaran S 2017. *Electrochemical Technologies for Environmental Remediation*. Springer International Publishing AG 2017 N.A. Anjum et al. (eds.), *Enhancing Cleanup of Environmental Pollutants*, DOI 10.1007/978-3-319-55423-5-2.

Yavuz Y, Shahbazi R 2012. Anodic oxidation of reactive black 5 dye using boron doped diamond anodes in a bipolar trickle tower reactor. *Separ. Purif. Tech.*, 85: 130-136

Zhang XB, Dong WY, Sun FY, Yang W, Dong J 2014. Degradation efficiency and mechanism of azo dye RR2 by a novel ozone aerated internal micro-electrolysis filter. *J. Hazard. Mater.*, 276: 77-87.

Zhang Y, Gao M, Wang SG, Zhou W, Sang Y, Wang XH 2017. Integrated electro-fenton process enabled by a rotating Fe₃O₄/gas diffusion cathode for simultaneous generation and activation of H₂O₂. *Electrochim. Acta*, 231: 694-704.

Zhang H, Ran X, Wu X, Zhang D 2011. Evaluation of electro-oxidation of biologically treated landfill leachate using response surface methodology. *J. Hazard. Mater.*, 188: 261-268.

Zhang G, Yang F, Gao M, Fang X, Liu L 2008. Electro-fenton degradation of azo dye using Polypyrrole/Anthraquinone disulphonate composite film modified graphite cathode in acidic aqueous solutions. *Electrochimica Acta*, 53: 5155-516.

Zhao X, Zhang B, Liu H, Chen F, Li A, Qu J 2012. Transformation characteristics of refractory pollutants in plugboard wastewater by an optimal electrocoagulation and electro-fenton process. *Chemosphere*, 87: 631-636.

Zhou M, Yu Q, Lei L, Barton G 2007. Electro-fenton method for the removal of methyl red in an efficient electrochemical system. *Sep. Purif. Technol.*, 57: 380-387.

INVESTIGATION OF PHOTON SHIELDING PERFORMANCES OF SOME SELECTED BINARY ALLOYS

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Abstract

In this study, the radiation-shielding properties of binary alloys were investigated. In this study, the linear attenuation coefficient (MAC), half value layer thickness (HVL), tenth value layer thickness (TVL), mean free path (Mfp), effective atomic number (Z_{eff}), effective electron density (N_{eff}), equivalent atomic number (Z_{eq}), effective conductivity (C_{eff}) and fast neutron removal cross section (FNRCs) were calculated. The alloys include the binary alloys, zinc-lead alloys (binary Zn-Pb) and tin-lead alloys (binary Sn-Pb) and zinc-tin alloys (binary Zn-Sn). All results describe a decreasing trend of the mass attenuation coefficient with increasing photon energy. The obtained results emphasise the capability of Phy-X/PSD as a new theoretical method for future radiation research and alloy development. The Pb0.8/Sn0.2 sample has the highest effective atomic number values, and the Zn, Sn alloys also provides the highest neutron shielding properties. In addition, comparison was made between the radiation shielding proficiency of the alloys studied and that of conventional materials. It can be concluded that the binary alloys can replace the traditional materials in photon shielding.

Keywords: Shielding, effective atomic number, mass attenuation coefficient, fast neutron removal cross-section.

INTRODUCTION

During the twentieth century, the development of technologies such as particle accelerators and nuclear reactors has given rise to many other sources of radiation, most of which are unnatural. These developments have resulted in radioactive materials, and the number of people exposed to nuclear radiation has increased significantly. For this reason, it is important to study the photon attenuation properties of materials exposed to high energy intensity.

In this study, the mass attenuation coefficient values of different photon interaction parameters such as half value layer (HVL), tenth value layer (TVL) and mean free path (Mfp) at different penetration depths were investigated. In this study, the values of LAC, HVL, TVL and Mfp were investigated for some binary alloys at different energy ranges. The mass attenuation coefficient for some binary alloys was calculated using the Phy-x/PSD data programme at different photon energies ranging from 1keV to 100GeV.

Shielding thicknesses are generally determined in terms of TVL and HVL. This physical quantity indicates the thicknesses required to attenuate radiation to one-tenth and half of its original intensity. Mfp is the standard distance between two successive changes in height energy. The linear attenuation coefficient is a fundamental parameter that describes the extent to which the intensity of the radiation is reduced as it passes through the sample.

The LAC is a necessary physical parameter to determine the HVL, TVL, and Mfp of an alloy. The linear attenuation coefficient, MAC, TVL, HVL and Mfp are the basic parameters for the interaction properties of radiation. These parameters play an important role in many different fields such as radiation protection, nuclear diagnostics, medicine and dosimetry. The accurate values of the mass attenuation coefficient occupy a large place in research to solve various problems in the field of radiation. At MAC, the contribution to the total interaction of the photon is assumed to apply to the alloys of the individual elements. According to this definition, the MAC of an alloy is the sum of the weight fractions of the individual elements present (Morabad and Kerur, 2010). Diverse studies are conducted in different energy ranges to determine the parameters of radiation interaction on elements, compounds, mixtures and alloys. In many studies in the literature, the linear attenuation coefficient, mass attenuation coefficient and other absorption parameters of various materials have been carried out at high energy and the response of the materials were studied (Agar et al., 2019; Alshahrani et al., 2021; Manohara et al., 2008; Tekin et al., 2021).

MATERIAL AND METHOD

Phy-X/PSD and WinXCom are software that generates total atomic cross sections, attenuation coefficients, and also partial effective cross sections for various interaction processes such as incompatible and compatible scattering, photoelectric absorption, and match generation for elements, compounds, and mixtures at energies from 1 keV to 100 GeV as required. The Xcom software, in which the component types were described by their elementary subdivisions and the descriptions of the input factors are quite understandable and easily accessible (Kılıçoğlu, 2019; Şakar et al., 2020).

The MAC obtained was then used to calculate LAC, HVL, TVL, and Mfp for the proposed materials. MAC was determined for each multiple structure using the WinXCom programme. The mass attenuation coefficient of alloys was given by Formula 1; (Hubbell, 1999).

$$MAC_{alloy} = \sum_i \omega_i \left(\frac{\mu}{\rho} \right)_i ; \omega_i = \frac{a_i A_i}{\sum a_i A_i} \quad (1)$$

In equation (1), ρ is the density, ω_i is the weight fraction, (μ/ρ) is the MAC of the element.

HVL and Mfp are terminology commonly used in radiation shielding applications. HVL is the thickness of a material at which the transmitted radiation reaches 50% of the initial radiation intensity. A one-tenth (1/10) value (TVL) layer is the thickness required to reduce the radiation interacting with the material to 1/10 (Sayed, 2017). The HVL and TVL values were calculated using equations (2) and (3);

$$HVL = \frac{0.6931}{\mu_{alloy}} \quad (2)$$

$$TVL = \frac{2.3025}{\mu_{alloy}} \quad (3)$$

The mean free path (Mfp) was calculated using equation (4);

$$Mfp = \frac{1}{\mu_{alloy}} \quad (4)$$

This study includes a discussion of the various medical preparations commonly used for radiation shielding. A study of the radioprotective properties of binary alloys were carried out with respect to their HVL, TVL and Mfp parameters (Kamislioglu, 2021).

The active atomic number (Z_{eff}) was calculated using the formula (5); (Singh et al., 2002).

$$Z_{eff} = \frac{\sigma_{ta}}{\sigma_{te}} \quad (5)$$

The effective electron density (N_{eff}) was calculated using the Formula (6); (Manohara et al., 2008).

$$N_{eff} = \frac{N_A n_{tot} Z_{eff}}{\sum_i n_i A_i} \quad (6)$$

In the formula (6), n_{tot} is the total number of atoms, N_A Avogadro number, A_i atomic weight, n_i ratio of atoms forming an alloy, Z_{eff} is the active atomic number.

Furthermore, the ability of the alloys to attenuate fast neutron removal is evaluated in this manuscript. The Fast Neutron Removal Cross Section (FNRCSS) is estimated through following Equation (7); (Faw, 2010).

$$FNRCSS = \sum_i \rho_i \left(\frac{FNRCSS}{\rho} \right)_i \quad (7)$$

$$\rho_i = \omega_i \rho$$

Where ω_i and ρ_i are the weight fraction and partial density of i th constituent element, respectively. The value of $FNRCSS/\rho$ for each element is as follow as Equation (8); (Faw, 2010).

$$\frac{FNRCSS}{\rho} = \begin{cases} 0.190 Z^{-0.743} & Z \leq 8 \\ 0.125 Z^{-0.565} & Z > 8 \end{cases} \quad (8)$$

The following Equation (9) relates the effective conductivity (s/m) of a shielding material for attenuation to the effective number of electrons per-gram;

$$C_{eff} = \left(\frac{N_{eff} \rho e^2 \tau}{m_e} \right) 10^3 \quad (9)$$

where r , e and m_e denote the density of materials (g/cm^3), the charge on an electron (C), and the electron's rest mass (kg), respectively. t depicts the electron's relaxation time and is calculated using the following Equation (10):

$$\tau = \frac{h}{600\pi k} \quad (10)$$

where h : Planck's constant and k : Boltzmann constant.

RESULTS

In this study, the radiation-shielding interaction parameters of the ten binary alloys were investigation in order to determine its usability in radiation protection. In this study, absorption parameters of some binary alloys MAC, LAC, HVL, TVL, Mfp, Z_{eff} , N_{eff} , Z_{eq} and FNRCSS large photon energies were calculated and graphed.

The values of LAC depend on the chemical content of the studied alloys, it was observed that the linear attenuation coefficients change due to the different electronegativity of the elements in the alloys. It has been observed from the calculations that the LAC value decreases with increasing photon energy.

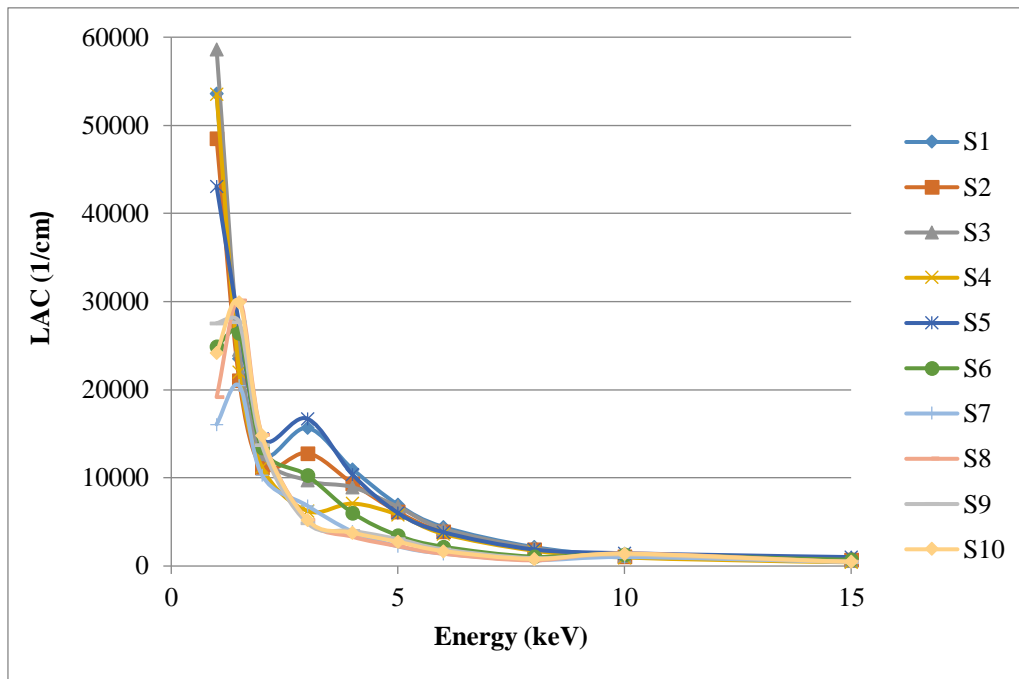


Figure 1. The variations of LAC values versus incident photon energy for the binary alloys

Among the binary alloys have the highest LAC value at low energy region. Compton scattering is the dominant interaction mechanism in the range of 0.001-15 keV for photon radiation and the HVL is inversely proportional to the linear attenuation coefficient.

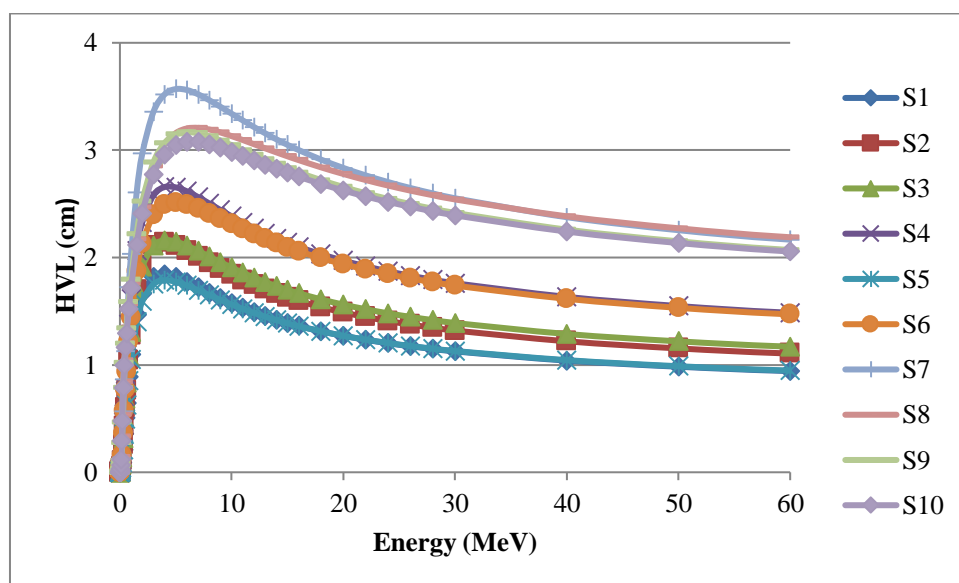


Figure 2. Half-value layer thickness HVL variation obtained depending on the energy

A low HVL value for the studied compounds means that the incident photons interact less with the alloys. The highest half-value layer thickness value was obtained for S7. The HVL of the Zn_{0.6}/Pb_{0.4} alloys was found to be 3.569 at 5 MeV.

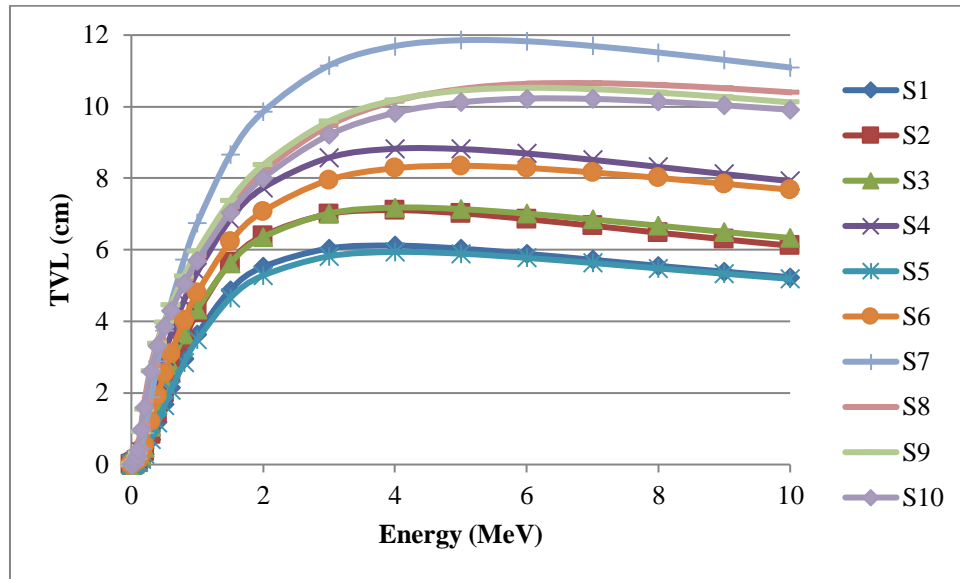


Figure 3. Variation of TVL thickness as a function of energy

As can be seen from Figure 3, the highest values of TVL for S7 (11.856 cm) and the lowest values of TVL for S5 (5.892 cm) were obtained in the energy range of 5 MeV compared to other binary alloys.

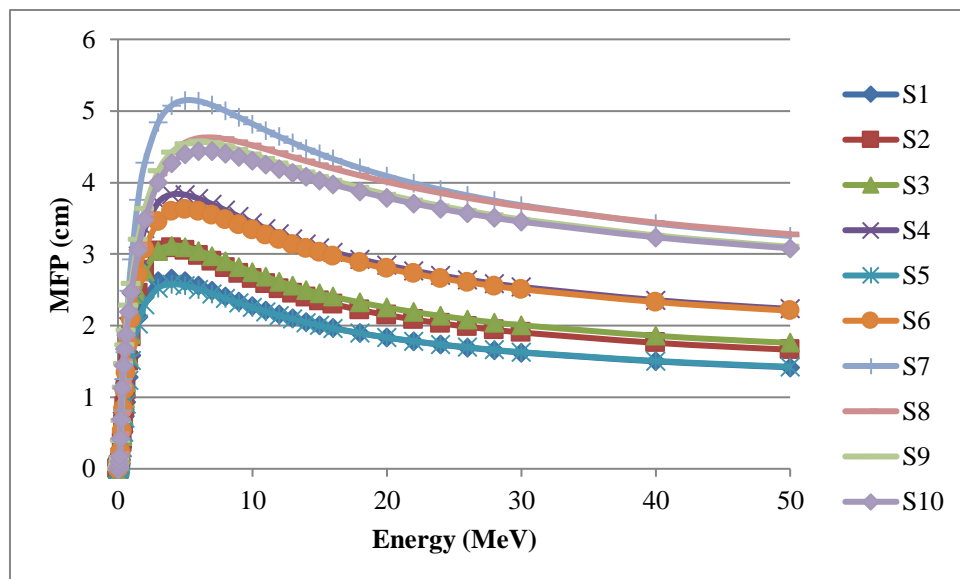


Figure 4. Mean free path Mfp change with respect to energy

As can be seen from Figure 4, the mean free path has the lowest value in the low energy region. MFP increases more linearly in the high energy region. In the interaction with the surface, a fine HVL for photons means that the incoming radiation penetrates the material less. The smaller the average distance between two successive interactions of photons at current energies, the better the conservation property. The MFP values of the S7 (5.149) is higher than other at 5 MeV.

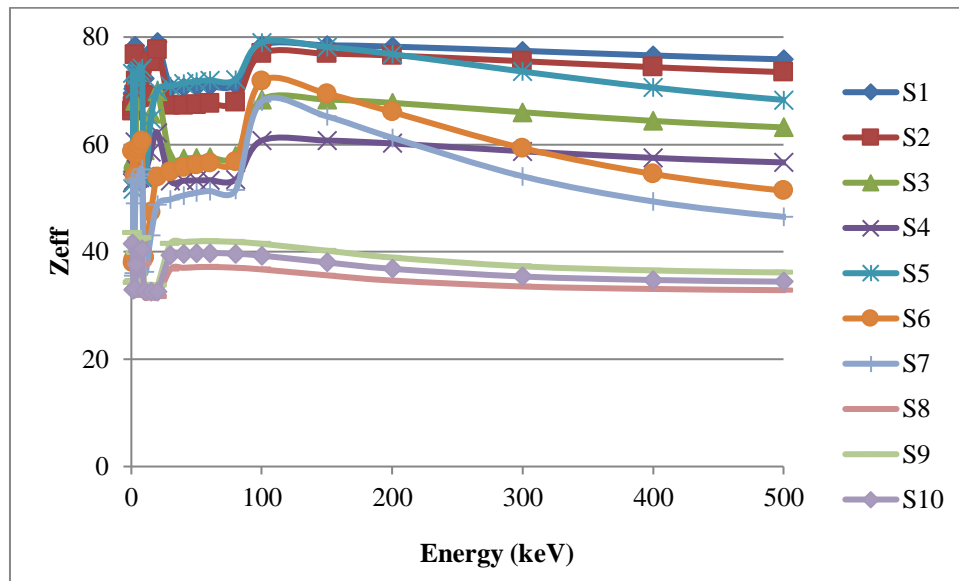


Figure 5. The changes of Z_{eff} versus energy

From Figure 5, it can be seen that the Z_{eff} value decreases with increasing high photon energy; at intermediate energy, the Z_{eff} value is approximately constant. This situation could be due to the fact that the photoelectric effect dominates in the low energy regions, Compton scattering dominates in the medium energy regions. The effective atomic number values for S1 (80%Pb+20%Sn) and S2 (60%Pb+40%Sn) were found to be maximum in the entire energy range. This means that an alloy with an element with a higher atomic number ($Z:82$) than the elements that make up the alloy offers a higher value for its effective atomic number.

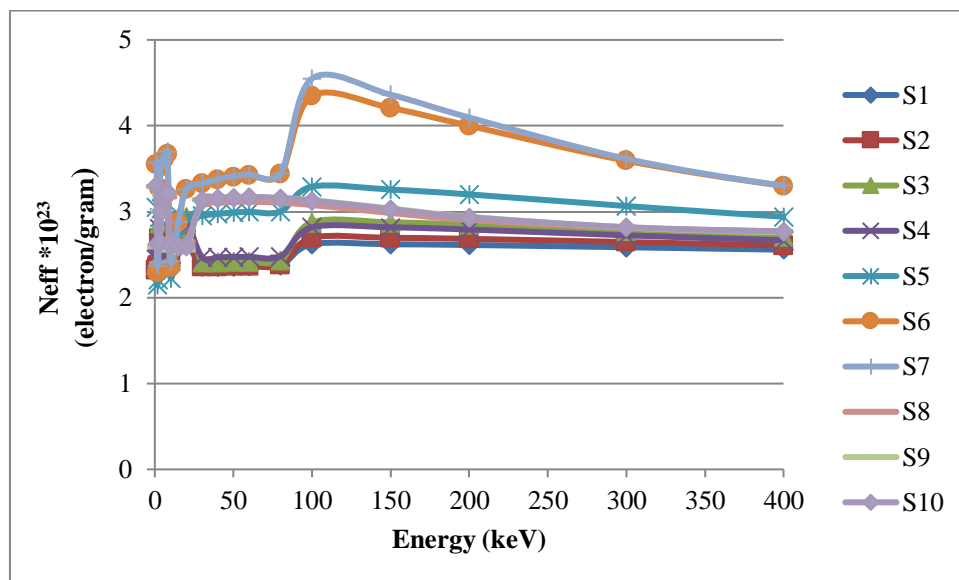


Figure 6. The changes of (N_{eff}) values against incident photon energy for binary alloys

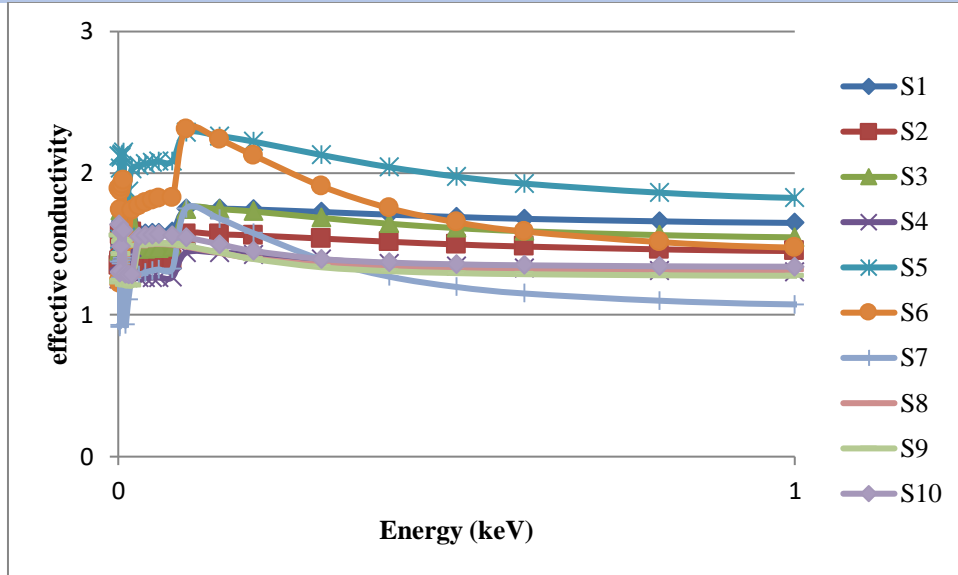


Figure 7. The changes of (Ce_{eff}) values against incident photon energy for present alloys

It is obviously shown in Figure 7 that Ce_{eff} increases with increasing Lead ratio within the investigated specimens. As photons have low energy and longer wavelengths in this field, they interact more with electrons from the binary alloys, causing a rise in the free electron numbers. The Ce_{eff} values of the S5 and S6 are higher than other alloys in low photon energy regions. At 0.1 keV, alloys S1, S2, S3, S4, S5, S6, S7, S8 and S9 Ce_{eff} values are 1.75, 1.57, 1.75, 1.44, 2.29, 2.31, 1.75, 1.48, 1.49 and 1.55×10^9 respectively.

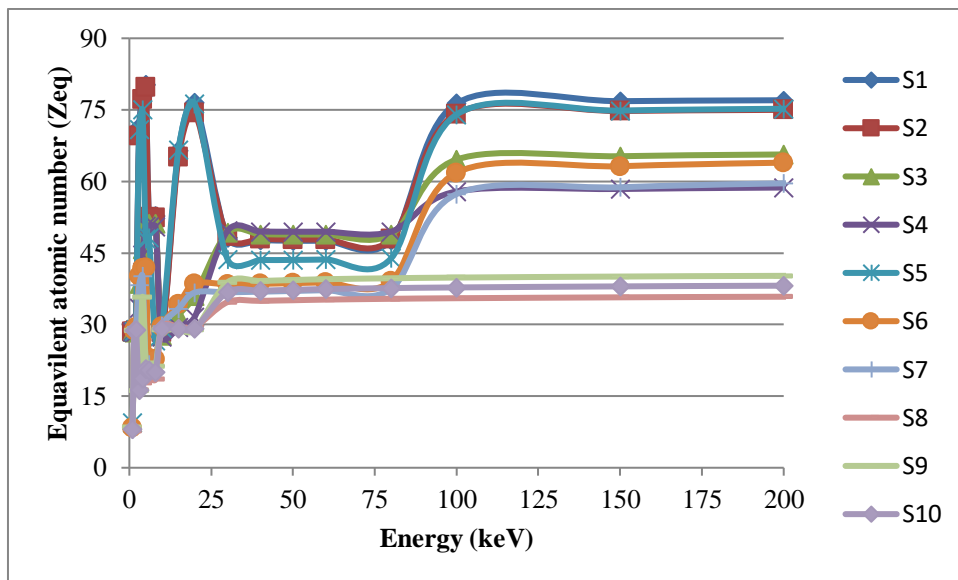


Figure 8. The changes of Z_{eq} values against incident photon energy for present alloys

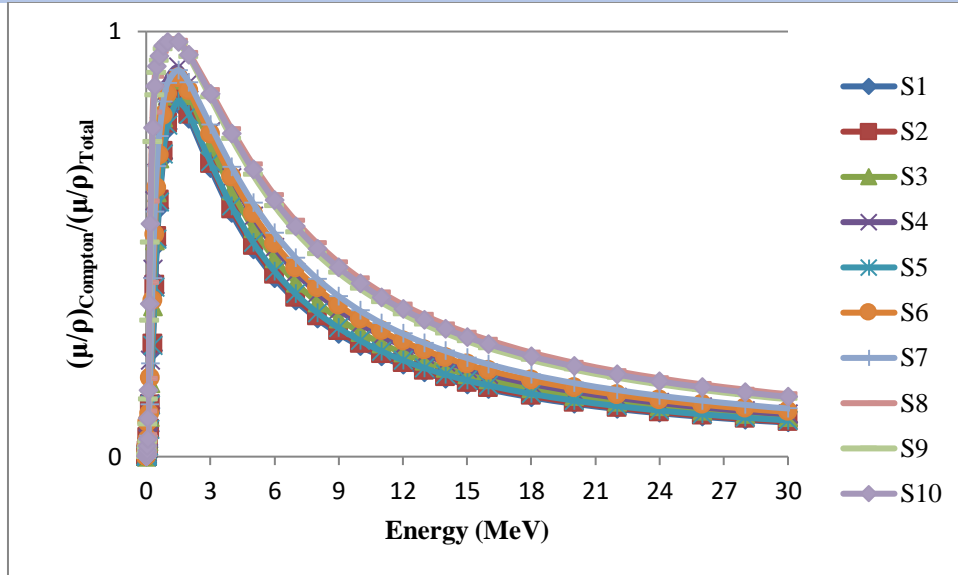


Figure 9. Change of R $((\mu/\rho)_{\text{Compton}}/(\mu/\rho)_{\text{Total}})$ values according to energy

The R value, which is the ratio between the total Compton scattering coefficient and the total mass attenuation coefficient, reaches a maximum at 1 MeV. The dominance of pair production increases with increasing photon energy and the probability of Compton scattering decreases, resulting in decreasing R values $((\mu/\rho)_{\text{Compton}}/(\mu/\rho)_{\text{Total}})$.

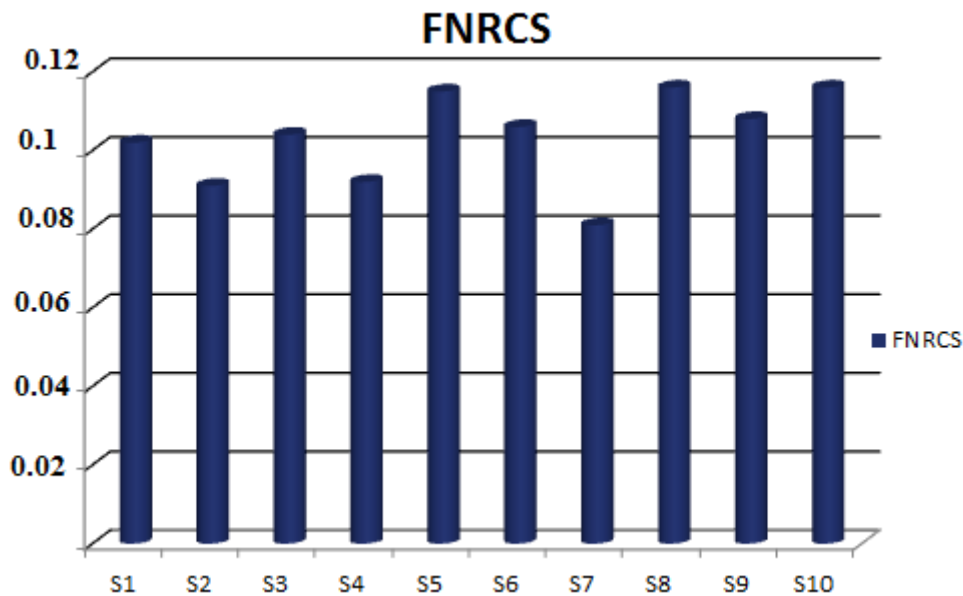


Figure 10. Fast neutron removal cross section change of binary alloys

From Figure 10 it has been observed that the Sn (Z:50) doped alloy (S8 and S10) has the best neutron attenuation property (FNCS = 0.116) and S7 alloy has the lowest value (FNCS=0.081) among the other alloys.

It was found that the determined values of the calculated shielding parameters depend on the photon intensity of the binary alloys. The radiation absorption is caused by three types of photon interactions with respect to the whole considered energy range. The consistent interaction probably occurs at very low energies. However, its contribution is small and insignificant compared to the contribution of the photoelectric interaction. As the photon energy increases, the possibility of the Compton interaction increases, and this interaction dominates the deceleration process at intermediate photon energies ($E > 0.2$ MeV). It is worth noting that the photoelectric effect is preferred in medical practice because the photoelectric interaction depends on the atomic number of the absorbent. The Compton interaction is an undesirable effect in medical images and in radiation therapy because the scattered photon can be scattered in all directions. Photoelectric interaction is the predominant mechanism at low photon energies, where the binding energies of very many elements occur (Al-Buriahi and Tonguc, 2020).

CONCLUSION

As a result of this radiation interaction research, it can be predicted which thickness can absorb how much of the binary alloys present. The results obtained from these calculations may be useful in understanding the radiation protection performance of some binary alloys. The value of LAC is higher in the low energy range, where photoelectric phenomena dominate, and lower in the medium energy range, where Compton scattering is the main process. The gradual decrease of LAC values with increasing energy can be explained by a weak energy dependence.

The higher values of the HVL, TVL and Mfp parameters are in the lower energy range where the photoelectric effect dominates. To obtain better shielding properties, the compounds should have lower HVL and Mfp values, indicating a stronger interaction between gamma rays and alloys. Considering the Lead content, the increased presence of Lead leads to a decrease in TVL value upon photon irradiation. We can conclude that in lead containing alloys, which have the lowest HVL and MFP values and the highest linear attenuation coefficient, have better shielding properties than the other alloys. Thus, the lead containing alloys (Zn%20+Pb%80) exhibit good radiation shielding properties. According to the obtained results, the lead containing alloys (Zn%20+Pb%80) could be considered as a shielding material against γ -radiation used in various fields.

REFERENCES

- Agar, O., Sayyed, M. I., Akman, F., Tekin, H. O., & Kaçal, M. R. (2019). An extensive investigation on gamma ray shielding features of Pd/Ag-based alloys. *Nuclear Engineering and Technology*, 51(3), 853–859. <https://doi.org/10.1016/j.net.2018.12.014>
- Al-Buriahi, M. S., & Tonguc, B. T. (2020). Mass attenuation coefficients, effective atomic numbers and electron densities of some contrast agents for computed tomography. *Radiation Physics and Chemistry*, 166(September 2019), 108507. <https://doi.org/10.1016/j.radphyschem.2019.108507>
- Alshahrani, B., Olarinoye, I. O., Mutuwong, C., Sriwunkum, C., Yakout, H. A., Tekin, H. O., & Al-Buriahi, M. S. (2021). Amorphous alloys with high Fe content for radiation shielding applications. *Radiation Physics and Chemistry*, 183. <https://doi.org/10.1016/j.radphyschem.2021.109386>
- Faw, J. K. S. · R. E. (2010). *Radiological Protection*. <https://doi.org/10.4324/9780203020746->

- Hubbell, J. H. (1999). Review of photon interaction cross section data in the medical and biological context. *Physics in Medicine and Biology*, 44(1). <https://doi.org/10.1088/0031-9155/44/1/001>
- Kamislioglu, M. (2021). Research on the effects of bismuth borate glass system on nuclear radiation shielding parameters. *Results in Physics*, 22, 103844. <https://doi.org/10.1016/j.rinp.2021.103844>
- Kılıçoğlu, Ö. (2019). An Investigation on Effective Atomic Numbers and Mass Attenuation Coefficients of Some Bioactive Glasses. *European Journal of Science and Technology*, Xx, 168–175. <https://doi.org/10.31590/ejosat.517731>
- Manohara, S. R., Hanagodimath, S. M., Thind, K. S., & Gerward, L. (2008). On the effective atomic number and electron density: A comprehensive set of formulas for all types of materials and energies above 1 keV. *Nuclear Instruments and Methods in Physics Research, Section B: Beam Interactions with Materials and Atoms*, 266(18), 3906–3912. <https://doi.org/10.1016/j.nimb.2008.06.034>
- Morabad, R. B., & Kerur, B. R. (2010). Mass attenuation coefficients of X-rays in different medicinal plants. *Applied Radiation and Isotopes*, 68(2), 271–274. <https://doi.org/10.1016/j.apradiso.2009.10.033>
- Şakar, E., Özpolat, Ö. F., Alım, B., Sayyed, M. I., & Kurudirek, M. (2020). Phy-X / PSD: Development of a user friendly online software for calculation of parameters relevant to radiation shielding and dosimetry. *Radiation Physics and Chemistry*, 166. <https://doi.org/10.1016/j.radphyschem.2019.108496>
- Sayyed, M. I. (2017). Half value layer, mean free path and exposure buildup factor for tellurite glasses with different oxide compositions. *Journal of Alloys and Compounds*, 695, 3191–3197. <https://doi.org/10.1016/j.jallcom.2016.11.318>
- Singh, K., Singh, H., Sharma, V., Nathuram, R., Khanna, A., Kumar, R., Singh Bhatti, S., & Singh Sahota, H. (2002). Gamma-ray attenuation coefficients in bismuth borate glasses. *Nuclear Instruments and Methods in Physics Research, Section B: Beam Interactions with Materials and Atoms*, 194(1), 1–6.
- Tekin, H. O., Bilal, G., Zakaly, H. M. H., Kilic, G., Issa, S. A. M., Ahmed, E. M., Rammah, Y. S., & Ene, A. (2021). Newly developed vanadium-based glasses and their potential for nuclear radiation shielding aims: A monte carlo study on gamma ray attenuation parameters. *Materials*, 14(14). <https://doi.org/10.3390/ma14143897>

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES
INVESTIGATION OF THE EFFECT OF *LAVENDULA* GROWN IN DIFFERENT
SOIL TYPES ON OXIDATIVE STRESS AND ANTIOXIDANT SYSTEM: A CASE OF
DİYARBAKIR**

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Mehmet Hayrullah Akyıldız

Nesrin İnceören

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Abstract

In this study, the lavender plant, which was started to be grown in different soil types and adapted to the climatic conditions of the region, was used in the Bismil district of Diyarbakir province located in the southeast of Turkey.

The lavenders used in the study, the 3rd year products of lavender plants of various types grown on a 50-decare land reclaimed for medicinal aromatic plant cultivation in Diyarbakir province Bismil Vocational School campus within the scope of the project numbered Bismil MYO19.002.

Studies have shown that antioxidant system disorders and damages that may occur in biological materials; It has been shown that it reduces the quality of life with many diseases, accelerates aging, and that the damage can cause genetic problems. In recent years, there has been an intense interest in studies on natural products. The reasons for this interest are either to reveal new pharmacologically active compounds or to obtain a precursor compound for further synthetic studies. The aim of the research is to research the pioneer compound as an alternative to the synthetic immune-enhancing drugs available in the market and to investigate the early-stage inhibition effect of oxidation sources that cause damage to the antioxidant system of this compound, to contribute to both the literature, drug design studies and treatment.

The main components of lavender are linalool, linalyl acetate, lavandulyl acetate, camphor and 1,8-cineol. The aroma and pulp of lavender oil are suitable for use in perfumes, colognes, soaps, skin lotions and other cosmetics. Due to its clinical benefits on the central nervous system, its essential oil is frequently used in the field of aromatherapy and alternative medicine. In addition, lavender essential oil has commercial importance in pharmaceutical applications due to its anticonvulsive, antiseptic, anti-inflammatory, antidepressant, antiviral and antibacterial activities.

Lavender samples were extracted with 96% methanol solvent in a soxhlet apparatus. Methanol was removed with the help of evaporator and dried extract was obtained.

Total phenolic, total flavonoid, DPPH and OH radical quenching activities were measured with the extracts obtained. Then, the effects on protein oxidation and UV-induced DNA cleavage were examined.

As a result; In in vitro antioxidant studies with lavender samples grown in both soil types, it was determined that as the concentrations of the plant extracts increased, it showed higher activity than the positive controls and prevented UV-induced DNA cleavage.

Keywords: Lavender, antioxidant system, DNA cutting, natural inhibitor

CLIMATE CHANGE TARGETS WITHIN THE FRAMEWORK OF
DEVELOPMENT PLAN AND STRATEGY DOCUMENTS

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Abstract

Climate change creates negative effects on different scales, including global, national, regional and local. The sphere of influence of adverse situations is gradually expanding over time, including on a local, regional, national and even global scale. Especially for cities, transportation, agriculture, industry, housing and tourism areas have been the group that triggered climate change both economically, spatially, socially and ecologically and have been the most affected group. This situation has necessitated the development of climate change-themed risk management and adaptation priority approaches for transportation, agriculture, industry, settlement and tourism in the country's plans and policies. In this direction, the main topic of the study is to examine the national approaches and forecasts within the framework of the development plan and strategy documents for climate change in the context of the causes and consequences of climate change. In this context; How has the development situation related to climate change been in the National Development plan process? and what are the goals and strategies related to climate change in the relevant plan and strategy documents? Answers to their questions have been sought. To this end; 11 Development Plans and Specialized Commission Reports, National Climate Change Strategy (2010–2020), National Climate Change Action Plan (2011–2023) and National Climate Change Adaptation Strategy and Action Plan (2011–2023) will be examined. The relevant plan and strategy documents will be evaluated within the scope of the national vision, content and objectives for climate change. The evaluations made within the scope of the study will be important in terms of revealing the basic principles of how the issue of climate change is handled in the country planning actions and strategies in the developing process. At the same time, the study will contribute to the formation of awareness and awareness about climate change.

Keywords: Climate Change, Country Development Plans, Turkey, Urban Area.

PLANLAMA VE TASARIM YAKLAŞIMLARIMDA İKLİM DEĞİŞİKLİĞİ
KAVRAMI

Özet

İklim değışikliği; küresel, ulusal, bölgesel ve yerel olmak üzere farklı ölçeklerde olumsuz etkiler yaratmaktadır. Olumsuz durumların etki alanı zamanla, yerel, bölgesel, ulusal ve hatta küresel ölçekte olmak üzere giderek genişlemektedir. Özellikle de kentlere yönelik ulaşım,

tarım, sanayi, yerleşim ve turizm alanları; iklim değişikliğini hem ekonomik, mekansal, sosyal ve ekolojik anlamda tetikleyen hem de ondan en çok etkilenen grup olmuştur. Bu durum, ülke plan ve politikalarında ulaşım, tarım, sanayi, yerleşim ve turizme yönelik olarak iklim değişikliği temalı risk yönetimi ve uyum öncelikli yaklaşımların geliştirilmesi gerekliliğini ortaya çıkarmıştır. Bu doğrultuda çalışmanın ana konusunu; iklim değişikliği sebep ve sonuçları bağlamında; iklim değişikliğine yönelik kalkınma plan ve strateji belgeleri çerçevesinde ulusal ölçekteki yaklaşım ve öngörülerin incelenmesi oluşturmaktadır. Bu çerçevede; Ulusal Kalkınma plan sürecinde iklim değişikliği ile ilgili gelişim durumu nasıl olmuştur? ve İlgili plan ve strateji belgelerinde iklim değişikliğine yönelik ilişkin hedef ve stratejiler nelerdir? Sorularına yanıt aranmıştır. Bu amaçla; 11 adet Kalkınma Planı ve Özel İhtisas Komisyon Raporları ile Ulusal İklim Değişikliği Stratejisi (2010–2020), Ulusal İklim Değişikliği Eylem Planı (2011–2023) ve Ulusal İklim Değişikliği Uyum Stratejisi ve Eylem Planı (2011–2023) incelenecektir. İlgili plan ve strateji belgeleri, iklim değişikliğine yönelik olarak ulusal ölçekteki vizyon, içerik ve hedefler kapsamında değerlendirilecektir. Çalışma kapsamında yapılan değerlendirmeler; gelişen süreçte ülke planlama eylem ve stratejilerinde iklim değişikliği konusunun nasıl ele alındığı konusunda temel ilkeleri ortaya koymak açısından önemli olacaktır. Aynı zamanda çalışma, iklim değişikliğine yönelik farkındalık ve bilinç oluşumu açısından katkı sağlayacaktır.

Anahtar Kelimeler: İklim Değişikliği, Kentsel Alan, Türkiye, Ülke Kalkınma Planları.

GİRİŞ

İklim Değişikliği; doğal ve/veya insan kaynaklı etkiler sonucu, iklimin ortalama durumunda veya onun değişkenliğinde onlarca ya da daha uzun yıllar boyunca süren istatistiksel olarak anlamlı değişimler olarak tanımlanmaktadır (Türkeş, 2007; Akçakaya vd., 2015). İklim değişikliği sürecinde; sıcaklık, yağış ve rüzgâr gibi farklı meteorolojik kriterlerin şiddet, etki alanı ve sürelerinde değişimler gözlemlenmektedir. Bu değişim özellikle de yapılı çevreler ve tarım alanları üzerinde; kuraklık, taşkın, sel, fırtına ve kentsel ısı adası gibi olumsuz etkilere neden olmaktadır. İklim değişikliğine bağlı olarak yaşanan bu tür olumsuzluklar çevre üzerinde geri dönüşü olmayan kayıpları beraberinde getireceği gibi, bireylerin yaşam kalitelerinde de etkilere neden olacaktır. Dolayısıyla da iklim değişikliği mekânsal, çevresel, sosyal ve ekonomik anlamda çok yönlü ve karmaşık etkiler meydana getirmektedir.

Bu bağlamda küresel bir problem olan iklim değişikliği konusunda ülkemizde uluslararası ve ulusal birçok anlaşma, proje ve faaliyet gerçekleştirilmektedir. İklim değişikliğinin olumsuz etkilerinden en fazla etkilenecek bölge olan Akdeniz Havzası üzerinde yer alan ülkemiz (İklim İn, 2019b) uluslararası bağlamda iklim değişikliği ile mücadele kapsamında, Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi (2004), Kyoto Protokolü (2009) ve Paris Anlaşması (2021)'na taraf olmuştur (ÇSB, 2021).

Ülkemizin taraf olduğu ozon tabakasını korumaya yönelik Viyana Sözleşmesi ve Montreal Protokolü'ne, hava ortamına ilişkin Uzun Menzilli Sınırlar Ötesi Hava Kirlenmesi Sözleşmesi'ne, yutak alanlar ile ilgili Birleşmiş Milletler Çölleşme ile Mücadele Sözleşmesi, Birleşmiş Milletler Biyolojik Çeşitlilik Sözleşmesi, Özellikle Su Kuşları Yaşama Ortamı Olarak Uluslararası Öneme Sahip Sulak Alanlar Hakkında Sözleşme, Avrupa Peyzaj Sözleşmesi, Avrupa'nın Yaban Hayatı ve Yaşama Ortamlarını Koruma Sözleşmesi gibi uluslararası antlaşmaların hükümleri doğrudan olmasa da dolaylı olarak iklim değişikliği ile mücadeleyi güçlendirici güncel kararların alınmasında önemli katkı sağlamaktadır (İklim İn, 2019b).

İklim değişikliği ile mücadele kapsamında uluslararası sözleşmelerin yanı sıra azaltım ve uyum süreci ile ilgili birçok tamamlanmış ve devam eden projeler yer almaktadır. Bu projeler arasında özellikle kurumların eğitimleri ile sera gazlarının azaltımı ve düşük karbonlu kalkınma eğitim çalışmaları ile ozon tabakasının korunması ile ilgili projeler yer almaktadır (ÇSB, 2021).

İklim değişikliği konusu sadece çevre sorunu olmayıp aynı zamanda sosyo-ekonomik bir kalkınma sorunu da olduğu için ülkemizde kalkınma politikalarına iklim bağımlı (sanayi, inşaat, ulaştırma gibi) ya da iklime bağımlı (tarım, gıda gibi) önemli ekonomik sektörlerle ilişkin yaklaşımlar benimsenmiştir. Bu bağlamda ülkemizin iklim değişikliğine uyum süreci sadece uluslararası sözleşmeler ve projeler bağlamında kalmamış, kalkınma planlarında da doğrudan veya dolaylı olarak yer edinmiştir (İklim İn, 2019b);

Bu çerçevede; Ulusal Kalkınma plan sürecinde iklim değişikliği ile ilgili gelişim durumu nasıl olmuştur? ve İlgili plan ve strateji belgelerinde iklim değişikliğine yönelik ilişkin hedef ve stratejiler nelerdir? Sorularına yanıt aranmıştır. Bu amaçla; 11 adet Kalkınma Planı ve Özel İhtisas Komisyon Raporları ile Ulusal İklim Değişikliği Stratejisi (2010–2020), Ulusal İklim Değişikliği Eylem Planı (2011–2023) ve Ulusal İklim Değişikliği Uyum Stratejisi ve Eylem Planı (2011–2023) incelenmiştir. İlgili plan ve strateji belgeleri, iklim değişikliğine yönelik olarak ulusal ölçekteki vizyon, içerik ve hedefler kapsamında değerlendirilmiştir.

MATERYAL VE YÖNTEM

Çalışmanın ana materyalini 11 adet Kalkınma Planı ve Özel İhtisas Komisyon Raporları ile Ulusal İklim Değişikliği Stratejisi (2010–2020), Ulusal İklim Değişikliği Eylem Planı (2011–2023) ve Ulusal İklim Değişikliği Uyum Stratejisi ve Eylem Planı (2011–2023) oluşturmaktadır. İlgili plan ve strateji belgeleri, iklim değişikliğine yönelik olarak ulusal ölçekteki vizyon, içerik ve hedefler kapsamında değerlendirilmiştir.

Çalışma kapsamı iklim değişikliği teması ile literatür verilerinin değerlendirilmesi doğrultusunda şekillenmiştir. Bu amaçla, bildiride; iklim değişikliği ile mücadele kapsamında ele alınan konular ve yaklaşımlar Kalkınma planları ve strateji belgeleri özelinde tespit edilerek, ön görülen hedef ve stratejiler irdelenmiştir. İlgili plan ve strateji belgelerinde iklim değişikliğine yönelik olarak ele alınan öngörüler, hedefler ve yaklaşımlar temelinde Ulusal ölçekte iklim değişikliği konusunun ele alınışı değerlendirilmiştir. İklim ve iklim değişikliği kavramlarının ilgili plan ve strateji belgelerindeki geçiş sıklıkları da çalışma kapsamında ele alınmıştır. Bu durum iklim değişikliğinin hangi konu başlıkları içerisinde ne şekilde ve ne derece ele alındığı konusunda ipuçları sağlamaya katkı oluşturmuştur.

BULGULAR

1961 Anayasası kapsamında kalkınmanın plana bağlanmış olması nedeniyle On bölümden oluşan **Birinci Beş Yıllık Kalkınma Planı** (1963-1967); 21 Kasım 1962 yılında onaylanmış ve aynı yıl içerisinde 11272 sayılı Resmi Gazete 'de 3 Aralık günü yayınlanmıştır (DPT, 1963; DPT,1968). Plan kapsamında doğrudan iklim değişikliği ile ilgili içerik yer almamakla birlikte; ilgili planda; iklimle ilgili ormancılık aktivitelerine yönelik, ağaç seçimlerinin iklim koşullarına uygun olarak yapılması gerekliliği vurgulanmıştır. Plan içerisinde yapı ve doğal çevre ile ilgili politikalar arasında; çevre sağlığı ve ağaçlandırma ile su havzalarının doğal ve ekolojik dengesine sağlayacağı olumlu katkılara yer verilmiştir.

On bir bölümden oluşan **İkinci Beş Yıllık Kalkınma Planı** (1968-1972) da; doğrudan iklim değişikliği ile ilgili bir ibare içermemekle birlikte, ilgili planda; iklimle ilgili olarak inşaat amaçlı gerçekleştirilen yapı ve malzeme seçimlerinde iklim koşullarına uyumun gözetilmesi gerekliliğine dikkat çekilmiştir (DPT, 1968).

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Altı ana kesim ve 25 alt bölümden oluşan **Üçüncü Beş Yıllık Kalkınma Planı** (1973-1977) da diğer iki planda olduğu gibi; doğrudan iklim değişikliği ile ilgili bir ibare içermemekle birlikte, içeriğinde yerleşim alanlarının projelendirilmesinde iklim şartlarının göz önüne alınması ibaresi yer almıştır (DPT, 1973).

16393 sayılı Resmi gazetede 31.08.1978 tarihinde yayımlanan dört ana başlık ve 21 alt bölümden oluşan **Dördüncü Beş Yıllık Kalkınma Planı** (1979-1983) da doğrudan iklim değişikliği ile ilgili ifadeleri içermemekte olup, içeriğinde çimento fabrikalarının kuruluşunda iklim koşullarına uyumun gözetilmesi gerekliliğine dikkat çekilmiştir. İlgili planda; su, toprak ve hava kirliliği ile kent yoğunluğundaki artışa dikkat çekilmiştir (DPT, 1979b).

Beş bölümden oluşan **Beşinci Beş Yıllık Kalkınma Planı** (1985-1989) TBMM tarafından 13.07.1984 tarihinde onaylanmıştır. Bu planda da iklim değişikliği konusuyla doğrudan ilgili bir ibare yer almamaktadır. Bununla birlikte; konutların inşaat ve kullanımında tasarruf sağlamak amacıyla; iklim koşullarını dikkate alan projelerin teşvik edileceğinden bahsedilmiştir. İlgili planda; orman alanların genişletilmesi, turizm faaliyetlerinde doğal, kültürel değerlerin ve ekolojik dengenin korunması, temiz çevre, çevrenin iyileştirilmesi, yatırım projeleri ile ilgili çevresel etki irdelemesi raporunun hazırlanması, mevcut kirliliğin önlenmesine ek olarak sürdürülebilir kaynak kullanımı, arazi kullanımında meydana gelebilecek sorunların planlama aşamasında tespit edilmesi gibi konulara yer verilmiştir (DPT, 1984).

Beş bölümden oluşan **Altıncı Beş Yıllık Kalkınma Planı** (1990-1994) ise, TBMM tarafından 22.6.1989 tarihinde onaylanmıştır. Bu planda da; iklim değişikliği konusuyla doğrudan ilgili bir ibare yer almamıştır. Sadece tarımsal mekanizasyon araçlarının seçiminde ve konutların inşaat ve kullanımında iklim koşullarının dikkate alınması gerekliliğine dikkat çekilmiştir. İlgili planda; çevre kirliliği, sorunları ve önlemlerine yönelik konularda bilgilere yer verilmiştir (SBB, 2022).

Dört bölümden oluşan **Yedinci Beş Yıllık Kalkınma Planı** (1996-2000) kapsamında da; doğrudan iklim değişikliğini ifade eden bir ibare yer almamış olup, kentsel alanlarda yeşil alanların korunması arttırılması ve ağaçlandırılmasına yönelik hedefler yer almaktadır. Bölgesel gelişme ve fiziki planlarda sürdürülebilirlik temelli ekolojik dengenin korunmasını amaç eden planların ve yerleşimlere yönelik gelişim alanlarında yer seçimleri de ekolojik denge dahilinde ele alınması gerekliliğine yer verilmiştir (DPT, 1995).

On bölümden oluşan **Sekizinci Beş Yıllık Kalkınma Planı** (2001-2005); TBMM tarafından 27.6.2000 tarihinde onaylanmış olup içeriğinde doğrudan iklim değişikliğine ilişkin ifadelerin yer aldığı ilk plandır. İlgili planda, iklim değişikliği kavramı; bitkisel üretim, çevre, ulaştırma başlıkları içerisinde değerlendirilmiştir. Plan kapsamında; sera gazı emisyonlarının azaltılmasına yönelik politikaların oluşturulup, ulaştırma faaliyetlerinin neden olduğu emisyonların envanterlerinin çıkarılması gerekliliğine vurgu yapılmıştır. Ayrıca, Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesine dâhil olmak üzere çalışmalara devam edildiği edileceği yer almıştır (DPT, 2000a).

Sekizinci Beş Yıllık Kalkınma Planı Özel İhtisas Komisyonu 127 Alt komisyon raporundan oluşmuş olup, doğrudan iklim değişikliği ile ilgili alt komisyon raporu da bu plan döneminde hazırlanmıştır (SBB, 2022). İlgili rapor; 8 bölümden oluşmakta olup, ilgili başlıklar çerçevesinde, iklim değişikliği konusuyla ilgili genel konular, uluslararası sözleşmeler, İklim Değişikliği Çerçeve Sözleşmesi'ne göre ülkemizin durumu, ülkemizin sera gazı salım ve sera gazı projeksiyonları, iklim değişikliğine ilişkin sorunlar, hedefler politikalar ve önlemlere yer verilmiştir. Son bölümde ise; performans kriterleri hakkında bilgiler yer almıştır (DPT, 2000b);

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Politika ve önlemler kapsamında enerji, kentsel ulaşım, ormancılık, tarım ve hayvancılık ana konuları altında aşağıda yer alan konular ele alınmıştır (DPT, 2000b);

- Sera gazı salınımlarını azaltma ulusal programı ve eylem planı önerisi. Sera gazı azaltımı konusunda ilgili kamu, kurum ve kuruluşlarda kapasite oluşturma çalışmalarının gerçekleştirilmesi,
- Ulusal rapor sisteminin oluşturulması (iklim değişikliğinin izlenmesi, sera gazlarına yönelik salınım ve kontrol çalışmaları için)
- Hidrolojik verilerle ilgili değişimlerin takip edilmesi,
- Sera gazı emisyonlarının hesaplanması,
- Eğitim, öğretim ve halk bilinçlendirme çalışmalarının düzenlenmesi,
- Enerji üretim ve tüketiminin sebep olduğu sera gazı faaliyetlerinin azaltılması,
- Yenilenebilir enerji, yeşil enerji kullanımının artırılması,
- Araç kullanımının azaltılarak, doğa dostu ulaşım araçlarının kullanımının artırılması,
- Yutak alanların artırılması, CH₄ ve N₂O salınımlarını azaltacak uygulamaların yaygınlaştırılması.

Dokuzuncu Kalkınma Planı (2007-2013) 1.07.2006 tarihinde TBMM kararı ile yayınlanmıştır. Plan içeriğinde iklim değişikliğine yönelik olarak; bir önceki planda hedeflenen; BM İklim Değişikliği Çerçeve Sözleşmesine taraf olmuştur. İlgili planda; sera gazı etkisinin azaltımına yönelik politika ve tedbirleri kapsayan Ulusal Eylem Planının oluşturularak, sözleşme ile ilgili yükümlülüklerini yerine getireceği belirtilmektedir (DPT, 2006).

Dokuzuncu Kalkınma Planı Özel İhtisas Komisyonu 57 Alt komisyon raporundan oluşup, doğrudan iklim değişikliği ile ilgili alt komisyon olmamasına rağmen, Çevre alt raporu altında iklim değişikliği kavramı ayrı bir başlık olarak değerlendirilmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 46 kez geçmiştir. İklim Değişikliği Ulusal Eylem Planının hazırlanması öngörülmüştür. Ayrıca bu rapor içerisinde iklim değişikliği ile ilgili konularda uygulama stratejileri kapsamında; İklim Değişikliği Ulusal Eylem Planının Hazırlanması, Ulusal Sera Gazı Salım Envanter Sisteminin Oluşturulması, Yenilenebilir Enerji Kullanımının ve Enerji Verimliliğinin Artırılması, Temiz Üretimin Desteklenmesi, Karbon Tutucu Yutak Alanlarının Korunması ve Geliştirilmesi, İklim Değişikliği Koordinasyon Kurulu'nun Güçlendirilmesi, Ulaştırma Sektöründe Politika Değişikliğine Gidilmesi, Kyoto Protokolü için Hazırlık Yapılması konularına değinilmiştir (SBB, 2022a).

Ormancılık alt komisyonunda tehditler ile ilgili kısımda iklim değişikliği kavramı yer almaktadır. Toprak ve su kaynaklarının kullanımı ve yönetimi alt raporunda iklim değişikliğinin doğal kaynaklar üzerine yol açabilecek olumsuzlukları üzerinde durulmuştur. İlgili Komisyon raporunda iklim değişikliği terimi 3 kez geçmiştir (SBB, 2022a).

Onuncu Kalkınma Planı (2014 - 2018) 01.07.2013 tarihinde TBMM kararı ile onaylanmıştır. İlgili planda; özellikle çevre kirliliği, iklim değişikliği, çölleşme, ormansızlaşma, su kıtlığı ve küresel ısınmayla ilgili sorunların önemli bir düzeye geldiği ve bu kapsamda da iklim değişikliğiyle mücadelenin gözetilmesi gerekliliğine vurgu yapılmıştır. Öyle ki, "İklim Değişikliği ve Çevre" başlığının yer alması da bunun bir göstergesidir. Bununla birlikte plan kapsamında, iklim değişikliği; gıda, su ve doğal kaynakların etkin kullanımı yaşanabilir mekânlar, sürdürülebilir çevre, çevrenin korunması toprak ve su kaynakları yönetimi başlıkları ile de ilişkili bir biçimde ele alınmıştır.

İklim Değişikliği ve Çevre başlığı kapsamında 62-64. Maddelere yer verilmiştir. Gıda, Su ve Doğal Kaynakların Etkin Kullanımı başlığı altında 65-66. Maddeler iklim değişikliğinin etkileri ile ilgilidir. Ayrıca 113, 900, 901, 1028, 1029, 1040, 1052. Maddeler iklim değişikliği ile ilgilidir. (DPT, 2013).

Onuncu Kalkınma Planı Özel İhtisas Komisyonu 49 Alt komisyon raporundan oluşup, doğrudan iklim değişikliği ile ilgili alt komisyon olmamasına rağmen, “**Afet Yönetiminde Etkinlik Özel İhtisas Komisyon Raporu**” altında afetler ve iklim değişikliği kavramı bir arada değerlendirilmiştir. Bu bölümde İklim Risk Yönetimi kapsamında iklim değişikliği kavramı ile ilgili yerel ölçeklerde yatırımlar yapılmalı ve politika, planlama ve uyum programlarının afet risk yönetimi stratejisi ile birleştirilerek AFAD, su ve meteoroloji işlerine bağlı kurum ve kuruluşların süreci birbirleri ile koordineli olarak devam ettirmelerinin önemi belirtilmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 13 kez geçmiştir (SBB, 2022).

Bitkisel Üretim ve Hayvancılık raporu kapsamında iklim değişikliği ve gıda-üretim üzerine oluşturacağı tehditlere yönelik bilgilere yer verilmiştir. İnşaat, Mühendislik-Mimarlık Teknik Müşavirlik ve Müteahhitlik Hizmetleri raporu hedefler kısmında; çevre ve iklim değişikliğine uyum teknolojilerin destekleneceği belirtilmiştir. İlgili Komisyon raporlarında iklim değişikliği terimi 4 kez (Bitkisel üretim 3, hayvancılık 1 kez) geçmiştir. (SBB, 2022).

Su Kaynakları Yönetimi ve Güvenliği raporunda iklim değişikliğinin su kaynakları üzerine etkilerinin açıklandığı bir alt başlığa yer verilmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 55 kez geçmiştir. Aynı raporda iklim değişikliği ile ilgili ülkemizde yürütülen projelerden bahsedilmiştir. Hedefler arasında, model çalışmaları aracılığıyla beklenmeyen iklim olaylarından en çok etkilenecek havzalar tespit edilecektir. İklim değişikliğinin yapı ve doğal çevre üzerinde yaratacağı olumsuzluklar bilimsel araştırmalar dâhilinde tespit edilerek, uyum stratejileri ve uygulamalar gerçekleştirilecektir. Politikalar kapsamında; su kaynaklarının yönetimi politikalarına iklim değişikliğinin etkilerine uyumun entegre edilmesi, yenilenebilir enerji kaynaklarının iklim değişikliği karşısında ki olumlu etkilerinin saptanması ve planlamalara dahil edilmesi gibi amaçlara yer verilmiştir (SBB, 2022a).

Tarım Arazilerinin Sürdürülebilir Kullanımı Çalışma Grubu alt raporunda iklim değişikliği ile ilgili yürütülen projelere yer verilmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 38 kez geçmiştir. **Yerel Yönetimler** alt raporunda, kentsel alanlarda yapılacak dönüşüm faaliyetlerinin İklim Değişikliği Risk Yönetimi ile ele alınması hedeflenmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 27 kez geçmiştir. Kentlerde kullanılma üzere doğal enerji üretim sistemlerinin planlama ve uygulamalara dâhil edilmesi. İklim değişikliği eylem planlarının yaygınlaştırılması, yeşil binaların yaygınlaştırılarak emisyon azaltımı, çevre dostu ulaşım araçlarının kullanılması, güneş mimarisi uygulamalarının kentsel alanlarda yaygınlaştırılması gibi hedef ve stratejilere yer verilmiştir (SBB, 2022a).

On Birinci Kalkınma Planı (2019 - 2023) 18.07.2019 tarihinde TBMM kararı ile onaylanmıştır. İlgili planda; iklim değişikliğinin küresel düzeyde çeşitli etkilerinin hızlanmakla birlikte, ülkemizin coğrafi konumu nedeniyle iklim değişikliğinden en çok etkilenecek ülkeler arasında olduğuna dikkat çekilmiştir. Bu kapsamda, İklim değişikliğinin olumsuz etkilerine uyum sağlama kapasitesini artırmaya yönelik ulusal ve bölgesel uyum stratejilerini içeren planlama, uygulama ve kapasite geliştirme çalışmalarının yürütülmesi gerekliliği vurgulanmıştır. İlgili planda; iklim değişikliği, gıda güvenliği ve suyun etkin kullanımı, turizm, yaşanabilir şehirler, sürdürülebilir çevre, şehirleşme, çevrenin korunması başlıkları içerisinde iklim değişikliğine ilişkin ifadeler yer almıştır. İlgili plan kapsamında; iklim değişikliğine uyumun sağlanması ve gerekli tedbirlerin alınması amacıyla bölge ve şehir ölçeğinde ihtiyaçların tespit edilerek çözüm önerilerinin geliştirilmesi amacıyla, başta Karadeniz Bölgesi olmak üzere 7 Bölge için “İklim Değişikliği Eylem Planları”nın hazırlanması hedeflenmiştir. Ayrıca iklim değişikliğinin yaratacağı etki ve sorunların öngörüldüğü afet ve risk haritalarının hazırlanması gerekliliği de yine bu plan kapsamında

iklim değişikliğine yönelik olarak geliştirilen hedeflerdendir. Plan kapsamındaki; 79, 80,81,82, 102, 157, 406.5, 410.6, 411.6, 426.6, 664, 666, 674, 676, 685, 714, 714.2, 714.3, 723 nolu maddeler iklim değişikliği ile ilgilidir (DPT, 2019).

On birinci Kalkınma Planı Özel İhtisas Komisyonu 71 Alt komisyon raporundan oluşup, doğrudan iklim değişikliği ile ilgili alt komisyon olmamasına rağmen, **Çevre ve Doğal Kaynakların Yönetimi ve Sürdürülebilir Yönetimi** Özel İhtisas Komisyon raporunda 2023 yılı hedefleri içerisinde iklim değişikliği kapsamında pek çok önlem ve uyum yaklaşımı geliştirilmiştir. Keza ilgili komisyon raporunda, iklim değişikliği ifadesi 135 kez yer almıştır. İlgili raporda özellikle; düşük karbonlu, iklim dostu kalkınma modelinin benimsenmesi, iklim değişikliği, çevre ve kaynakların sürdürülebilir kullanımı gibi olguların ele alınış biçimlerinin koruma kullanma dengesi temelinde ele alınması, gelecek dönemlerde çevre politikalarının oluşturulmasında önceliğin iklim değişikliği temelli olması, iklim değişikliği karşısında uyum ve azaltım çalışmalarının ön plana çıkması. İklim dostu ve düşük karbonlu faaliyetlere geçilmesi, yenilenebilir enerji kullanımının arttırılarak sera gazı emisyonlarının azaltılması, atık yönetimi, enerji verimli binalar ve üretilen enerjilerin depolanması, sürdürülebilir tarımsal faaliyetlerin arttırılması, iklim değişikliği karşısında sektör bazlı risk analizleri ve uyum faaliyetlerine yönelik stratejilerin geliştirilmesi, iklim değişikliğine neden olabilecek sektörlerin etkilerinin ve oluşturabileceği risklerin saptanması, sürdürülebilir şehirler kavramının benimsenmesi, etkin enerji kullanımının benimsenmesi ve bu bağlamda katılımcılık temelli iklim değişikliğiyle mücadele odaklı, ulusal plan ve programların oluşturulması, çevre dostu bina (yeşil bina) ve ulaşım (hibrit araçlar) gibi uygulamalar teşvik edilerek iklim değişikliği ile azaltım ve uyum mücadelelerinin benimsenmesi yer almıştır. Sürdürülebilir şehirler kapsamında; iklim değişikliği ve doğal kaynakların yönetimi matrislerinin mekânsal planlamaya entegre edilmesi, yeşil alanların arttırılması, geçirimli yüzey miktarlarının arttırılması, yerel yönetimler tarafından ulusal iklim eylem planına entegre yerel iklim değişikliği eylem planlarının hazırlanması öngörülmüştür (SBB, 2022).

Kentsel Yaşam Kalitesi raporu içeriğinde; açık yeşil ve kamusal alan planlama anlayışında yeniliğe gidileceği hedefi doğrultusunda; doğa temelli çözümlerin geliştirileceği, kentlerin ekolojik değerlerinin korunacağı, mahalle ölçeğinde kısa, orta ve uzun vadeler için peyzaj master planlarının oluşturulup yeşil altyapı ve iklim değişikliği eylem planlarının yaygınlaştırılacağı belirtilmiştir. Ayrıca mekânsal planlama bağlamında afet riskleri ve iklim değişikliği verilerinin kent planlamaya hangi ölçeklerde entegre edileceğine yönelik çalışmaların yapılması hedefler arasında yer almaktadır. İlgili Komisyon raporunda iklim değişikliği terimi 3 kez geçmiştir (SBB, 2022a).

Ormancılık ve Orman Ürünleri raporunda; İklim değişikliğine uyum ve dirençlilik kapsamında, kuraklığa dayanıklı türlerin kullanımının teşviki ve ekosistem boyutundaki etkilerinin araştırılmasına yönelik çalışmaların gerçekleştirilmesi vurgulanmaktadır. İlgili Komisyon raporunda iklim değişikliği terimi 33 kez geçmiştir (SBB, 2022a).

Tarımda Toprak ve Suyun Sürdürülebilir Kullanımı raporunda, yenilenebilir enerji kaynaklarının kullanımından olabildiğince faydalanılması ve toprak-su kaynaklarının sürdürülebilir kullanılması ile iklim değişikliğinin olumsuz etkilerini ve sera gazı emisyonlarının azaltılması ile iklim değişikliğinin tarım ve su kaynaklarına olumsuz etkilerinin en aza indirileceği uygulamaların faaliyete geçirilmesi öngörülmüştür. İlgili Komisyon raporunda iklim değişikliği terimi 43 kez geçmiştir (SBB, 2022a).

Kırsal Kalkınma raporunda, Doğal kaynakların sürdürülebilir kullanımı ile kırsal çevrenin iyileştirilmesi amacıyla, mikro havza ölçeğinde talebe bağlı üretim planlama çalışmalarının ekoloji ve iklime uyum sağlamalıdır. İklim uyum temelinde oluşabilecek afetlere ve kuraklığa karşı çözümler için Ar-GE çalışmalarının desteklenerek teşvik edilmelidir. İlgili Komisyon raporunda iklim değişikliği terimi 47 kez geçmiştir. (SBB, 2022a).

Su Kaynakları Yönetimi ve Güvenliği raporunda, su kaynaklarının projelendirilmeleri ve gelecekteki durumlarına yönelik senaryoların oluşturularak, mevcut planların güncellenerek ileriye dönük eylem planlarının hazırlanması, ekosistem üzerinde oluşabilecek durumların bütüncül bir biçimde değerlendirilmesinin gerekliliği belirtilmiştir. Ayrıca kentleşmeye bağlı olarak arazi ve suyun döngüsünde meydana gelebilecek etkilere bağlı oluşabilecek afetlere karşısında doğa ile uyumlu koruma planlarının oluşturulmasına vurgu yapılmıştır. İklim değişikliğine uyum konusu havza temelli ve sektörel olarak ele alınarak, kısa-orta-uzun dönemlere yönelik eylem planları ile bütünleştirilmesi gerekliliği belirtilmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 64 kez geçmiştir.

Tarım ve Gıdada Rekabetçi Üretim raporunda, yerel tohum çeşitlerinin tescil edilerek korumaya alınmaları ve iklim değişikliğine uyumlu tohum ve türlerin geliştirilmesi. Ürün desenleri ve verim üzerine iklimin etkilerinin tespit edilerek bitki, hayvancılık, su ürünleri gibi üretim kollarına yönelik eylem planlarının hazırlanması konularına vurgu yapılmıştır. İlgili Komisyon raporunda iklim değişikliği terimi 30 kez geçmiştir. (SBB, 2022).

Turizm raporunda, tarihi ve kültürel miras bakımından önem taşıyan turizm alanlarında iklim değişikliğinin etkilerinin saptanması ve olumsuz etkilere karşı önlemlerin alınması, Kar kütlelerinin hızlı erimesi ile kış turizminde meydana gelebilecek etkilerin değerlendirilerek, kış turizmi planlamaları için önlemlerin geliştirilmesi hedeflenmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 33 kez geçmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 31 kez geçmiştir. (SBB, 2022).

Yerel Yönetimler ve Hizmet Kalitesi raporunda, kentsel ölçekte iklim değişikliği ile mücadele kapsamında, nüfusu 500.000'in üzerinde ki kentlerde iklim eylem planlarının hazırlanması ile dirençli ve karbon ayak izini azaltma hedeflerine sahip şehirlerin ortaya çıkması hedeflenmiştir. İlgili Komisyon raporunda iklim değişikliği terimi 21 kez geçmiştir (SBB, 2022).

On iki bölümden oluşan, **Türkiye İklim Değişikliği Stratejisi** (2010-2020) Yüksek Planlama Kurulu tarafından 3 Mayıs 2010 tarihinde onaylanmıştır. İlgili strateji kapsamında iklim değişikliği ile mücadele kapsamında ulusal imkânlar dâhilinde; azaltım, uyum, teknoloji, finansman ve kapasite oluşturma politikaları açıklanmaktadır (ÇŞB, 2012a). Strateji kapsamında, yenilenebilir enerji kaynaklarının kullanıldığı, katılımcılık esaslı yaşam kalitesi yüksek ve düşük karbon yoğunluğuna sahip ülke vizyonu belirlenmiştir. Strateji belgesinde; enerji, binalar, sanayi, ulaştırma, atık, tarım, arazi kullanımı ve ormancılık ve uyum konularında iklim değişikliği ile ulusal mücadele alanında amaç ve hedefler verilmiştir ÇŞB (2012b).

Hedefler arasında aşağıda maddeler halinde verilen konular yer almaktadır (ÇŞB, 2012a);

- İklim değişikliği ile mücadeleye ortak fakat farklılaştırılmış sorumluluklar yaklaşımı ile dâhil olmak
- Sera gazı emisyon salınıminin sınırlandırılması
- İklim değişikliğinin olumsuzlukları karşısında ele alınacak azaltım ve uyum faaliyetlerinin bölge ülkeleri ile paylaşılarak çok taraflı katılımcı projelerde bulunmak,
- Azaltım, uyum, teknoloji transferi ve finansman konularında ilgili tarafların sorumluluklarını bilmesi. Azaltım ve uyum konuları ile ilgili mali kaynaklara ulaşılabilirliği arttırmak,
- Temiz üretime yönelik potansiyelin geliştirilmesi,
- Karar alma süreçlerinde bilimsel çalışmalar ve katılımcılık esasına dayanan mücadele ve uyum çalışmalarının gerçekleştirilmesi.

6th INTERNATIONAL NEW YORK CONFERENCE ON EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES

- İklim dostu tüketim yaklaşımının benimsenmesi için çeşitli aktörlerin bir araya gelerek kamuoyunun bilinçlendirilmesini sağlamak. Bilgi akışı ve paylaşımı için bütüncül bilgi yönetim sisteminin oluşturulması.

İklim Değişikliği Ulusal Eylem Planı; Mülga Çevre ve Şehircilik Bakanlığı tarafından 2012 yılda hazırlanmıştır. İlgili planda iklim değişikliğine ilişkin olarak; enerji, bina, sanayi, ulaştırma, atık, tarım, arazi kullanımı ve ormancılık, su kaynakları yönetimi, tarım sektörü ve gıda güvencesi, insan sağlığı ile iklim değişikliğine uyum bağlamında sektörler arası ortak konuları başlıkları altında stratejik amaç ve hedefler saptanmıştır. Bu kapsamda toplamda, 49 adet amaç ile 106 adet hedef saptanmıştır. İlgili strateji ve amaçlar, iklim değişikliği etkilerinin azaltılması ile uyum konularında yoğunlaşmıştır ÇŞB (2012b).

Türkiye'nin İklim Değişikliği Uyum Stratejisi ve Eylem Planı ise; 2012 yılda Mülga Çevre ve Şehircilik Bakanlığı tarafından yayımlanmıştır. İlgili planda; iklim değişikliği bir sürdürülebilir kalkınma sorunu olarak belirtilmiş olup, iklim değişikliğinin etkilerine uyum sağlamanın, ekosistemlerin korunması açısından ele alınması gerekliliğine dikkat çekilmiştir. İklim değişikliğinin etkileri ve Türkiye'de etkilenebilirlik arz eden sektörler/bölgeler tanımlanmıştır. İlgili plan; su kaynakları yönetimi, tarım sektörü ve gıda güvencesi, ekosistem hizmetleri, biyolojik çeşitlilik ve ormancılık, doğal afet risk yönetimi ile insan sağlığı olmak üzere 5 temel konuya odaklanmıştır. Bu kapsamda toplamda, 17 adet amaç ile 47 adet hedef çerçevesinde; eylem, süre, çıktılar ve performans göstergeleri, sorumlu/koordinatör kuruluş ve ilgili kuruluşlar tanımlanmıştır ÇŞB (2012c).

Bildiri kapsamında ele alınan kalkınma planları ve strateji belgeleri ile eylem planlarında iklim değişikliği ibaresinin geçme sıklıkları ise Çizelge 2. de verilmiştir. Buna göre iklim değişikliği ibaresi ilk kez VIII. Beş Yıllık Kalkınma Planı kapsamında ele alınmış olup, günümüze kadar geline süreçte önemle dikkate alınan bir kavram olmuştur.

Çizelge 2. Kalkınma Planları ve Strateji Belgeleri ile Eylem Planlarında İklim Değişikliği İbaresinin Geçme Durumu

Plan	İlgili Terimin Geçtiği Konu Başlıkları	İlgili Terimin Geçme Sıklığı	
		İklim	İklim değişikliği
I.BYKP.	Tarım	3	-
II.BYKP	Sağlık, Tarım, Hayvancılık, İnşaat	4	-
III.BYKP	Yerleşim	2	-
IV. BYKP	İmalat Sanayi	1	-
V.BYKP	Köye Götürelen Hizmetler, Mahalli İdareler	3	-
VI. BYKP	İmalat Sanayi, Çevre ve Yerleşim	4	-
VII. BYKP		-	-
VIII. BYKP	Bitkisel Üretim, Çevre, Ulaştırma	2	3
IX. KP	Çevrenin Korunması ve Kentsel Altyapının Geliştirilmesi		2
X. BYKP	İklim Değişikliği ve Çevre Gıda, Su ve Doğal Kaynakların Etkin Kullanımı, Yaşanabilir Mekânlar, Sürdürülebilir Çevre, Çevrenin Korunması Toprak ve Su Kaynakları Yönetimi		14
XI. KP	İklim Değişikliği, Gıda Güvenliği ve Suyun Etkin Kullanımı, Turizm, Yaşanabilir Şehirler, Sürdürülebilir Çevre, Şehirleşme, Çevrenin Korunması	3	26
Sekizinci Beş Yıllık Kalkınma Planı İklim Değişikliği Özel İhtisas Komisyonu	Enerji, Kentsel Ulaşım, Ormancılık, Tarım ve Hayvancılık,		203
TC Ulusal İklim Değişikliği Strateji Belgesi (2010 – 2020)	Enerji, Ulaştırma, Sanayi, Atık, Arazi Kullanımı, Tarım ve Ormancılık		117
TC İklim Değişikliği Ulusal Eylem Planı (2011 –2020 [İkinci baskı (2011–2023)])	Enerji, Bina, Sanayi, Ulaştırma, Atık, Tarım, Arazi Kullanımı ve Ormancılık, Su Kaynakları Yönetimi, Tarım Sektörü ve Gıda Güvencesi, İnsan Sağlığı, İklim Değişikliğine Uyum		446
Türkiye'nin İklim Değişikliği Uyum Stratejisi ve Eylem Planı	Su Kaynakları Yönetimi, Tarım Sektörü ve Gıda Güvencesi, Ekosistem Hizmetleri, Biyolojik Çeşitlilik ve Ormancılık, Doğal Afet Risk Yönetimi, İnsan Sağlığı		345

Çalışma kapsamında; iklim değişikliği sebep ve sonuçları bağlamında, ulusal ölçekteki yaklaşım ve öngörülerin incelenmesi amacıyla iklim değişikliğine yönelik kalkınma plan ve strateji belgeleri incelenmiştir. Bu kapsamda 11 adet kalkınma planı ile iklim değişikliği temalı özel ihtisas komisyon raporları ve iklim değişikliği strateji belge ve eylem planları ele alınmıştır. Bu plan ve belgelerde ulusal ölçekte iklim değişikliği çerçevesinde ele alınan yaklaşım ve hedefler incelenmiştir. Bu amaçla, iklim ve iklim değişikliği kavramlarının ilgili rapor ve planlardaki geçiş sıklıkları da ele alınmıştır. Yapılan incelemeler kapsamında iklim değişikliği konusuna ilişkin olarak elde edilen saptamalar aşağıda maddeler şeklinde verilmiştir.

- İlk altı adet beş yıllık kalkınma planlarında farklı sektörler öncelikli olmakla birlikte iklim koşullarının göz önüne alınması gerekliliğine ilişkin ifadeler yer almıştır. Planlarda sektörler arasında farklılıklar olsa da yerleşim, tarım, hayvancılık, sanayi ve ormancılık gibi alanlarda yapılacak faaliyetlerde iklim koşullarına uyum ifadelerine yer verilmiştir. İlgili planlarda; çevre kirliliği, nüfus artışı ve şehirleşmenin ve sera gazlarının neden olduğu sorunlara yönelik bir takım problemlerden bahsedilmiştir.
- Yedinci Beş Yıllık Kalkınma Plan kapsamında iklim kavramı hiç yer almamıştır.
- İklim değişikliği terimi, ilk kez Sekizinci Beş Yıllık Kalkınma Planı içerisinde ele alınmıştır. İklim değişikliği çerçevesinde sera gazı emisyonlarının azaltılması yer almıştır. Plan hedefleri kapsamında; Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesine taraf olunmuştur. Bu plan hazırlıkları kapsamında doğrudan iklim değişikliği ile ilgili özel ihtisas komisyon raporu oluşturulmuştur.
- Dokuzuncu Kalkınma Plan döneminde sera gazı azaltımı politika ve tedbirlerini ortaya koyan bir Ulusal Eylem Planı hazırlanması gerekliliği hedeflenmiştir. İlgili plan dönemi hazırlıkları çerçevesinde oluşturulan iki adet özel ihtisas komisyon raporlarında iklim değişikliğine ilişkin ibareler yer almıştır.
- Onuncu Kalkınma Planı kapsamında “İklim Değişikliği ve Çevre Gıda, Su ve Doğal Kaynakların Etkin Kullanımı” başlığım ile ilk kez iklim değişikliğine özel bir başlık açılmıştır. Ayrıca iklim değişikliği ile yaşanabilir mekânlar, sürdürülebilir çevre konuları ilişkilendirilmiştir. İlgili plan dönemi hazırlıkları çerçevesinde oluşturulan beş adet özel ihtisas komisyon raporlarında iklim değişikliğine ilişkin ibareler yer almıştır.
- On birinci kalkınma planı içerisinde de İklim değişikliği ayrı bir başlık içerisinde değerlendirilmiş olup, yedi adet bölge için İklim Değişikliği Eylem Planlarının yapılması öngörülmüştür. İlgili plan dönemi hazırlıkları çerçevesinde oluşturulan dokuz adet özel ihtisas komisyon raporlarında iklim değişikliğine ilişkin ibareler yer almıştır.
- Kalkınma planları ve strateji belge ve eylem planlarında iklim değişikliğine ilişkin kavramların geçiş sıkları incelendiğinde giderek önemli bir artışın olduğu saptanmıştır. Bu durum iklim değişikliği konusuna ilişkin önemin giderek arttığını göstermektedir. Aynı zamanda iklim değişikliği ibaresinin birçok alan ve sektörle ilişkilendirilmesi de yerel, bölgesel ve ulusal anlamda etki ve riskler oluşturacağı hususunu işaret etmektedir.
- Sekizinci plan ile birlikte ilerleyen süreçte iklim değişikliği konusunda ülkemizin nasıl bir rol alacağına yönelik ulusal iklim değişikliği eylem planlarının hazırlanmaya başladığı görülmektedir. Uluslararası bağlamda da üzerine düşen görevi yerine getirmeyi, ulusal imkânlar doğrultusunda amaç edinerek çeşitli uyum, azaltım stratejileri geliştirilmiştir.
- Gerek strateji belgeleri ile eylem planları gerekse de kalkınma planları kapsamında iklim değişikliği ile mücadele kapsamında ele alınan ortak konular ise aşağıdaki gibi özetlenebilir;
 - Emisyon hesabı ve azaltım uygulamaları (yutak alanlarının artırılması),
 - Doğal kaynakların sürdürülebilir kullanımı,
 - Sürdürülebilir kent modellerinin uygulamaya konulması (çok merkezli kentler),
 - Doğa dostu ulaşım araçlarının kullanımı (bisiklet ve hibrit araçların kullanımı),

- Su havzalarının bütüncül olarak ele alınması ve risk tespiti,
- İklim değişikliğine bağlı olarak oluşabilecek olası tehditlere yönelik risk analizleri,
- Doğa dostu, ekoloji temelli uygulamaların kentlere entegre edilmesi (ekolojik ağlar, yeşil kuşaklar, yeşil altyapı, yağmur suyu yönetimine yönelik uygulamalar.),
- Enerji verimli yapıların oluşturulması. Atık ve su yönetimi, suyun verimli kullanımı,
- İklim dirençli tohum, bitki kullanımı,
- İklim değişikliğinin çeşitli sektörler (enerji, tarım, ormancılık, ulaştırma, sanayi, atık, turizm) üzerine etkileri
- Çok aktörlü katılımcı planlama yaklaşımlarının benimsenmesi.

İklim değişikliği kavramı, doğal ya da yapılı çevre üzerine doğrudan ya da dolaylı olarak ciddi tehlikeler oluşturacağı düşünüldüğünde her boyutu ile ele alınması gereken bir kavramdır. Bu bağlamda kalkınma planları, özel ihtisas plan raporları, ulusal iklim değişikliği stratejileri göz önüne alındığında doğal çevre (hava, su, toprak) ve yapılı çevrede (kırsal-kentsel) iklim değişikliği ile mücadeleye yönelik birçok hedef ve stratejinin geliştirildiği görülmektedir. Ayrıca iklim değişikliği kavramı her bölgede farklı şekilde etki göstereceğinden dolayı meydana gelebilecek risk ve tehlikeler de çeşitlilik gösterecektir. Bu sebeple ilgili planlarda yerel ölçekte risk durumlarının hesaplanması gerekliliği belirtilmektedir. Özellikle iklim değişikliğinin olumsuz etkilerinin daha fazla hissedildiği kentsel alanlarda doğa temelli yaklaşımlar ele alınarak, yaşam kalitesi yüksek, sürdürülebilir kentlerin oluşturulmasına yönelik amaçlara yer verilmiştir. Ayrıca iklim değişikliği ile mücadele yaklaşımının mekânsal planlamalara dâhil edilmesine yönelik hedeflere yer verilmiş olmasına rağmen hangi ölçekte ve nasıl dâhil edilebileceğine yönelik yasal bir süreç henüz tam olarak oluşmamıştır. İklim değişikliği ile mücadele kapsamında, iklim verilerinin yerel ölçekte bölge özellikleri dahilinde mekânsal planlamaya entegre edileceği planlama yaklaşımlarının geliştirilerek yasal bir zorunluluk haline gelmesi oldukça önemlidir. Çalışma kapsamında yapılan değerlendirmeler; gelişen süreçte ülke planlama eylem ve stratejilerinde iklim değişikliği konusunun nasıl ele alındığı konusunda temel ilkeleri ortaya koymak açısından önemli olup, iklim değişikliğine yönelik farkındalık ve bilinç oluşumu açısından katkı sağlayacaktır.

NOT: Bu çalışma doktora tez çalışmasından yararlanılarak hazırlanmıştır.

KAYNAKÇA

Akçakaya, A., Sümer, U.M., Demircan, M., Demir, Ö., Atay, H., Eskioğlu, O., Gürkan, H., Yazıcı, B., Kocatürk, A., Şensoy, S., Bölük, E., Arabacı, H., Açar, Y., Ekici, M., Yağan, S. & Çukurçayır, F. (2015). Yeni Senaryolar ile Türkiye İklim Projeksiyonları ve İklim Değişikliği. Ankara: T.C. Orman ve Su İşleri Bakanlığı, Araştırma Dairesi Başkanlığı, Klimatoloji Şube Müdürlüğü, Meteoroloji Genel Müdürlüğü Matbaası, ss. 164, Ankara.

ÇŞB (2012a). T.C. Çevre ve Şehircilik Bakanlığı, İklim Değişikliği Stratejisi (2010-2020), Ankara.

ÇŞB (2012b). T.C. Çevre ve Şehircilik Bakanlığı, İklim Değişikliği Ulusal Eylem Planı (2011-2023), Ankara.

ÇŞB (2012c). T.C. Çevre ve Şehircilik Bakanlığı, Türkiye'nin İklim Değişikliği Uyum Stratejisi ve Eylem Planı (2011-2023), Ankara.

ÇŞB, (2021). Çevre Şehircilik ve İklim Değişikliği Bakanlığı, Uluslararası Anlaşmalar. <https://iklim.csb.gov.tr/paris-anlasmasi-i-98587> (Erişim tarihi: 05.04.2021).

DPT, (1977a). Devlet Planlama Teşkilatı, Dördüncü Beş Yıllık Kalkınma Planı.

DPT, (1979b). Devlet Planlama Teşkilatı, Dördüncü Beş Yıllık Kalkınma Planı (1979-1983).

DPT, (1984) Devlet Planlama Teşkilatı, Beşinci Beş Yıllık Kalkınma Planı Çalışma Sorunları Özel İhtisas Komisyonu Raporu.

DPT, (1989) Devlet Planlama Teşkilatı, Altıncı Beş Yıllık Kalkınma Planı Çalışma Sorunları Özel İhtisas Komisyonu Raporu.

DPT, (2000a). Devlet Planlama Teşkilatı, Sekizinci Beş Yıllık Kalkınma Planı.

DPT, (2000b). Devlet Planlama Teşkilatı, İklim Değişikliği Özel İhtisas Komisyonu Raporu.

DPT, (2006). Devlet Planlama Teşkilatı, Dokuzuncu Beş Yıllık Kalkınma Planı.

DPT, (2013). Devlet Planlama Teşkilatı, Onuncu Kalkınma Planı.

DPT, (2019). Devlet Planlama Teşkilatı, On Birinci Kalkınma Planı.

DPT. (1963). Devlet Planlama Teşkilatı, Birinci Beş Yıllık Kalkınma Planı (1963- 1967), Ankara: DPT Yayınları. <https://www.sbb.gov.tr/kalkinma-planlari/> Erişim tarihi, 10.03.2022.

DPT. (1968). Devlet Planlama Teşkilatı, İkinci Beş Yıllık Kalkınma Planı (1968 - 1972), Ankara: DPT Yayınları. <https://www.sbb.gov.tr/kalkinma-planlari/> Erişim tarihi, 10.03.2022.

DPT. (1973), Devlet Planlama Teşkilatı, Üçüncü Beş Yıllık Kalkınma Planı (1973- 1977), Ankara: DPT Yayınları <https://www.sbb.gov.tr/kalkinma-planlari/> Erişim tarihi, 10.03.2022.

İklim İN, (2019b). İklim Değişikliği Eğitim Modülleri Serisi 4. Türkiye’de İklim Değişikliği ile Mücadelede Politikalar, Yasal Ve Kurumsal Yapı. http://www.iklimin.org/wp-content/uploads/egitimler/seri_04.pdf (Erişim tarihi: 05.04.2021).

SBB (2022). T.C. Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı, Beş Yıllık Kalkınma Planı Özel İhtisas Komisyonu Raporları. <https://www.sbb.gov.tr/ozel-ih-tisas-komisyonu-raporlari/#1543404958135-5a0767bc-1764> Erişim tarihi, 10.03.2022.

Şahin, Ü. (2018). Türkiye’nin İklim Politikalarında Aktör Haritası, İstanbul Politikalar Merkezi, Sabancı Üniversitesi, İstanbul, 210 s.

Türkeş, M. (2007). Küresel İklim Değişikliği Nedir? Temel Kavramlar, Nedenleri, Gözlenen ve Öngörülen Değişiklikler. I. Türkiye İklim Değişikliği Kongresi (TİKDEK), 11 - 13 Nisan 2007, İTÜ-İstanbul, 38-53.

THE CONCEPT OF CLIMATE CHANGE IN PLANNING AND DESIGN
APPROACHES

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Abstract

Today, local-regional-national changes and differentiations have begun to be observed in the climate cycle due to natural or human-induced effects throughout the world. This change, showing its effect in many areas, causes various negative results in terms of urban life quality. In this sense, the fight against climate change has become a global situation and has taken place primarily in the strategies, plans and policies of many countries in the national and international arena. Many plans and policy approaches have envisaged strategies and goals related to the compatibility of spatial planning with climate change in cities. In this context, the paper provides a general assessment of studies on climate change adaptation and spatial planning-design relationship on an international and national scale. For this purpose, it is aimed to conduct a quantitative analysis of articles and graduate theses written on related topics in the Scopus and YÖK National Dissertation Center databases between 2000 and 2021. In line with the purpose, 288 thesis related to climate change were identified in the database of the National Thesis Center and it was determined that 25 of these thesis were related to planning and design. Subsequently, the Scopus database was used to determine the studies related to climate change in the international context and 303,933 studies were identified in the study. It has been determined that 1226 of these studies are related to planning and design issues. As a result of the studies examined, it has been determined that the issue of climate change has become increasingly important in parallel with its effects and results, and nature-based approaches to risk reduction and adaptation have come to the fore within the scope of struggle.

Keywords: Climate Change, Nature Based Solutions, Planning and Design, Urban Area.

PLANLAMA VE TASARIM YAKLAŞIMLARIMDA İKLİM DEĞİŞİKLİĞİ
KAVRAMI

Özet

Günümüzde, Dünya genelinde özellikle kentleşmenin etkisiyle birlikte ekonomik, sosyal, teknolojik ve kültürel anlamda pek çok değişim ve gelişim gözlenmiştir. Bu değişim ve gelişim zaman içerisinde nüfus artışı ile birlikte; yaşam alanlarında arazi kullanım değişiklikleri, fosil yakıtların yoğun kullanımı, yeşil alanların azalması, yapılaşmanın artması ile geçirimsiz yüzey ve alanların artışı gibi etkileri de beraberinde getirmiştir. Bu süreçle birlikte zamanla iklimsel döngüde de yerel-bölgesel-ulusal değişim ve farklılaşmalar

görülmeye başlanmış ve pek çok alanda etkisini göstererek kentsel yaşam kalitesi anlamında çeşitli olumsuz sonuçlar ortaya çıkmıştır. Bu anlamda, iklim değişikliği ile mücadele küresel bir durum halini alarak, ulusal ve uluslararası alanda pek çok ülkenin strateji, plan ve politikalarında öncelikli olarak yer almıştır. Birçok plan ve politika yaklaşımlarında da, kentlerde mekânsal planlamanın iklim değişikliği ile uyumlu olmasına ilişkin strateji ve hedefler öngörülmüştür. Bu bağlamda bildiride; akademik alanda uluslararası ve ulusal ölçeklerde iklim değişikliğine uyum ve mekânsal planlama-tasarım ilişkisi konularında yapılan çalışmaların genel bir değerlendirilmesi yapılmıştır. Bu amaçla; ilgili konulara yönelik scopus ve yök tez tarama veri tabanlarında 2000 ile 2021 yılları arasında yazılan makale ve lisansüstü tezlerin niceliksel olarak analizi hedeflenmiştir. Amaç doğrultusunda Ulusal Tez Merkezi veri tabanında iklim değişikliği ile ilgili 288 tez çalışmaları tespit edilmiş olup, bu tez çalışmalarından 25'inin planlama ve tasarım ile ilgili olduğu tespit edilmiştir. Daha sonra iklim değişikliği ile ilgili hazırlanan uluslararası bağlamda çalışmaların tespitinde Scopus veri tabanından yararlanılmış olup, yapılan taramada 303.933 çalışma tespit edilmiştir. Bu çalışmalardan 1226'sının planlama ve tasarım konuları ile ilgili olduğu incelenerek tespit edilmiştir. İncelenen çalışmalar sonucunda iklim değişikliği konusunun etki ve sonuçları paralelinde giderek önem kazandığı ve mücadele kapsamında risk azaltma ve uyuma yönelik doğa temelli yaklaşımların ön plana çıktığı saptanmıştır.

Anahtar Kelimeler: İklim Değişikliği, Doğa Temelli Çözümler, Kentsel Alan, Planlama ve Tasarım.

GİRİŞ

Yaklaşık 46 milyar yıl yaşındaki yerkürede Dünya'nın ve oluşmaya başladığı ilk zamanlardan beri fiziki coğrafyasında (yeryüzü şekilleri, hava ve iklimi, toprak ve bitki örtüsü, yüzey ve yeraltı suları, akarsu ve gölleri, buzulları, ekosistem, biyom ve biyolojik çeşitliliği, vb.) yanında küresel iklimde de çok önemli ve büyük değişiklikler gerçekleşmiştir. Yapılan bilimsel çalışmalar ve gözlemler sonucunda 21. Yüzyılda Dünya'nın birçok bölgesinde aşırı hava ve iklim olaylarının sıklık ve şiddetlerinde artışların olabileceği görülmekte olup son 25 yıllık dönemde ülkemizde hem sıcaklık rejiminin belirgin olarak ılıman ve sıcak koşullara doğru değiştiği hem de sıcak hava dalgalarının sıklık ve şiddetinde önemli değişimlerin gerçekleştiği tespit edilmiştir (İklim İn, 2019a).

İklim Değişikliğinin Fiziksel Bilim Temeli Raporuna (IPCC, 2013) göre, küresel iklimdeki ısınma kaçınılmaz olup, 1950'li yıllardan günümüze iklimde gözlenen değişikliklerin çoğu son bin yıllık dönem ile karşılaştırıldığında daha önce hiç görülmemiş düzeydedir (İklim İN, 2019a). Ayrıca kentsel alanlar, dünya nüfusunun yaklaşık %54'ünü barındırıp, doğal kaynak tüketiminin %75'inden, enerji tüketiminin %60-80'inden, sera gazı emisyonlarının %70'inden fazlasına neden oldukları için iklim değişikliği ile mücadelede dikkate alınması gereken en önemli alanlardır (İklim İn, 2019c; Uncu, 2019).

İklim değişikliğine bağlı olarak meydana gelen sıcaklık artışı ve yağış miktarındaki değişikliklerin sonucunda taşkın, sıcak hava dalgası, kuraklık (Onur, 2014), yangın gibi etkiler; beraberinde tarımsal, mekânsal, sosyal, kültürel ve ekonomik anlamda pek çok olumsuz sorunları da oluşturmaktadır. Küresel bir sorun olarak iklim değişikliğinin olumsuz etkileri yerel-bölgesel-ulusal düzeyde tüm dünyayı etkisi altına almış durumdadır. Bu bağlamda iklim değişikliğinin meydana getirdiği olumsuz etkileri en aza indirmek ve bu değişime yaşam alanlarını dirençli hale getirmek amacıyla gerek uluslararası gerekse ulusal anlamda birçok stratejiler, planlar ve politikalar bulunmaktadır.

Bu bağlamda değerlendirildiğinde yaşamın her alanını etkileyen iklim değişikliği kavramı birçok araştırmacının çalışma konusunu oluşturmakta ve meydana gelebilecek olumsuzlukları uzamanı olduğu anlarda tespit edip önlemler önermektedir. Çok boyutlu bir kavram olan iklim değişikliği kavramı üretimi, yaşam kalitesini, ekosistemi kısacası hayatın her alanını farklı boyutlarda etkilediğinden dolayı güncel uyum ve azaltım yaklaşımlarının tespiti oldukça önemlidir. Özellikle üst ölçekli plan kararlarından On Birinci Kalkınma Planının Çevrenin Korunması başlığı altında yer alan 714. Maddeleri iklim değişikliğine uyum sürecinde bölgesel çözümlerin üretilmesinin gerekliliğini vurgulamıştır. Bu kapsamda iklim değişikliğinin olumsuz etkilerini en aza indirecek ve bu değişime adaptasyonun sağlanması amacıyla uluslararası ve ulusal düzeyde yapılan çalışmalar ve benimsenen yaklaşımların tespiti oldukça önemli olmaktadır. Küresel ölçekte iklim değişikliği kavramına güncel yaklaşımların ve bakış açılarının kavranması bu soruna etkili çözüm üretme sürecine oldukça önemli katkılar sağlayacaktır. Bu kapsamda bu çalışmada kentlerde mekânsal planlama-tasarım konusu üzerine uluslararası ve ulusal bağlamda iklim değişikliği ile mücadele yaklaşımlarının akademik çalışmalar dâhilinde nasıl ele alındığının ortaya koyulması amaçlanmıştır. Bu amaç ile iklim değişikliği ile mücadelede planlama ve tasarım disiplinlerinin çalışmalarına yönelik Scopus ve YÖK tez tarama veri tabanlarında 2000 ile 2021 yılları arasında yazılan makale ve lisansüstü tezlerin niceliksel olarak analizi hedeflenmiştir. Bu bağlamda bölgesel uyum ve adaptasyon süreçlerine yönelik uygulanabilir çözüm önerilerinin, strateji ve hedeflerin geliştirilmesinde oldukça önemli katkı sağlayacaktır.

İklim Değişikliği ile Mücadelede Planlama ve Tasarım Yaklaşımları

İklim değişikliğinin yaratmış olduğu sorunlar karşısında yerel yöneticiler, çeşitli sektörler ve disiplinler çözüm önerileri için çalışmalarına devam etmektedirler. Bu kapsamda kentlerin mevcut fiziksel yapılarının sahip olduğu, iklim değişikliğinin önüne geçme ve uyum sağlamaya yönelik çeşitli planlama ve tasarım çalışmaları düzenlenmektedir (Toy vd., 2018). Dünya genelinde yaklaşık 9400, Avrupa'da ise 600 farklı ölçekte iklim değişikliği konusunda azaltım ve uyum tedbirleri uygulamaya koyulmuş iken ülkemizde 30 büyükşehir belediyesinden 7'si iklim eylem planına sahip olduğu için yerel yöneticilerin iklim değişikliği ile mücadelede henüz başlangıç aşamasında olduğu görülmektedir (Uncu, 2019).

Kentsel İklim politikalarının kapsamı (Toy vd., 2018; Uncu, 2019);

İklim değişikliğinin azaltılması; fosil yakıt tüketiminden vazgeçerek sera gazlarının azaltılması, sıfırlanması ve mevcut karbon yutaklarının korunması, yenilerinin oluşturulması,

Olumsuz etki ve sonuçlara *uyum sağlama*; çevre ve üzerinde yer alan toplum ve toplulukların üzerinde meydana gelebilecek olumsuz etkilerin en az zarar göreceği biçimde yaşamlarına devam etmelerini sağlamak. Olmak üzere iki temel başlıktan oluşmaktadır.

Kentsel alanlarda iklim değişikliği ile mücadelede azaltma ve uyum çalışmaları, enerji sistemleri ve kullanımında, binalarda, ulaşımında, kentsel planlama çalışmalarında, yeşil alanlarda ve atık yönetimi gibi alanlarda önlemlerin alınması gerekmektedir (Uncu, 2019). Bu kapsamda kentsel alanlarda, Ekolojik planlama yöntemleri, eko-morfolojik yaklaşım yöntemi, Esnek şehir modelleri, eko-şehircilik, karbon nötr şehirler, peyzaj şehirciliği gibi planlama yaklaşımları, risk taşıyan bölgelerin saptanması çalışmaları, İklim verilerinin planlama-tasarım sürecine dâhil edilmesi, ekosistem servisleri, kentsel morfoloji analiz yöntemleri, biyoklimatik konfor çalışmaları, kentsel ısı adasına yönelik çalışmalar, yeşil altyapı uygulamaları, yağmur suyu yönetimi gibi uygulamalar planlama ve tasarım çalışmaları kapsamında yapılabilecek çalışmalar arasında yer almaktadır.

Yukarıda yer alan çalışmalar ulusal, bölgesel, mahalle ve daha küçük ölçeklerde gerçekleştirilebilecek çalışmalardan oluşmaktadır. Bu kapsamda kentlerin geleceğinin

bütüncül bir şekilde tasarlanması amacıyla ölçeklerin birlikte düşünülmesi gerekli görülüp, İklim duyarlı tasarım yaklaşımının ölçekler için ayrı bir çalışma konusunun olmadığı ve kentlerin geleceklerini tasvir etmek amacıyla kullanılan bir yöntem olduğu göz ardı edilmemelidir (Peker, 2020).

Yapılan araştırmalar kapsamında İklim Değişikliği ile Mücadele ve Uyum kapsamında çevre ve ekoloji üzerindeki etkileri değerlendirme, ölçme, önleme, gibi konularda ki planlama ve tasarıma altlık oluşturacak yaklaşımlar ile ilgili çalışma konuları aşağıda maddeler halinde verilmiştir (Görgülü ve Görgülü, 2021; Hu vd., 2021; Semeraro vd., 2021; Çetin vd., 2019; İBB ve PAD, 2019; Toy vd., 2018; Sılaaydın Aydın vd., 2017; Hansen vd., 2015; Balık ve Duman Yüksel, 2014; Toy ve Yılmaz, 2009;

- Ekolojik planlama yöntemleri
- Eko-morfolojik yaklaşım yöntemi
- Risk taşıyan bölgelerin saptanması çalışmaları
- Arazi bozunumu haritaları ve modelleri
- İklim verilerinin planlama- tasarım sürecine dâhil edilmesi
- Hava kirliliği çalışmaları
- Kent iklimi modelleme ve simülasyon çalışmaları
- Kentsel termal konfor çalışmaları
- Ekosistem Hizmetleri
- Yeşil altyapı

MATERYAL VE YÖNTEM

Materyal

Çalışmanın ana materyalini iklim değişikliği üzerine yapılmış planlama ve tasarım ile ilgili bilimsel çalışmalar oluşturmaktadır. Bu kapsamda 2000-2021 (Ocak-Mayıs) yılları arasındaki Ulusal Tez Merkezi ile Scopus veri tabanlarında iklim değişikliği ile mücadelede planlama ve tasarım ile ilgili hazırlanmış makale ve tez çalışmaları bir araya getirilerek veri tabanı hazırlanmıştır. Bu kapsamda; Ulusal Tez Merkezi veri tabanında iklim değişikliği ile ilgili 288 tez çalışmaları tespit içerisinde planlama ve tasarım ile ilgili olduğu tespit edilen 25 adet lisansüstü tezi kullanılmıştır. Scopus veri tabanında yapılan taramada ise 303.933 çalışmadan planlama ve tasarım ile ilgili olduğu tespit edilen 1249 adet makale ele alınmıştır. Ayrıca kuramsal temeller bölümünün oluşturulmasında konu ile yakından ilgili bazı kurum ve kuruluşların (Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, Peyzaj Araştırmaları Derneği, YÖK, TÜBİTAK) kütüphanelerinden elde edilen veriler kullanılmıştır.

Yöntem

Bildiride; 2000-2021 yılları arasındaki akademik alanda uluslararası ve ulusal ölçeklerde iklim değişikliğine uyum ve mekânsal planlama-tasarım ilişkisi konularında yapılan çalışmaların genel bir değerlendirilmesinin yapılması amaçlanmıştır. Bu amaçla çalışma; aşağıda ana başlıklar altında detaylı bir şekilde verilen 3 temel aşamada yürütülmüştür.

1. Aşama (Çalışmanın amacı ve öneminin belirlenmesi): Bu aşamada, bildirinin kurgu ve çerçevesini oluşturan ana amaç ve önem tanımlanmıştır. Uluslararası boyutta küresel bir sorun olan iklim değişikliğinin mevcut ve olası sorunlarına planlama ve tasarım disiplinlerinin bakış açılarının ortaya konulması, güncel çözüm ve yaklaşımların neler olduğunu ortaya koyulması ve yaşam kalitesi yüksek mekânların oluşmasında iklim elemanlarının nasıl kullanıldığının tespiti çalışmanın amaç ve önemini oluşturmaktadır.

2. Aşama (Literatür verilerin toplanması): 2000-2021 yılları arasındaki Ulusal Tez Merkezi veri tabanında “iklim değişikliği”, Scopus veri tabanında ise “climate change urban planing design ” anahtar kelimeleri kapsamında taramalar yapılarak ana materyali oluşturan çalışmaların veri tabanı oluşturulmuş ve ayrıca Google Scholar veri tabanı aracılığıyla iklim değişikliği ile ilgili temel bilgiler ve konuya araştırmacıların yaklaşımlarının tespiti sağlanmıştır. Bu kapsamda 2000-2021 yılları arasında Scopus veri tabanında 1249 adet makaleye ve Ulusal Tez Merkezi veri tabanında da toplam 25 adet lisansüstü teze erişim sağlanmıştır. Tespit edilen çalışmalar yıl, anabilim dalı, ülke ve üniversite bazında niceliksel olarak değerlendirilmiş olup, çizelge ve grafiklerle sunulmuştur.

3. Aşama (Sonuç ve önerilerin geliştirilmesi): Bu aşamada; ilgili konuda elde edilen bilgiler sonucunda akademik alanda son 20 yılda yapılan çalışmalar değerlendirilmiş olup, planlama ve tasarım alanında iklim değişikliği ile mücadelede güncel yaklaşımlar doğrultusunda çeşitli öneriler geliştirilmiştir.

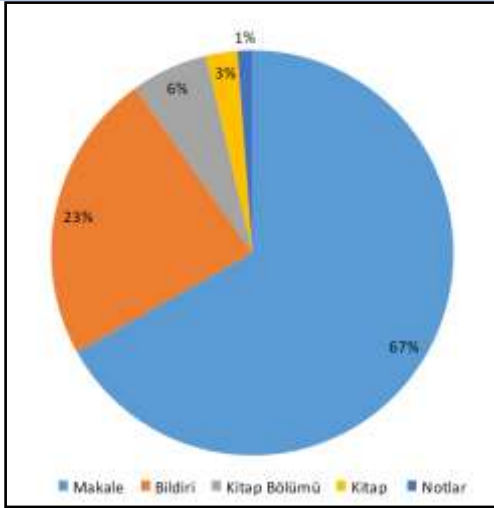
BULGULAR

İklim değişikliği konusunda gerçekleştirilen Uluslararası yaklaşımların tespiti amacıyla öncelikle Scopus veri tabanında tüm alanlarda konu ile ilgili ne tür araştırma yapıldığı hakkında fikir edinmek amacıyla 2021 yılı Nisan- Mayıs ayları arasında öncelikle “Climate change” anahtar kelimesi ile arama yapılmıştır. Bu arama sonucunda 1837 yılından 2021 yılına kadar toplam 403.973 çalışma tespit edilmiştir. 2000-2021 arasında 303.933 çalışma var olup, 2010-2021 arasında 378.262 belgenin var olduğu tespit edilmiştir (Çizelge 2).

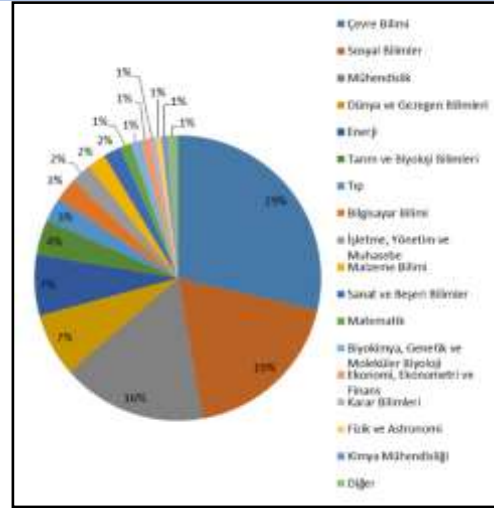
Çizelge 2. İklim Değişikliği Konulu Scopus Veri Tabanı Taraması

Başlık, özet, anahtar kelime içinde geçen	Tüm yıllar	2021-2000	2021-2010
Climate change	403.973	303.933	378.262
Climate change urban planning design	1.249	1.226	1.095

İklim değişikliği konusu ile ilgili çalışmalarda artışlar 2000’li yıllar itibariyle önemli bir ivme kazanmış olup, 2020 yılında 39.747 bilimsel çalışma gerçekleştirilmiştir. Kentsel alanlarda planlama ve tasarım bağlamında ele alınan konuları saptamak adına taramayı kısıtlamak için Scopus veri tabanında başlık, özet ve anahtar kelimelerde “climate change urban plannig design” geçen makale, konferans bildirisi, kitap, kitap bölümü gibi çalışmaların tespiti için tekrar arama yapılmıştır. Elde edilen sonuçlarda en çok makale çalışması tespit edilmiş olup, sırasıyla konferans bildirisi ve kitap çalışmaları dâhil olmak üzere birçok türde çalışmanın var olduğu tespit edilmiştir (Şekil 1). Scopus veri tabanında iklim değişikliği ile ilgili çalışmalar yapan meslek disiplinlerinin tespiti gerçekleştirilmiştir. Bu kapsamda, yapılan tarama sonucunda; çevre bilimleri, sosyal bilimler, sanat ve beşeri bilimler, bilgisayar bilimi, mühendislik, tıp, enerji, matematik, tarım ve biyoloji alanları dâhil olmak üzere çok farklı alanların bu konu üzerine çalışma yaptığı tespit edilmiştir. Meslek disiplinleri kapsamında gerçekleştirilen taramada, bu konu üzerine sırasıyla birinci sırada çevre bilimleri yer alıp bu sırayı sosyal bilimler, mühendislik, malzeme ve enerji bilimleri takip etmektedir (Şekil 2).

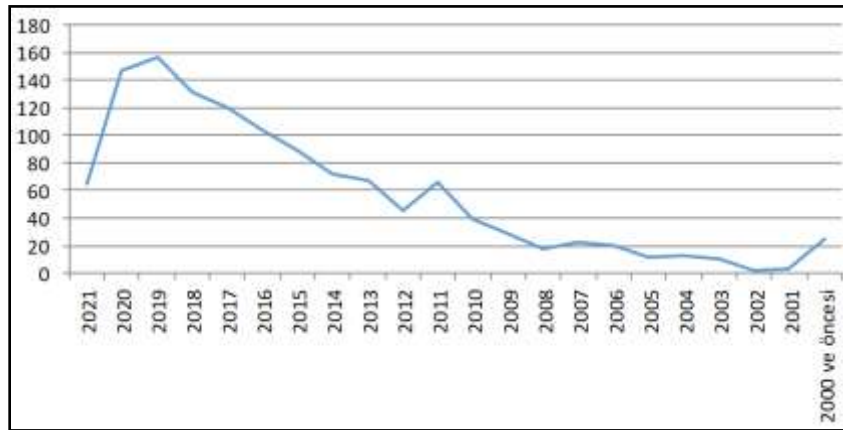


Şekil 1. Kaynak Belgenin Türü



Şekil 2. İklim Değişikliği Konusunda Çalışma Yapan Bilim Dalları

Yapılan incelemeler doğrultusunda 1979 yılından günümüze kadar toplam 1.249 çalışmanın var olduğu tespit edilmiş ve 2000-2021 yılları arasında 1.226 çalışmanın, 2021-2010 yılları arasında 1.095 çalışmanın var olduğu saptanmıştır. 2011 yılına kadar iklim değişikliği konulu bilimsel çalışmalar artış gösterirken 2012 yılında çalışma sayılarında düşüş gözlemlenmiştir. Fakat 2012 yılından sonra 2019 yılına kadar ciddi bir artış görülmektedir. 2019 ile 2020 arasında tekrar bir düşüş meydana gelmiş olup, taramalar 2021 yılının nisan-mayıs aylarında gerçekleştiği için bu yılda düşüş görülmektedir şeklinde yorum yapmak yanlış bir değerlendirme olacaktır. Bu kapsamda yıllar itibari ile gerçekleştirilen çalışma sayılarının 2006 yılı itibari ile yıllık 20'nin üzerine çıktığı görülmekle birlikte 2019 yılında toplam 157 ve 2020 yılında toplam 147 çalışmanın yapılmış olduğu tespit edilmiştir (Şekil 3).



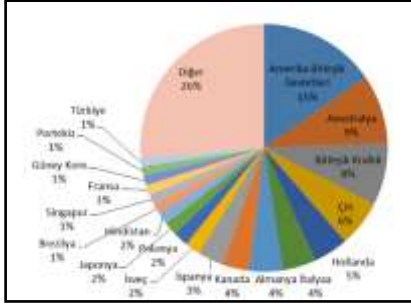
Şekil 3. İklim Değişikliği Konusunda Ülkelerin Yapmış Olduğu Çalışmalar

Yayımlanan bilimsel çalışmalar ayrıca Scopus veri tabanı aracılığı ile ülkeler bağlamında da incelenmiştir. En çok çalışma yapan ilk on ülke sırasıyla Amerika Birleşik Devletleri (270), Avustralya (158), Birleşik Krallık (143), Çin (107), Hollanda (80), İtalya (77), Almanya (76), Kanada (62), İspanya (60) ve İsveç (35) olup, Türkiye'de 20 çalışma bulunmaktadır (Şekil 4). Birçok ülkenin iklim değişikliği üzerine çok sayıda bilimsel çalışma ürettiği yapılan inceleme sonucunda tespit edilmiştir.

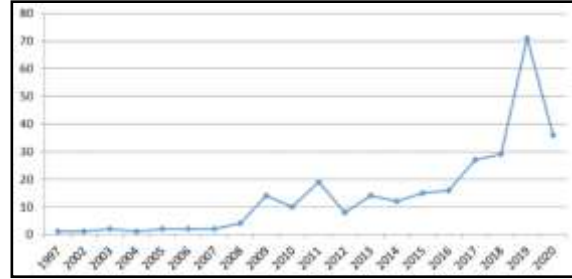
Ulusal ölçekte gerçekleştirilmiş çalışmaların tespitinde Ulusal tez merkezi veri tabanından yararlanılmıştır. Bu kapsamda ulusal tez merkezi veri tabanında 2021 yılı Nisan ayında "İklim değişikliği" anahtar kelimesi tarama yapılmıştır. Bu bağlamda yapılan tarama sonucunda 1997 yılından 2021 yılının Nisan ayı itibariyle 218 yüksek lisans tezi 70 doktora tezi ve 1 tıpta

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uzmanlık olmak üzere toplam 289 çalışma tespit edilmiştir. Ülkemizde oluşturulan lisansüstü tez çalışmalarının 2009 yılına kadar yıllık sayılarının 10'un altında olduğu, 2010 yılı itibari ile yıllık çalışma sayısının 10'un üzerine çıkarak artış gösterdiği tespit edilmiştir. Ülkemizde özellikle 2019 yılı itibariyle toplam 71 ve 2020 yılında ise toplam 36 lisansüstü tez çalışması hazırlanmıştır (Şekil 5).



Görsel 4. İklim Değişikliği ve Ülkelerin



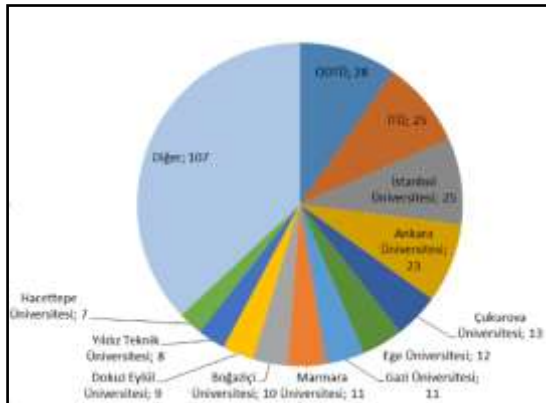
Görsel 5. İklim Değişikliği Konusunda Yapılan Tez

Yapmış Olduğu Çalışmaların Dağılımı

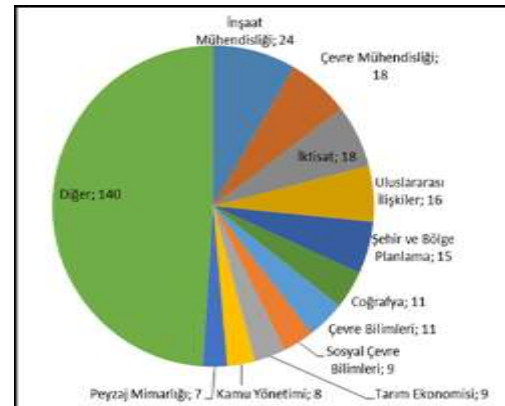
Çalışmalarının Yıllık Dağılımı

Bu çalışmaları gerçekleştiren toplam 38 üniversite içerisinde ilk on sırada sırasıyla, Orta Doğu Teknik Üniversitesi (28), İstanbul Teknik Üniversitesi (25), İstanbul Üniversitesi + Cerrahpaşa (23+2), Ankara Üniversitesi (23), Çukurova Üniversitesi (13), Ege Üniversitesi (12), Gazi Üniversitesi (11), Marmara Üniversitesi (11), Boğaziçi Üniversitesi (10) ve Dokuz Eylül Üniversitesi (9) yer alıp, Tekirdağ Namık Kemal Üniversitesinde konuyla ilgili 2 çalışma yer almaktadır (Şekil 6).

Yayımlana tez çalışmaları anabilim dalı kapsamında incelediğinde toplam 88 anabilim dalı içerisinde gruplandırılmaktadır. İklim değişikliği konusunun çok farklı anabilim dalının inceleme konusu içerisinde yer aldığı tespit edilmiştir. Tarama sonucunda anabilim dalı ve tez sayıları kapsamında oluşturulan sıralamada ilk on içerisinde sırasıyla İnşaat Mühendisliği (24), Çevre Mühendisliği (18), İktisat (18), Uluslararası İlişkiler (16), Şehir ve Bölge Planlama (16), Coğrafya (11), Çevre Bilimleri (11), Sosyal Çevre Bilimleri ve Tarım Ekonomisi (9) ve Kamu yöntemi (8) ve Peyzaj Mimarlığı (7) yer almaktadır. Mimarlık Anabilim Dalında ise konu ile ilgili yapılmış 3 tez çalışması bulunmaktadır (Şekil 7). El edilen taramalar sonucunda çalışmaların içerikleri incelenmiş, iklim değişikliği ile mücadele kapsamında planlama ve tasarım ile ilgili çalışmaların yaklaşımları tespit edilmiştir.



Görsel 6. İklim Değişikliği Konusunda Anabilim Dalı Kapsamında Dağılımı



Görsel 7. İklim Değişikliği Konusunun Tez Çalışması Yapılan Üniversiteler

TARTIŞMA VE SONUÇ

Çalışma kapsamında; uluslararası ve ulusal ölçeklerde iklim değişikliğine uyum ve mekânsal planlama-tasarım ilişkisi konularında yapılan akademik çalışmaların genel bir değerlendirilmesi yapılmıştır. Yapılan değerlendirmeler 2000-2021 yılları arasında Scopus ve YÖK Tez tarama veri tabanları çerçevesinde gerçekleştirilmiştir. Yıl, anabilim dalı, ülke ve üniversite açısından sayısal değerlendirmelerin yapıldığı sonuçlar çizelge ve grafikler şeklinde sunulmuştur. Elde edilen bulgular kapsamında çıkan sonuçlar aşağıda maddeler şeklinde verilmiştir.

- Literatür araştırmaları kapsamında verilen iklim değişikliği içerik ve kapsam açısından çok boyutlu ve multidisipliner bir kavram oluşu görülmektedir. Bu durum, iklim değişikliği konusunun farklı disiplinlerce ele alınmasını sağlamıştır. Çalışma kapsamında yapılan değerlendirmeler neticesinde ise mekânsal planlama- iklim değişikliği ilişkisi çerçevesinde çevre bilimleri, sosyal bilimler, mühendislik, malzeme bilimi, sanat ve beşeri bilimler gibi birçok alanda çalışmalar gerçekleştirildiği saptanmıştır. Özellikle de ilgili çalışmaların çevre bilimleri, sosyal bilimler ve mühendislik disiplinlerinde yoğunlaştığı belirlenmiştir.
- İklim değişikliği ile ilgili konuların özellikle yıllar içerisinde artış gösterdiği de çalışmadan elde edilen diğer bir sonuç olmuştur. İlgili konuda Scopus ve YÖK tez tarama veri tabanlarında yapılan değerlendirmelerde özellikle 2018 ve 2019 yılları arasında en fazla sayıda çalışma yapıldığı tespit edilmiştir. Bu durum akademik alanda iklim değişikliği ile mekânsal planlama ilişkisi konularına verilen önemin yıllar içerisinde giderek arttığını göstermesi açısından önemlidir. İlgili çalışmalar, 2021 yılında azalış gösterdiği gözükse de çalışmanın hazırlandığı zaman sürecinde yılın tam bitmemiş olması göz önüne alınmalıdır.
- İklim değişikliği konusunda Ulusal Tez Tarama veri tabanında 2000 yılı itibari ile 288 tez çalışmaları tespit edilmiş olup, bu tez çalışmalarından 25'inin planlama ve tasarım ile ilgili olduğu tespit edilmiştir. İklim değişikliği ile ilgili hazırlanan uluslararası bağlamda çalışmaların tespitinde Scopus veri tabanında ise iklim değişikliği alanında, yapılan taramada 303.933 çalışma tespit edilmiş olup, bu çalışmalardan 1249'unun planlama- iklim değişikliği ilişkisi alanında yapıldığı belirlenmiştir. Bu durum, iklim değişikliği ile mekânsal planlama ilişkisinin ele alındığı çalışmaların sınırlı sayıda olduğunu ortaya koymaktadır. Sılaydın Aydın ve Ark., 2017'nin de belirttiği gibi; iklim değişikliği konusunda çok fazla sayıda çalışma yer almasına karşın ülkemizde 3194 sayılı İmar Kanununda iklim değişikliği kavramı kısıtlı bir yerde geçmekte ve mevzuatta kendine yer edinmiş olmasına rağmen, uygulamaya ilişkin kapsamın hala yeterli düzeyde olmadığı dikkat çekmektedir (Sılaydın Aydın vd., 2017). Onur (2014)'ün yaptığı çalışma bu çalışmayı destekler niteliktedir. Ancak ilgili alanda ulusal ve uluslararası ölçekte yıllar içerisindeki çalışmaların sayıca artış göstermesi, bu konuya verilen önemin giderek arttığına işaret eder.
- Ülke düzeyinde Scopus veri tabanına yönelik taramalarda ilgili konularda en çok Amerika Birleşik Devletleri, Avustralya ve Birleşik Krallık gibi ülkelerde en fazla sayıda çalışma yapıldığı görülmektedir. Türkiye'de ise ilgili konularda yapılan akademik çalışmalar oldukça sınırlı sayıda kalmıştır. Bu durum özellikle gelişmiş ülkelerde ilgili konuya daha fazla önem verildiğine işaret edebilir.
- Ulusal tez tarama veri tabanında yapılan taramalar incelendiğinde; ilgili konularda yapılan lisansüstü tezler daha çok Ortadoğu Teknik Üniversitesi, İstanbul Teknik Üniversitesi ve İstanbul Üniversitesi'nde ve mühendislik alanlarında yoğunlaştığı saptanmıştır. Bu da ilgili konuların daha çok Ankara ve İstanbul gibi büyükşehirler özelinde yoğunlaştığını ve konunun daha çok teknik anlamda ele alındığını ortaya koymuştur.

• Literatür taramaları sonucu yapılan değerlendirmelerde; Uluslararası bağlamda gerçekleştirilen araştırmaların genel olarak ekolojik kentsel planlama yaklaşımları, termal konfor, kentsel ısı adası, su yönetimi, yeşil altyapı, düşük karbonlu yerleşimler, doğa temelli çözümler, iklim modellemesi, planlama ve tasarımda hibrit yaklaşımlar, kentlerin serinletilmesi, havalandırma koridorları üzerine yoğunlaşmış oluğu belirlenmiştir (Roosbahani ve Ark., 2020; Atanasova, 2020; Romano ve Ark., 2020; Capolongo ve Ark., 2020; Chokhachian ve Ark., 2020; Ma ve Ark., 2020; Abdi ve Ark., 2020; Grilo ve Ark., 2020; Westendorff, 2020; Lam ve Ark., 2021; Thomson ve Newman, 2021; Peng ve Ark., 2021). Bu kapsamda özellikle doğa temelli yaklaşımların iklim değişikliği ile mücadelede önemli bir araç olarak kullanıldığı görülmektedir. Bu kapsamda iklim değişikliği ile mücadele kapsamında doğa temelli çözümler ile modelleme-simülasyon çalışmalarının birlikte kullanılması azaltma ve uyum çalışmalarında oldukça önemli sonuçlar oluşturacaktır. Fakat bu çözümler karşısında yere özgü planlamadan tasarıma kadar ölçeklerin bütüncül bir şekilde ele alındığı stratejilerin ve yasal zorunlulukların oluşturulması gerekmektedir.

Sonuç olarak, iklim değişikliği ile yerel, bölgesel, ulusal ve küresel ölçekte tarımsal, sosyal, ekonomik vb. pek çok alanda değişimler yaşanmaktadır. Bu durumuma bağlı olarak meydana gelen kuraklık, taşkınlar, yangınlar gibi etkiler sonucu ekosistem zarar görmekte ve dolayısıyla da yaşam alanlarında olumsuzluklar yaşanmaktadır. Böylelikle iklimlerde meydana gelen değişim ve dönüşümlerin farklı ölçeklerde kendini hissettirmeye başladığı 21. Yüzyılda iklim değişikliğinin azaltılması ve iklim değişikliğine adapte olma çalışmaları daha da önem taşımaktadır. Bununla birlikte; özellikle de kentsel alanlarda, yeşil alanların giderek azalması, yoğun yapı kütleleri ve asfalt beton gibi yüzeyler kentsel ısı adalarının oluşmasına ve kentlerde mikro iklimlerin oluşmasına neden olmaktadır. Bu noktada; Çetin ve Ark., 2019'un da belirttiği gibi; fiziksel ve sosyo-ekonomik açıdan gelişmiş yaşanılabilir bir kentin en önemli göstergesi planlı kentleşme yaklaşımıdır (Çetin vd., 2019). Bu bağlamda planlamaya esas olan kriterler ve veriler ne kadar çeşitli ve hassas ise elde edilen başarı o kadar yüksek olacaktır. Bu noktada iklim planlama ve tasarım çalışmalarında ele alınması gereken en önemli etkidir. Özellikle mekânsal planlama çalışmalarında iklim değişikliği ile uyum yaklaşımının ele alınması ve ilgili çalışmaların yoğunlaşması oldukça önemli olacaktır. Bu bağlamda kaliteli yaşam mekânlarının oluşturulmasında önemli yeri olan planlama ve tasarım disiplinleri iklim değişikliğinin etkilerinin azaltılması ve adaptasyon çalışmalarında birlikte çözüm üretmeleri uygulanabilir ve kalıcı çözümlerin oluşturulmasında önemli bir etmendir. Böylece farklı disiplinlerin diğer alanlar için önerileri vermeleri yerine ilgili meslek disiplinleri ile bir arada uygulanabilir hassas ve çeşitli kriterler ile çözümler üretebilecektir.

NOT: Bu çalışma doktora tez çalışmasından yararlanılarak hazırlanmıştır.

KAYNAKÇA

Abdi, B., Hami, A., & Zarehaghi, D. (2020). Impact of small-scale tree planting patterns on outdoor cooling and thermal comfort. *Sustainable Cities and Society*, 56, 102085.

Aşıcı, A. A. (2017). İklim için Yeşil Ekonomi Politikaları. https://www.researchgate.net/publication/317304373_IKLIM_ICIN_YESIL_EKONOMI_PO_LITIKALARI (Erişim tarihi: 05.04.2021).

Atanasova, A. (2020). The Green City: New Opportunity for Planning and Developing Cities. *International Multidisciplinary Scientific GeoConference: SGEM*, 20(6.1), 655-661.

Balık, H. ve Duman Yüksel, Ü. (2014). Planlama Sürecine İklim Verilerinin Entegrasyonu. *Türk Bilimsel Derlemeler Dergisi*. 7 (2): 01-06. ISSN: 1308-0040. (Erişim tarihi: 05.04.2021).

Capolongo, S., Buffoli, M., Brambilla, A., & Rebecchi, A. (2020). Healthy urban planning and design strategies to improve urban quality and attractiveness of places. *TECHNE-Journal of Technology for Architecture and Environment*, 271-279.

Chokhachian, A., Perini, K., Giulini, S., & Auer, T. (2020). Urban performance and density: Generative study on interdependencies of urban form and environmental measures. *Sustainable cities and society*, 53, 101952.

Çetin, M., Özel, H. B., Çalı, K. ve Cantürk, U. (2019). Kentsel Peyzaj Planlama Çalışmalarında Biyokonfor. İklim Değişikliği ve Kentler Yapısal Çevre ve Yeşil Alanlar içerisinde.

ÇSB, (2021). Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, Sözleşme ve Protokoller. <https://iklim.csb.gov.tr/paris-anlasmasi-i-98587> (Erişim tarihi: 05.04.2021).

Görgülü, Ç. ve Görgülü, L. (2021). İklim Değişikliğine Eko-Morfolojik Yaklaşım: Kentsel Çeper Kuşak Alanları. *Journal of Environmental and Natural Studies*, 3(1): 72-99. ISSN: 2146-9229 (Erişim tarihi: 05.05.2021).

Grilo, F., Pinho, P., Aleixo, C., Catita, C., Silva, P., Lopes, N., ... & Branquinho, C. (2020). Using green to cool the grey: Modelling the cooling effect of green spaces with a high spatial resolution. *Science of the Total Environment*, 724, 138182.

Hansen, R., Rall, E. L. and Pauleit, S. (2015). *A Transatlantic Lens on Green Infrastructure Planning and Ecosystem Services: Assessing Implementation in Berlin and Seattle. In Revising Green Infrastructure Concepts Between Nature and Design.*

Hu T., Chang J., ve Syrbe R. (2021). Green Infrastructure Planning in Germany and China A comparative approach to green space policy and planning structure. *Research in Urbanism Series*, 6, 99-126. <https://doi.org/10.7480/rius.6.96> (Erişim Tarihi: 01.05.2021).

İBB ve PAD (2019). İklim Değişikliğine Dirençli Kentler için Bir Çerçeve: Yeşil Odaklı Uyarlama Kılavuzu. <https://www.skb.gov.tr/wp-content/uploads/2019/07/Izmir-Buyuksehir-Belediyesi-Yesil-Odakli-Uyarlama-Kilavuzu.pdf> (Erişim tarihi: 05.04.2021).

İklim İN, (2019a). İklim Değişikliği Eğitim Modülleri Serisi 1. İklim Değişikliğinin Bilimsel Temelleri, Türkiye'ye Etkileri. http://www.iklimin.org/wp-content/uploads/egitimler/seri_01.pdf (Erişim tarihi: 05.04.2021).

İklim İN, (2019b). İklim Değişikliği Eğitim Modülleri Serisi 4. Türkiye'de İklim Değişikliği ile Mücadelede Politikalar, Yasal Ve Kurumsal Yapı. http://www.iklimin.org/wp-content/uploads/egitimler/seri_04.pdf (Erişim tarihi: 05.04.2021).

İklim İN, (2019c). İklim Değişikliği Eğitim Modülleri Serisi 11. İklim Değişikliği, Sürdürülebilir Kentler ve Kentsel Planlama Etkileşimi. <http://www.iklimin.org/moduller/kentmodulu-surdurulebilirkentler.pdf> (Erişim tarihi: 05.04.2021).

Lam, C. K. C., Lee, H., Yang, S. R., & Park, S. (2021). A review on the significance and perspective of the numerical simulations of outdoor thermal environment. *Sustainable Cities and Society*, 71, 102971.

Ma, X., Wang, M., Zhao, J., Zhang, L., & Liu, W. (2020). Performance of different urban design parameters in improving outdoor thermal comfort and health in a pedestrianized zone. *International Journal of Environmental Research and Public Health*, 17(7), 2258.

Onur, A.C. (2014). *İstanbul'da Kentleşmenin İklim Değişikliğine Uyum Çerçevesinde Değerlendirilmesi*, Doktora Tezi, İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.

Peker, E. (2020). Bir Şehircilik Problemi: Değişen İklimde Termal Konforu Sağlamak. *Planlama*, 31(1):108–119. DOI: 10.14744/planlama.2020.92679 (Erişim tarihi: 05.05.2021).

Peng, L. L., Jiang, Z., Yang, X., He, Y., Xu, T., & Chen, S. S. (2020). Cooling effects of block-scale facade greening and their relationship with urban form. *Building and Environment*, 169, 106552.

Romano, R., Bologna, R., Hasanaj, G., & Arnetoli, M. V. (2020). Adaptive Design to Mitigate the Effects of UHI: The Case Study of Piazza Togliatti in the Municipality of Scandicci. In *Sustainability in Energy and Buildings* (pp. 531-541). Springer, Singapore.

Roobahani, A., Behzadi, P., & Bavani, A. M. (2020). Analysis of performance criteria and sustainability index in urban stormwater systems under the impacts of climate change. *Journal of Cleaner Production*, 271, 122727.

Semeraro T, Scarano A, Buccolieri R, Santino A, Aarrevaara E. (2021). Planning of Urban Green Spaces: An Ecological Perspective on Human Benefits. *Land*. 2021; 10(2):105. <https://doi.org/10.3390/land10020105> (Erişim Tarihi: 01.05.2021).

Sılaydın Aydın, M. B., Erdin, H. E. ve Kahraman, E. D. (2017). Mekansal Yapı Özellikleri Açısından İklim Değişikliğine Karşı Risk Taşıyan Bölgelerin Saptanması, İzmir. *Planlama*, 27(3):274-285. DOI: 10.14744/planlama.2017.61587 (Erişim tarihi: 05.05.2021).

Thomson, G., & Newman, P. (2021). Green infrastructure and biophilic urbanism as tools for integrating resource efficient and ecological cities. *Urban Planning*, 6(1), 75-88.

Toy, S. ve Yılmaz, S. (2009). Peyzaj Tasarımında Biyoklimatik Konfor ve Yaşam Mekânları için Önemi. *Atatürk Üniversitesi Ziraat Fakültesi Dergisi*, 40(1):133-139. ISSN : 1300-9036.

Toy, S., Kayıp, D. B. ve Çağlak, S. (2018). Eskişehir'de (biyo)İklime Duyarlı Kentsel Tasarım Örneği. *GÜFBED/GUSTIJ*, 9 (2): 353-361. DOI: 10.17714/gumusfenbil.470288. (Erişim tarihi: 05.05.2021).

Uncu, A. B. (2019). İklim için Kentler Yerel Yönetimlerde İklim Eylem Planı. https://world.350.org/iklimicinkentler/files/2019/05/350_booklet_2.pdf (Erişim tarihi: 05.04.2021).

Westendorff, V. E. (2020). Role of Trees in Mitigating Urban Heat Island in Charlotte, North Carolina, USA. *WIT Transactions on Ecology and the Environment*, 245, 73-83.

**EXAMINATION OF THE QUALITY-DIMENSION RELATIONSHIP IN HEREKE
SILK CARPETS THROUGH THE INTERPRETATION OF "THE LAST SUPPER"
WOVEN IN DIFFERENT QUALITIES**

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Abstract

The art of carpet weaving, the first examples of which are claimed to be found in Central Asia, has an important place in Turkish culture. Throughout history, carpets, often appeared as floor ground clothes or wall carpets.

Carpets woven with wool and cotton yarn were also woven only silk, together with the discovery of silk yarn. In Hereke Fabrika-i Hümayunu, which was a textile manufacturing factory in the Ottoman period, hand-woven carpets called 'Hereke' have been started to be manufactured using the Gordes technique.

Hereke carpets, which have a unique weaving technique, entered a new era as of 1980. The fine silk yarns obtained from the fine shots from the cocoons allowed to weave high quality carpets. The increase in quality has made it possible to weave detailed drawings. So, the works that have an important place in the art history have also been depicted in Hereke carpets. In the paintings of the artists interpreted by the designers, it is possible to see some of the value and highlight effects that artists want to present in the weaving due to the increase in the warp frequency and the number of colors. This is because as the yarn denier becomes thinner, the number of warps and knots increases. There is an inverse proportion between the size of the weave and the increase of the movement area. So, which are called 'painting carpets', whose size decreases, are hung on the walls using frames.

In the study, two woven carpets with different quality were studied based on the painting of the artist Leonardo Da Vinci named "The Last Supper". To determine the number of knots in 1 cm² by using a loop. The frequency of knots, number of colors, chiaroscuro in the two woven carpets were compared and the effect of their frequency on size was examined.

Keywords: Hereke, Quality, Dimension, Hand-Woven, Leonardo Da Vinci, The Last Supper

HEREKE SILK CARPET AND WALL HANGINGS PERIOD

Hereke carpets are pile weaves that have gained originality with their unique technique. In the textile manufacturing factory named Hereke Fabrika-i Hümayunu, founded during the Ottoman period, manufacturing was carried out for many years under the guidance of Armenian and Turkish master weavers (Küçükerman, 1987: 47). Originally produced only for the palace, carpets evolved into commercial sizes over time and were exported until the First World War (Küçükerman, 1987:53). The carpets, which attract attention at home and abroad, are named after the district in which the factory was located.

One of the biggest reasons why Hereke carpets are considered valuable is that they are woven with double weft yarn. Each knot is woven with two weft yarns, one thick and the other one thin, after the Turkish knot called 'Gördes'. Weft yarns and knots are struck with carpet combs and interlock with each other. Thanks to this clamping, the knots are compressed. Thus, when using the carpet for many years, there are no problems such as deterioration of knots or their displacement. Durability is one of the most important features of Hereke carpets. Another important point is that it was woven with natural yarns dyed with natural dyes in the period.



Photo 1. Two Weft Yarns and A Carpet Comb

(Photo 1: Reyhan POLAT Photo Archive, Sugören Village, Yalova, Turkey, 2018)

Since the foundation of the factory, carpets woven from wool, wool-silk blend, or silk alone entered a period of high quality after 1980. The fact that silkworm breeding remained in limited regions in the world has led the competition area to the production of extra thin carpets. The number of warp yarns and knots per centimeter has increased as quality cocoon breeding has become possible and 20-22 denier yarns can be obtained, especially from cocoons produced in Brazil and China (Polat, 2018:6). Because the increase in warp frequency is possible with the thinning of yarns. The yarn becomes thinner, the increase in the amount of warp yarn per square centimeter increases the number of knots. As the number of warp yarns per centimeter determines the quality of the carpet, the quality of the weaving increases depending on the increasing number of warp yarns. Likewise, as the number of warp yarns in centimeters decreases, the quality of the carpet decreases.



Photo 2. Silkworm Cocoons

(Photo 2: Reyhan POLAT Photo Archive, Umurbey, Bursa, Turkey, 2019)

The increase in the number of knots is directly proportional to the increase in the movement area. In this way, detailed patterns can be woven as much as the quality allows. It can be seen that the yarn uses rapport patterns, geometric motifs, or organic forms in the compositions designed for Hereke carpets before extra-fine reeling is performed from the cocoons. With the increase in quality, more depiction-oriented designs have started to be made. After 1980, portraits, characteristic writings, landscape-animal depictions were included in Hereke carpets, which were first woven for the palace, and therefore classical patterns such as the Hatayi group and Rumî group were used in pattern designs. In addition, on Hereke carpets, we can find interpretations of works that occupy an important place in the history of art. Due to the increase in the movement area, the light, shadow, value, depth effect depicted in the paintings can also be woven on carpets. Because there are enough knots to cover these areas. Although weaving is made from the examples in the art of painting, we cannot call these weaves tapestry. While tapestry is a plain weave; carpet is a type of pile weave. These pile weavings, which have small dimensions due to the high warp density, are called wall-hanging carpets. These silk hand-woven wall-hanging carpets are said to have emerged as a result of increased competition in the silk yarn market. (M. Latif TARAŞLI, Personal Interview, January 2018). The countries that could not compete with the market started to produce carpets called extra fine quality. These carpets are sold at high prices.

Although Hereke carpets are still woven in the required size and quality for floor mats, there is a great interest in carpets called "wall hanging". These weavings, woven by hand on a vertical loom, are usually hung on large paintings in frames with a velvet floor. Silk wall hanging carpets attract the attention of collectors.



Photo 3. An Example of Wall Hangings

(Photo 3: Reyhan POLAT Photo Archive, Mehmet ÇINAR Collection, Sultanahmet, Istanbul, Turkey, 2017)

FREQUENCY-DIMENSION RELATIONSHIP THROUGH DA VINCI

The Last Supper fresco, which Leonardo Da Vinci allegedly made in the 15th century on the wall of Santa Maria Dele Grazie in Milan, Italy (Gombrich, 2007:298); was also the subject of the patterns of the Hereke carpets including the interpretations of works from world art history after the transition to the high-quality period. In the study, the effect of quality on size was investigated on silk wall hanging carpets woven in two different qualities by a hand-weaving factory in Hereke. There is an inverse proportion between the qualities of two carpets, one of which is 21x36 cm and the other 11x18 cm, belonging to the same pattern interpretation. Small-sized carpets are of higher quality than large-sized ones. The large-sized 21x21 quality carpet is 21x36 cm in size. The small-sized carpet is 40x40 quality and 11x18 cm in size. As can be seen in the current example, as the quality increased, the size decreased. The number of warps per centimeter of small carpet is almost twice as large as the number of warps per centimeter of large carpet. This has the opposite effect in size. The width and height of the small-sized carpet are half the size of the large one.



Photo 4. The Dimensional Relationship of “The Last Supper” Interpretation in Two Different Qualities

(Photo 4: Reyhan POLAT Photo Archive, Mustafa ÇINAR Collection, Hereke, Kocaeli, Turkey, 2018)

Quality is measured from the backing of the carpet. The number of warp yarns within 1 cm of the carpets measured with a 2.5 cm loop multiplied by the order of weft yarns within 1 cm gives the number of knots in 1 cm². Knowing the total number of knots in the smallest unit, the designer has an idea of how detailed drawings can be made in the patterns.



Photo 5. Examining Two Different Quality Backings

(Photo 5: Reyhan POLAT Photo Archive, Mustafa ÇINAR Collection, Hereke, Kocaeli, Turkey, 2018)



Photo 6. Comparison of Original Picture of The Last Supper Fresco,
Carpets in 21x21 and 40x40 Quality in cm² on the Same Frame

(Photo 6: 1st Photo - <https://www.britannica.com/topic/Last-Supper-fresco-by-Leonardo-da-Vinci> &

Reyhan POLAT Photo Archive, Mustafa ÇINAR Collection, Hereke, Kocaeli, Turkey, 2018)

Compared to the original work, it can be seen that the ratio of the original work is adhered to in the compositions of the carpet touched by the interpretations (See Photo 6).

The perspective of the space, the number of partitions, the placement of still life, and figures visible from the window were woven according to the original. The sandy image, which is thought to be caused by abrasions on the wall over the years, is reflected as the wall texture in the weaving. To give you a sense of the draping and movement of the garments on Jesus Christ and his apostles, light, shadow, and value effects have been given with threads dyed in different shades of color. The same technique can be seen on the front of the tablecloth. The weaving composition was given depth with the black contours used in places, and the objects on the table were woven in different sizes from the original work.

About 18 different colors of thread were used in the weaving, with threads of the same color used with different color combinations to show as if a richer color scheme had been used. It is believed that this illusion was created on purpose. Dyeing more than one shade of color requires a high cost. In addition, the higher the number of colors, the longer the weaving action takes. Because changing a thread color in a few knots takes a long time. For this reason, the price paid to the weaver increases as the weaver spends more time. This also increases the material value of the carpet.

Another striking factor is that the colors of the space are completely different from each other, although the compositions of both qualities are in the same image and proportion. The reason is thought to be due to the evaluation of the remaining yarns. As silk thread is expensive and difficult to take from cocoons, pre-painted yarns are likely to be preferred. Another possibility is that a warm-colored wall image may have been preferred in the background of the composition so that a fabric that will be woven in 11x18 cm size does not look dark. A carpet designer who has received basic art education can foresee these situations.

Although there is a difference in size between high and low quality, it can be seen that both compositions are woven in proportion and as detailed as possible when compared to the original work. Though there is a 2-fold difference in size between them, the tissues on the wall are significantly woven on carpets of both qualities. The reason why the size shrinks and does not cause visible simplification in the pattern is the increase in quality. The desired composition is obtained when the quality and frequency are correctly calculated before designing the pattern. A designer needs to gain these experiences while drawing patterns in pixel-based weaving software. Since the weaving phase after the patterns are given to the weaver in squared and colored form is laborious, each stage must be planned correctly before weaving on the carpet loom. The same dedication should be shown when determining the quality appropriate to the yarn fineness and deciding on the correct size before the drawing begins. Otherwise, the carpets cannot lift the knots during the weaving process and the warps of the carpet will be constantly broken. This results in removing the carpet from the loom and rescheduling the pattern.



Photo 7: Carpets Removed From The Loom Due To The Incorrect Frequency-Dimension Relationship

(Photo 7: Reyhan POLAT Photo Archive, Mustafa ÇINAR Collection, Hereke, Kocaeli, Turkey, 2018)

CONCLUSION

As seen in carpets with two different qualities, high quality has enabled a designer to use the carpet as a canvas. Although the increase in quality has reduced the size of the carpet, it has made it possible to weave the detailed drawings in the pattern. The inverse proportion in question has enabled the carpet to be approached like a table and has led to the inclusion of every description that appeals to the aesthetic perception in the carpet. The painters whose paintings were woven on tapestries for centuries, and the ones whose paintings were woven like carpets, are thought to have contributed to these trends as well. Today, it is thought that the substructure of the interdisciplinary artists working not only in traditional arts but also in contemporary artworks to produce with textile materials is formed by the woven arts in the field of plastic arts. Because while the carpet is a common product used for conservation and warming purposes, it has become a product that portrait, landscape-animal depictions, and still life depictions can be touched in detail after 1980 thanks to extra fine threads taken from silk cocoons. This situation has brought the value of silk weaving to a more advanced level due to the possibility of richness in the pattern.

It is believed that the artistic importance of high-quality small-sized carpets, called wall hangings, will increase as time progresses and will be included in the collections of world museums because silk thread does not produce acid for many years and is structurally durable.

REFERENCES

BERGER, J. (1972), *Ways of Seeing*, Penguin Books, London.

DA VINCI, L. (2004), *Leonardo's Notebooks*, Black Dog & Leventhal Publishers, New York.

DANTO, A. C. (2014), *What Art Is*, Yale University Press, New Haven.

GOMBRICH, E. H. (1995), *The Story of Art*, 15th Edition, Phaidon Press, London.

GOMM, S. C. (2001), *The Secret Language of Art*, 1. Edition, Duncan Baird Publishers, London.

HODGE, S. (2017), *The Short Story of Art*, Laurence King Publishing, London.

KÜÇÜKERMEN, Ö. (1987), *Hereke Fabrikası*, 1. Basım, Apa Ofset Basımevi, İstanbul.

ÖZBALKAN, N. (1996), *Tekstil Terimleri Sözlüğü*, 2. Basım, Alfa Basım, İstanbul.

POLAT, R. (2018), *İnce (Yüksek) Hereke İpek Halıları Desen Tasarımları* (Unpublished Master's Thesis), Mimar Sinan Fine Arts University Fine Arts Institute, İstanbul.

Electronic References

The Last Supper Fresco Original Photo, Date of Access: 4 April 2022, <https://www.britannica.com/topic/Last-Supper-fresco-by-Leonardo-da-Vinci>

Personal Interview

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EVALUATION OF A PROJECT DEVELOPED TO PROVIDE QUALITY
INSTRUMENT INFRASTRUCTURE BY ACADEMICIANS' OPINION

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Abstract

One of the factors affecting performance in instrument training is instrument quality. Especially in the field of strings training, the quality of the instrument is the factor that motivates the student and increases the stage performance. Therefore, music teacher candidates are expected to have a quality instrument. However, acquiring a good instrument can be challenging for institutions, educators, and students nowadays. In this study, the outputs of an 'infrastructure project', which serves the field of string instruments and was developed to partially solve the current problem, are evaluated based on the opinions of academics. 7 instrument training specialists who work at a state university in Turkey participated in the study, which was carried out with a qualitative approach. The opinions of the instrument teachers were obtained with a semi-structured interview form and the data were analyzed with the content analysis technique. Results demonstrated that the project has the potential to meet institutional and individual expectations. It is expected that the study will provide some clues to researchers who want to develop projects for the same or similar purposes, especially on the efficient use of resources and sustainability.

Keywords: Instrument training, infrastructure project, opinions of experts

INTRODUCTION

Instrument training carried out within the scope of professional music education is a long-term process that requires enormous effort, dedication, and willpower from the teacher and the student. In instrument training, which mainly aims to gain behavioral skills as well as cognitive and affective knowledge and skills, coordinated use of psycho-motor skills is required. In this sense, practice in instrument training is both a necessity and a ritual. Practice, in addition to technical and musical skills, provides many gains such as musical memory, improvisation, creativity, development of interpretation, and combating stage fright. At the same time, the practice, which includes numerous physical and mental processes, is a challenging process for students and demands a high level of motivation. However, as can be seen in some studies, it is known that students do not follow a consistent approach in their practice process (see. Öztürk, 2020).

Affective characteristics can affect instrument training processes in different ways. For this reason, success and motivation increase when instrument training is designed with an approach that takes into account motivational resources and learning-teaching environments that respond to students' expectations are presented (Evans & Bonneville-Roussy, 2015;

Hallam et al., 2012). It is seen that the factors such as practice strategies, feedback, teaching methods, goal structure of the class, etc. are also related to motivation (Asmus, 1994). Therefore, the efficiency and course success of instrument study processes, which should be structured with a systematic approach, depend on many interrelated factors. Studies show that many personal and environmental factors affect success in instrument training such as curriculum, exams, teacher competencies and approach, learning-teaching processes, students' personality traits, affective characteristics such as anxiety, self-efficacy, attitude, how students perceive themselves, their tasks and performance, the strategies they use in the practical process, etc. (Austin & Berg, 2006; Hallam, 2001, 2006; Jørgensen, 2000; McPherson & McCormick, 2000; Nielsen, 1999; Oare, 2011; Pike, 2011; Şen & Akçay, 2021).

On the other hand, one of the most obvious differences between musicians is the choice of instrument. The instrument is a part of the student's identity rather than a physical object (MacIntyre & Potter, 2014). For this reason, it is important for the student to choose an instrument suitable for his/her personality in maintaining and motivating musical activities (Driscoll, 2009; Rotjan, 2017). As a matter of fact, as can be seen in some studies, students who prefer their own instrument are more motivated and tend to continue musical activities (Austin, 1990; Bartel, 2007; Cantero & Jauset-Berrocal, 2017; Öztürk, 2020).

Music teacher candidates are expected to have a quality instruments. However, in Turkey, the lack of development of the instrument making industry, the inability of instrument making experts who graduated from instrument construction undergraduate programs to meet the demands, the high prices of instruments imported from abroad, and the fact that the majority of candidates enrolled in music teaching programs come from a low socio-economic environment can make difficult to access a quality instrument. Some institutions can provide instruments for students to use during their education in line with their own facility, but this practice cannot reach all students. Naturally, most of the candidates are not able to meet a quality instrument during their education, which can negatively affect their individual practice processes, course success, and stage performance. Therefore, it is important to provide institutional support to students, who are enrolled in professional music education programs and have difficulty owning quality instruments, in providing qualified instruments that they can use during their education.

The Aim of the Study

Depending on the austerity measures circular published in recent years, budget restrictions were applied in public institutions and organizations. This practice had a negative impact on the processes of meeting instrument purchase and maintenance needs. Students who do not have the opportunity to acquire a quality instrument are supported by the institution with the instruments registered in the inventory of the institution without any time limit. However, since the resources of the institution are limited, a quality instrument cannot be offered to everyone. Briefly, current problems make it difficult to access quality instruments for institutions and students. Therefore, it is thought that there is a need for alternative applications to be developed to strengthen the infrastructure.

The aim of this study is to evaluate the outputs of an 'infrastructure project', which serves the field of string instruments and was developed to partially solve the current problem, based on the opinions of academics. It is expected that the study will provide some clues to researchers and educators who want to develop similar projects.

METHOD

Research Model

The study was structured according to the survey model. The main purpose of survey models is to describe what is living, existing, and what is experienced, by describing them qualitatively and quantitatively. In this study, the outputs of a developed infrastructure project are described with a qualitative approach through the opinions of field experts.

Study Group

The study group consists of 7 instrument instructors who work in Tokat Gaziosmanpaşa University, Faculty of Education, Department of Fine Arts Education and actively conduct instrument training courses. Some characteristics of the study group are presented in Table 1.

Table 1. Some characteristics of instructors

Code	Branch	Gender	Title
AU1	Piano	Female	Asst. Prof.
AU2	Piano	Male	RA
AU3	Flute	Female	Asst. Prof.
AU4	Flute	Female	Asst. Prof.
AU5	Flute	Female	Lecture
AU6	Violin	Male	Lecture
AU7	Guitar	Male	Asst. Prof.

Scope and Content of the Project

The project was developed with the support of the public to meet the quality instrument needs of the institution and the students. The scientific content of the project was prepared by four instrument training experts from the Faculty of Education, Department of Music Education. The authors contributed to the project as ‘project manager’ and ‘research assistant’. In the implementation process of the project, mostly students who took string instrument training took part. The project, which was prepared in 2017 and completed in 2018, was supported by Tokat Gaziosmanpaşa University (TOGU) Scientific Research Projects Commission Presidency (SReP) with project number 2017/11. Instruments and materials were provided by SReP. The project was financed with a budget of 54,315.40 TL. Within the scope of the project, a string instrument training process was carried out using the instruments provided and a concert series using the supplied instruments was held.

Data Collection and Analysis

The data were obtained through a semi-structured interview form prepared by the project developers. There are three open-ended questions in the form: opinions about the string concert series, opinions about the project, and suggestions. Qualitative data were analyzed using the content analysis technique. In qualitative studies, it is possible to reduce the data in written form to numbers at a certain level. Numerical analysis is the casting of study data into numbers or figures. The main purpose of digitizing qualitative data is to increase reliability, reduce bias, allow comparison between data, and allow the results of small-scale research or a case study to be retested later on a large sample (Yıldırım & Şimşek, 2006). In this study, frequency calculation was made for the analysis of the data. Qualitative data were interpreted by supporting the tables in the results section, and some opinions of field experts were directly conveyed to strengthen the comments. The code of the relevant field expert is indicated at the end of each citation shared. For expert opinions, FE1, FE2, FE3... coding, which is the abbreviation of the field expert, was used. Permissions for the research were got from the relevant institution. In order to ensure reliability in the study, the final version of the written text was shared with the participants and some changes were made in line with the feedback.

RESULTS

In this section, the opinions of instrument training experts regarding the project and quotations from their opinions are included.

Table 2. Opinions of instrument training experts on the project

Opinions	Frequency
The project contributed to the institution	7
The project contributed to the students	7
It is a sustainable project	6
The project can be expanded to include different instruments	5
Projects for instrument maintenance and repair can be developed	4

As seen in Table 2, all of the educators (n=7) think that the project contributes to the institution and students. On the other hand, almost all of the educators (n=6) stated that the project had a sustainable features. The majority of the participants (n=5) stated that the project should be expanded to include different instruments. Four educators shared the view that projects for instrument maintenance and repair can be developed.

Table 3. Opinions of instrument training experts on concerts

Opinions	Frequency
The concerts contributed to the institution	7
The project contributed to the students	7
The presence of educators on the stage has been beneficial in terms of being a role-model	6
It was effective that the educators performed a piece at the end of each concert	5
The motivation of the students who attended the concert seemed to be high	5
Student-teacher performance was compatible	4
It was understood that effort was made for the concerts	3

According to Table 3, all of the educators (n=7) think that the concerts contribute to both the institution and the students. Almost all of the field experts (n=6) shared the opinion that the presence of educators on the stage is beneficial in terms of being a role model. The majority of the participants (n=5) stated that to perform a piece by the educators is at the end of each concert is an effective method and the motivation of the students who attended the concert seemed high. On the other hand, four educators stated that the student-teacher performances were compatible, while three educators stated that they made efforts for the concerts. Some excerpts from expert opinions are given below.

“[...] The instruments of the department are quite old and in need of maintenance. For this reason, I think that the instruments purchased within the scope of the project are an achievement for both the institution and the students [...] Such projects can be submitted to the SReP every academic year in line with the needs. Or, it may be beneficial to develop the project by expanding the variety of instruments in certain periods...” FE6

“I think it was a successful project and concert event. [...] Because I observed that students who did not attend the concert but wanted to do individual studies after the concert [...] I can say that these studies, although not visibly, changed the study habits of the students and partially increased their success. Also, I think that the students who take part in the concerts are more successful both in the lessons and in the exams because they can overcome their stage anxiety a little bit.” FE5

“Students are asking when the next concert will take place. I think it is an important expectation [...] I think that the self-confidence and motivation of the student who went to the concert increased, and this situation was reflected in the success of the instrument lesson [...] Therefore, the concerts were effective in increasing the success.” FE3

“I think such projects should be developed continuously [...] It is difficult to achieve success in the instrument. There are many factors that affect success. One of these factors is the duration of the study [...] Acquiring the skills of playing an instrument requires long and intense work. That’s why I think these concerts motivate students.” FE7

“Concerts are a part of instrument training, we all know that. However, we also know that not every student who attends the concert is chosen among the successful students. Success in instrument training is achieved only by practice, not by concert. Concerts are effective for reinforcement. In short, working, working, working... There is no other way. Therefore, I do not think that the concerts have a direct effect on student success [...] But I can say that the instruments provided motivate the students to study. Because the instruments of the students are really of very poor quality.” FE1

“I wish the scope of the project had been wider [...] Due to the instrument branch and the content of the concert, none of my students took part in the concerts. For this reason, organizing a concert series in other instrument branches, similar to the string concert, can increase the motivation of the students...” FE3

“The teacher is a role model in instrument training. For this reason, the stage performance of the teacher is necessary for instrument education. I think that the project contributed to the institution and students in the supply of instruments. More importantly, at the end of each concert, the performance of a piece by the chamber music group consisting of teachers is valuable. As I saw that the students were watching the performances of the teachers with great attention, I thought that the stage performance of the educators was as important as the in-class teaching processes” FE1

CONCLUSION

Instrument education research constitutes an important part of the music education scientific literature. One of the prominent themes in current research is the phenomenon of motivation. It can be said that motivation research provides an important accumulation in music and instrument education, which has a history of nearly half a century. The common results of these studies are that the student’s decision to continue a behavior is effective in the motivation instrument training processes, and there are many factors related to motivation. In a limited number of studies, it is seen that one of these factors is the quality of the instrument. In Turkish conditions, the probability to reach a quality instrument for students who receive professional music education is quite low due to some of the factors highlighted in the aim of the study. Based on the results we have, it can be said that the infrastructure project developed in this problem center has a feature that can partially solve the current problem. Educator opinions generally focus on the fact that the project and concerts contributed to the institution and students.

It is thought that the study offers some clues to researchers who want to develop projects for the same or similar purposes, especially on the efficient use of resources and sustainability. Considering the student profile and institutional opportunities in provincial universities, especially in the context of socio-economic and socio-cultural factors, instruments can be procured through similar projects. Students’ economic purchasing power and cultural background can negatively affect the instrument acquisition process. For this reason, as in this study, it is recommended that researchers develop infrastructure projects that will enable underprivileged students to access quality instruments and to receive education with quality

instruments. Such projects can strengthen the instrument inventory of the institution, as well as motivate students to attend concerts and increase their course success.

Although music teaching programs are seen as one of the showcase programs of universities, they are considered expensive departments by most administrations. Instrument education is carried out under different branches in professional music education programs. This situation increases the number and hours of lessons and on the other hand, necessitates a large number of instrument training specialists. At the same time, music education institutions should have insulated individual and collective study classes and a strong inventory of instruments, especially pianos. Due to the current equipment needs, it may be considered normal for the administrations to see music teaching programs as expensive departments when compared to other teaching programs in education faculties. Briefly, music teaching programs demand significant financial investment. However, it can be said that the demands are often not met. This problem can be experienced more intensely, especially in provincial universities. Due to the austerity measures circular published in 2016, budget constraints in public institutions and organizations have led to an increase in the academic and physical infrastructure demands of music teaching programs today and in the context of our subject, had led to a negative impact on the processes of meeting the instrument purchase and maintenance needs. It is clear that there is a need for different resources and applications where we can find solutions to existing problems. In this context, it is expected that the study will contribute intellectually to the process of producing alternative solutions for institutions experiencing similar problems.

REFERENCES

- Asmus, E. P. (1994). Motivation in music teaching and learning. *The Quarterly*, 5(4), 5-32.
- Austin, J. R. (1990). Competition: Is music education the loser? *Music Education Journal*, 76(6), 21-25.
- Austin, J. R. & Berg, M. H. (2006). Exploring music practice among sixth-grade band and orchestra students. *Psychology of Music*, 34(4), 535-558.
- Bartel, L. (2007). What motivates students to enroll in a specialized music program? *The Canadian Music Educator*, 48(3), 26-32.
- Cantero, I. M. & Jauset-Berrocal, J. (2017). Why do they choose their instruments? *British Journal of Music Education*, 34(2), 203-215.
- Driscoll, J. (2009). 'If I play my sax my parents are nice to me': Opportunity and motivation in musical instrument and singing tuition. *Music Education Research*, 11(1), 37-55.
- Evans, P. & Bonneville-Roussy, A. (2015). Self-determined motivation for practice in university music students. *Psychology of Music*, 44(5), 1095-1110.
- Hallam, S. (2001). The development of metacognition in musicians: Implications for education. *British Journal of Music Education*, 18(1), 27-39.
- Hallam, S. (2006). *Music Psychology in Education*. London: Institute of Education, University of London.
- Hallam, S. et al. (2012). The development of practising strategies in young people. *Psychology of Music*, 40(5), 652-680.
- Jørgensen, H. (2000). Student learning in higher instrumental education: Who is responsible? *British Journal of Music Education*, 17(1), 67-77.
- MacIntyre, P. D. & Potter, G. K. (2014). Music motivation and the effect of writing music: A comparison of pianists and guitarists. *Psychology of Music*, 42(3), 403-419.

- McPherson, G. E. & McCormick, J. (2000). The contribution of motivational factors to instrumental performance in a music examination. *Research Studies in Music Education, 15*(1), 31-39.
- Nielsen, S. G. (1999). Learning strategies in instrumental music practice. *British Journal of Music Education, 16*(3), 275-291.
- Oare, S. (2011). Practice education: Teaching instrumentalists to practice effectively. *Music Educators Journal, 97*(3), 41-47.
- Öztürk, G. (2020). Motivation in higher instrumental education: A survey with music teacher candidates in Turkey. *Educational Policy Analysis and Strategic Research, 15*(3), 70-99.
- Pike, P. D. (2011). Maintaining student motivation: On the musical journey toward mastery. *American Music Teacher, 61*(1), 20-24.
- Rotjan, M. (2017). Why they choose: The instrumental selection choices of my own elementary school string students. *Visions of Research in Music Education, 29*, 1-15.
- Şen, Y. & Akçay, Ş. Ö. (2021). Individual instrument practice habits of professional music education students. *International Journal of Eurasian Education and Culture, 6*(13), 1311-1342.
- Yıldırım, A. & Şimşek, H. (2006). Sosyal Bilimlerde Nitel Araştırma Yöntemleri. Ankara: Seçkin Publishing.

OPINIONS OF MUSIC TEACHER CANDIDATES ON INSTRUMENT TRAINING

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Abstract

One of the explicit or embedded purposes of professional music education programs is to gain instrument playing skills. The individual instrument training course in music teaching programs is at the center of the program when compared to other courses in terms of specialization in the field and professional identity development. However, research shows that there are some problems in the field of instrument education and these problems negatively affect variables such as motivation, attitude, self-efficacy, and instrument playing behavior that affect success in instrument education. Therefore, it can be said that there is a need for instrument training-themed research that will be conducted through student opinions. This study reveals the views of a group of music teacher candidates regarding instrument training with a qualitative descriptive approach. 89 students enrolled in different classes participated in the study conducted at a public university in Turkey. The descriptive analysis technique was used to analyze the data. According to the prominent results, the majority of music teacher candidates think that the number of instrument training experts and individual studio/practice rooms in the institution is sufficient. On the other hand, the candidates think that the time allocated for instrument training in the curriculum is not enough. In particular, students who graduated from High Schools of Fine Arts, took string instrument education, and enrolled in the 4th grade do not find the time allocated for instrument training sufficient compared to other groups.

Keywords: Music teacher candidates, instrument training, opinions

INTRODUCTION

One of the explicit or embedded purposes of professional music education programs is to gain instrument playing skills. Instrument education is carried out through Individual Instrument Training, Piano, Guitar, Orff Instruments, Orchestra-Chamber Music courses in music teaching programs. Through these lessons, music teacher candidates become experts in an instrument, get to know instrument teaching methods, acquire musical culture by experiencing different instruments, and gain collective playing skills. These acquisitions cover an important part of the field-specific pedagogical knowledge and skills needed in the teaching process. The individual instrument training course is at the center of instrument training when compared to other courses in terms of specialization in the field and professional identity development. However, studies have shown that there are problems in certain subjects in the field of music and instrument education and that these problems can negatively affect

affective characteristics such as motivation, attitude, and self-efficacy that affect success in instrument education (Anguiano, 2006; Hallam, 2002; Jørgensen, 2002; Sichivitsa, 2001).

One of the problems experienced in the field of instrument training is the pedagogical equipment of the instrument training specialists (Barry & Hallam, 2002; Kennell, 2002; McPherson et al., 2011). In the words of Girgin (2015), music teaching training is one of the areas where motivation is most needed because performance-based lessons require long-term studies and repetitions. In the process of trying to motivate students with appropriate methods taking into account individual differences, the most important task falls to the teacher. A teacher's professional equipment is effective in the efficient conduct of a lesson, gaining the habit of personal practice, and developing affective characteristics. According to Çilden (2016), the acquisition of mental and physical skills in instrument education necessitates a systematic, gradual, and planned practice with a well-organized curriculum. The success of an instrument teaching program prepared in accordance with the purpose depends on the instrument playing proficiency, teaching ability, and approach to students of the teacher who will implement the program. However, as can be seen in Öztürk's (2020) study, instrument teachers has a dominant role in the lessons, mostly aims to provide technical skills and create a certain repertoire, focuses on the output of the lesson rather than the learning-teaching process, and ignores the accepted theories that emphasize the importance of active participation of the student in the learning process. Although this authoritarian approach is motivating for some students, it can lead to some negative effects such as less participation in teaching processes, low learning, and low motivation to work for most students.

Another problem experienced in the field of instrument education is the individual practice behavior of students. Instrument training carried out within the scope of professional music education requires high level of knowledge and skills. In the study of Kılınç (2017), it was determined that when students use the right instrument practice strategies, their study efficiency and their motivation increase. Similarly, it is seen that educators who use their instruments in class, appreciate the success of their students, include their instrument study attitudes and habits in their lessons, and teach the works loved by the students positively affect the students' practice desires, study system, and motivations, and these students exhibit effective instrument practice behavior (Moray, 2003; Önder, 2009). On the other hand, in the studies on the study habits of students, it is seen that the practice habits of music students are not in the expected direction. For example, in two different studies conducted with music teacher candidates enrolled at the same institution at different periods, it was determined that the students had a good level of study habits in the dimensions of interest in playing instruments, desire, preparation for study, and valuing work, but they had medium-level study habits in terms of using time correctly and working regularly. It has been determined that most of them do not spare enough time to practice (Babacan et al., 2017; Küçükosmanoğlu, 2013). Kalaycıoğlu (2019), on the other hand, draws attention to the fact that although regular, disciplined, and purposeful study is a requirement for success in instrument education, students do not practice frequently enough for instrument lessons. In general terms, it can be said that the lack of systematic and continuous study is a chronic problem in instrument education.

Another important problem experienced in the field of instrument training is that the instrument lesson hours are not sufficient. It is known that in the Central Music Teaching Undergraduate Programs implemented in Turkey from the 1990s to the present day, the number of lessons for music knowledge and performance is quite intense in terms of content. Content density is also valid for instrument training lessons. However, although instrument lessons are included in the program every semester, the time allotted for lessons is one lesson per week. Instrument lessons have content for technical, musical, collective playing and exhibition. In instrument training through content, it is aimed to gain mental perception and physical skills as well as the acquisition of technical and musical knowledge. In Kalaycıoğlu's

(2019) analysis on the string instrument, it is seen that the course content consists of a wide range of topics such as technical information about the instrument and playing, the basic principles of playing an instrument, bow techniques, musicality, instrument history, literature knowledge, and culture, etc. In addition to the theoretical content of the course, the fact that the performance is mainly in the center gives a complex identity to the teaching processes related to the instrument. On the other hand, in instrument training, the teacher should be able to play the instrument masterfully, sample a technical work by playing it, explain the details, and the student should have the opportunity to follow the technical work and apply it under the supervision and control of the teacher in order to learn this skill in all its aspects. For this reason, instrument education and playing an instrument, which has a multifaceted and complex structure, is a challenging and intense process that requires concentration for students and teachers (Çilden, 2016; Engin, 2012). There is an obligation to convey the course gains, intensive course content, and teacher expectations to the student in one-course hour. However, the current number of lessons and hours in the curriculum cause the objectives set in the instrument training lessons to not be achieved. It can be said that the instrument teacher could not convey the content effectively due to the insufficient course hours, could not spare time for additional supportive teaching other than the show-and-make method, could not carry out studies aimed at improving the self-regulation and metacognitive skills of the students, and accordingly, the students did not know what to study and how to practice in the context of the lesson.

As presented above, the literature provides important information about the factors affecting the instrument training processes. On the other hand, it can be said that the number of studies focusing on the opinions of music teacher candidates on individual instrument training courses in Turkey is quite limited. Therefore, research that will be conducted on student opinions can contribute to the field from different perspectives. This study focuses on the views of a group of music teacher candidates on instrument training. In the study, a description was made based on the opinions of the instrument training expert, the duration of the lesson, and the physical opportunities for individual study. It is expected that the study will present some ideas that will contribute to the planning processes of the curriculum and course contents to the administrators and instrument training experts.

METHOD

Research Model

The research was structured according to the single survey model, which is one of the general survey models. “General survey models are scanning arrangements made on the whole universe or a group, pattern or sample to be taken from it, in order to make a general judgment about the universe in a universe consisting of many elements. With general survey models, singular or relational scans can be made” (Karasar, 2014: 79). In this context, the study sought an answer to the question of “What are the opinions of music teacher candidates on instrument training?”.

Study Group

The study was conducted with a total of 89 students enrolled in the Music Teaching Undergraduate Program of a Public University and enrolled at different grade levels in the fall semester of the 2017-2018 academic year. The characteristics of the study group are presented in Table 1.

Table 1. The characteristics of the study group

		f	%
Grade	1st-grade	24	27,0
	2nd-grade	25	28,1
	3rd-grade	19	21,3
	4th-grade	21	23,6
Graduated high school	High School of Fine Arts (HSofA)	72	80,9
	Other	17	19,1
Instrument branch	Strings	52	58,5
	Flute	17	19,1
	Guitar	10	11,2
	Turkish music instruments	10	11,2

According to Table 1, students are evenly distributed according to grade level. 80,9% of the students are graduated from High Schools of Fine Arts and 19,1% from other high schools. 58,5% of the students are trained in string instruments, 19,1% in flute, 11,2% in guitar, and 11,2% in Turkish music instruments. It is seen that the study group mainly graduated from High Schools of Fine Arts and more than half of them taking training in the string instrument branch.

Data Collection and Analysis

The data were collected through a form prepared by the researchers and consisting of two parts. In the first part of the form, there is personal information, in the second part, there are three questions structured according to “Yes-Partly-No” options. The data were analyzed using the descriptive analysis technique. According to Yıldırım and Şimşek (2006), in qualitative analysis types, it is possible to numeral data in written form by going through certain processes. Descriptive analysis is mostly used in situations where the conceptual structure of the research is clearly determined beforehand. In this study, frequency and percentage calculations were made for the analysis of the data. Necessary permissions were obtained from the institution for the research.

RESULTS

In this section, there are results regarding the students’ views on instrument training and the distribution of opinions according to the variables of grade level, graduated high school, and instrument branch.

Table 2. Students’ opinions on instrument training

	N	Yes		Partly		No	
		f	%	f	%	f	%
1 Is the number of instrument training experts in your department sufficient?	89	58	65,2	18	20,2	13	14,6
2 Is the number of instrument practice rooms in your department sufficient?	89	52	58,4	28	31,5	9	10,1
3 Is the time allocated for instrument training in the curriculum sufficient?	89	25	28,1	19	21,3	45	50,6

According to Table 2, 65,2% of the students consider the number of instrument training experts in the institution sufficient. On the other hand, 20,2% of the students find it partly sufficient, and 14,6% do not find it sufficient. When the yes and partly options are evaluated together, it can be said that the students consider the number of instrument training experts in the institution sufficient.

According to the table, 58,4% of the students consider the number of individual instrument practice rooms in the institution sufficient. Similarly, 31,5% of the students find the number sufficient. On the other hand, 10,1% of them think that the number of practice rooms is not sufficient. The present result shows that the physical facilities of the institution in the context of individual instrument study fields are considered sufficient by the students.

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According to the same table, 28,1% of the students consider the time allocated for instrument training in the curriculum sufficient. 21,3% of the students find it partly sufficient. On the other hand, 50,6% majority do not consider the time allocated for instrument training sufficient. The present result can be interpreted as ‘the majority of students do not consider the time allocated for instrument training in the curriculum sufficient’ when the partly and no options are evaluated together.

Table 3. Distribution of opinions on instrument training according to grade level

	Grade Level	N	Yes		Partly		No		
			f	%	f	%	f	%	
1	Is the number of instrument training experts in your department sufficient?	1st-grade	24	17	70,8	6	25,0	1	4,2
	2nd-grade	25	16	64,0	6	24,0	3	12,0	
	3rd-grade	19	14	73,7	2	10,5	3	15,8	
	4th-grade	21	11	52,4	4	19,0	6	28,6	
2	Is the number of instrument practice rooms in your department sufficient?	1st-grade	24	14	58,3	10	41,7	0	0
	2nd-grade	25	10	40,0	9	36,0	6	24,0	
	3rd-grade	19	14	73,7	4	21,1	1	5,3	
	4th-grade	21	14	66,7	5	23,8	2	9,5	
3	Is the time allocated for instrument training in the curriculum sufficient?	1st-grade	24	8	33,3	8	33,3	8	33,3
	2nd-grade	25	6	24,0	5	20,0	14	56,0	
	3rd-grade	19	8	42,1	2	10,5	9	47,4	
	4th-grade	21	3	14,3	4	19,0	14	66,7	

According to Table 3, the students’ opinions on the question of “Is the number of instrument training experts in your department sufficient?” are concentrated on the yes answer in all classes and show an accumulation above the average. The rate of 1st, 2nd, and 3rd-grade students who have the yes opinion is over 60%. On the other hand, nearly half of the 4th-grade students (52,4%) stated yes, but this rate is lower than the other three grades. Considering the rate of 4th-grade students who answered no (28,6%), the current result can be interpreted as the majority of students found the number of instrument training experts sufficient, but the senior students had expectations regarding the number of experts.

According to the table, students’ opinions on the question of “Is the number of instrument practice rooms in your department sufficient?” are concentrated in the yes answer in all classes. On the other hand, the rate of those who answered yes does not show a balanced distribution according to the class. The majority of 3rd and 4th-grade students consider the number of practice rooms sufficient. However, approximately half of the 1st and 2nd-year students find the number of rooms sufficient. Based on the present results, it can be said that the number of rooms is sufficient, however, a balanced study planning cannot be made by the institution or the students, and in this process, especially the students in the lower classes are relatively negatively affected.

According to the same table, students’ opinions on the question of “Is the time allocated for instrument training in the curriculum sufficient?” differ according to the class variable. 33,3% of 1st graders, 56% of 2nd graders, 47,4% of 3rd graders, and 66,7% of 4th graders think that the time allocated for instrument training in the curriculum is not sufficient. It is seen that especially the 4th graders find the time allocated for instrument training insufficient.

Table 4. Distribution of opinions on instrument training according to graduated high school

	Graduated High School	N	Yes		Partly		No		
			f	%	f	%	f	%	
1	Is the number of instrument training experts in your department sufficient?	HSoFA	72	48	66,7	13	18,1	11	15,3
	Other	17	10	58,8	5	29,4	2	11,8	
2	Is the number of instrument practice rooms in your department sufficient?	HSoFA	72	40	55,6	24	33,3	8	11,1
	Other	17	12	70,6	4	23,5	1	5,9	
3	Is the time allocated for instrument training in the curriculum sufficient?	HSoFA	72	18	25,0	18	25,0	36	50,0
	Other	17	7	41,2	1	5,9	9	52,9	

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According to Table 4, the opinions of the students regarding the question “Is the number of instrument training experts in your department sufficient?” are concentrated in the yes answer according to their graduation status. 66,7% of High School of Fine Arts graduates and 58,8% of other high school graduates find the number of instrument training experts sufficient.

The opinions of the students on the question of “Is the number of instrument practice rooms in your department sufficient?” are concentrated in the yes answer according to the graduation status. 55,6% of High School of Fine Arts graduates and 70,6% of other high school graduates think that the number of instrument practice rooms is sufficient. On the other hand, when the no and partly answers are evaluated together, it is possible to say that nearly half of the High School of Fine Arts graduates do not consider the number of instrument practice rooms sufficient.

In the same table, the opinions of the students regarding the question “Is the time allocated for instrument training in the curriculum sufficient?” are concentrated in the answer no according to their graduation status. About half of both groups do not find the time allocated for instrument training sufficient. When the rates of no and partly answers are evaluated together, it can be said that the majority of High School of Fine Arts graduates do not consider the time allocated for instrument training sufficient.

Table 5. Distribution of opinions on instrument training according to instrument branch

	Instrument Branch	N	Yes		Partly		No		
			f	%	f	%	f	%	
1	Is the number of instrument training experts in your department sufficient?								
	Strings	52	34	65,4	9	17,3	9	17,3	
	Flute	17	13	76,5	4	23,5	0	0	
	Guitar	10	6	60,0	1	10,0	3	30,0	
2	Is the number of instrument practice rooms in your department sufficient?	Turkish music	10	5	50,0	4	40,0	1	10,0
		Strings	52	28	53,8	18	34,6	6	11,5
		Flute	17	11	64,7	5	29,4	1	5,9
		Guitar	10	6	60,0	3	30,0	1	10,0
3	Is the time allocated for instrument training in the curriculum sufficient?	Turkish music	10	7	70,0	2	20,0	1	10,0
		Strings	52	11	21,2	10	19,2	31	59,6
		Flute	17	7	41,2	4	23,5	6	35,3
		Guitar	10	4	40,0	3	30,0	3	30,0
		Turkish music	10	3	30,0	2	20,0	5	50,0

According to Table 5, the students’ opinions on the question “Is the number of instrument training experts in your department sufficient?” are concentrated in the yes answer in all instrument branches. 65,4% of the students taking string instrument training, 76,5% of those taking flute training, 60% of those taking guitar training, and 50% of those taking Turkish music instrument training consider the number of instrument training experts sufficient. It is seen that the rate of students who taking Turkish music instrument training and answered yes is lower than those who answered yes in other branches. The present result can be attributed to the fact that there is no Turkish music expert in the institution and the courses are conducted by an expert from outside the department.

According to the table, the students’ opinions on the question “Is the number of instrument practice rooms in your department sufficient?” are concentrated on the yes answer in all instrument branches. 53,8% of the students taking string instrument training, 64,7% of those taking flute training, 60% of those taking guitar training, and 70% of those taking Turkish music instrument training consider the number of instrument practice rooms sufficient. On the other hand, it is noteworthy that the rate of students who took string instrument training and answered yes is lower than in the other branches. The present result can be interpreted as that the repertoire of string instruments is relatively denser than the other instruments, students need more study time and environment to play the repertoire without any problems, but that their working environment cannot fully meet their expectations.

According to the same table, the students' opinions on the question "Is the time allocated for instrument training in the curriculum sufficient?" differ according to the instrument branch. 21,2% of the students who taking string instrument training stated yes, 19,2% partly expressed their opinion. On the other hand, 59,6% of the students stated that the time allocated for instrument training was not sufficient. It is seen that the opinions of the students who taking Turkish music instrument training show a similar distribution. On the other hand, when the yes and partly answers are evaluated together, it can be said that the students taking training in flute and guitar branches consider the time allocated for instrument training in the curriculum sufficient.

CONCLUSION, DISCUSSION and SUGGESTIONS

In this study, which was carried out to determine the opinions of music teacher candidates on instrument education under three headings, it was concluded that the students found the number of instrument training experts in the institution and the number of individual practice rooms sufficient, but they did not find the time allocated for instrument training sufficient.

International instrument education literature emphasizes many factors that influence course success and motivation. With an overview, research reveals that many variables such as student's mood, instrument selection method, instrument type, practice strategies, use of metacognitive skills, repertoire, instrument quality, prior knowledge, social environment, etc. influence instrument training processes in different ways (Dick, 2006; Jørgensen & Hallam, 2016; Katzenmoyer, 2003; Mazur & Laguna, 2019). Studies emphasize the importance of the teacher, practice field, and curriculum in the field of instrument education, as well as the aforementioned variables. In this study, it can be said that the teacher variable, which is centered as the representative of the in-class teaching processes, is perceived positively by the students. The fact that the students consider the number of instrument training experts in the institution sufficient can be evaluated as some teacher-related problems are not reflected in the instrument training processes. Similarly, the majority of students think that the physical facilities of the institution are sufficient. One of the most chronic problems in instrument training is practice behavior. The subject has been extensively covered in the instrument education literature. The places are an element that affects individual instrument playing behavior in different ways. In this context, the fact that the individual practice rooms are considered sufficient in number by the students can be interpreted as the existing physical facilities do not adversely affect the individual instrument training and practice behavior. The department, which dates back to approximately 20 years, has the minimum number of educators and physical facilities required to carry out instrument training processes. It is thought that the number of educators, especially in the fields of flute and string instruments, can meet the demands of the students. Likewise, it can be said that the practice rooms are sufficient in number for individual studies.

In the study, it was determined that the majority of the students did not consider the time allocated for instrument training in the curriculum sufficient. In some studies, it is seen that the music teacher candidates find the current instrument training course hours to be insufficient (Küçükosmanoğlu, 2013) and they are negatively affected by the instrument study processes due to the number of other music courses in the undergraduate program and the excess of course hours (Ceman, 2005). The present result is in line with a limited number of existing research results. In instrument education, there is an obligation to convey the intense course content and teacher expectations to the student in a one-course hour. However, the number and hours of lessons in the curriculum can make it difficult to reach the goals in instrument education. It can be said that due to insufficient course hours, the instrument teacher cannot effectively convey the content, cannot spare time for additional supportive teaching other than the show-and-make method, and cannot carry out studies aimed at

improving students' self-regulation and metacognitive skills, and accordingly, the students do not carry out an effective study process (Kalaycıoğlu, 2019; Öztürk, 2020).

According to another results we have, opinions about the duration of the lesson do not differ according to the graduation variable but differ according to the grade level and instrument branch. Especially the candidates taking training in the string instrument branch and studying in the 4th grade think that the instrument training course hours are insufficient. The result can be attributed to the intensification of the content of the instrument training course as the grade level increases and the expansion of the student repertoire depending on the acquisition of high-level technical skills. On the other hand, educators accept that there are some difficulties specific to the nature of each instrument. However, the fact that string instruments are fretless and require a certain level of musical hearing for a satisfactory performance reinforces the perception that the string family is a relatively more difficult branch compared to other instruments. It is thought that this perception is also present in the students and that the students studying in the string instrument branch need more course hours to meet the course content and repertoire.

In summary, based on the results, it is thought that the institution has the potential to provide qualified instrument training in terms of the number of instrument training experts and physical facilities, but this potential could not be used due to the insufficient course hours. In this context, some suggestions can be made. The study was carried out with students who taking instrument training according to the 2006 curriculum (CoHE, 2006). It can be said that the actual curriculum (CoHE, 2018) did not meet the expectations regarding the course duration featured in this study. In the 2006 curriculum, 7 terms of 'Individual Instrument' and 1 term 'Individual Instrument and Teaching' were included. On the other hand, in the curriculum dated 2018, the 'Individual Instrument Training' course was included for 7 terms, and the 'Individual Instrument and Teaching' course was abrogated. The number of courses has been reduced by removing the 'Individual Instrument and Teaching' course, which is valuable in terms of gaining field-specific pedagogical and didactic equipment. The current situation suggests that student expectations in the field of instrument education will increase even more. For this reason, increasing the number of instrument training courses in the process of preparing a possible new curriculum, planning instrument lessons for at least two hours in the 4th grade, especially for the string instrument field, or adding an instrument training course to the elective course pool may contribute to the field.

REFERENCES

- Anguiano, K. R. (2006). *Motivational predictors of continuing motivation and achievement for early adolescent instrumental music students*. Dissertation, The University of Iowa.
- Babacan, E., Yüksel, G., Küçükosmanoğlu, O. & Babacan, M. D. (2017). Müzik eğitimi anabilim dalı öğrencilerinin bireysel çalgı çalışma alışkanlıklarının incelenmesi (Konya ili örneği). *Journal of Research in Education and Teaching*, 6(1), 464-474.
- Barry, N. H. & Hallam, S. (2002). Practice. R. Parncutt & G. E. McPherson (Eds.), *The Science and Psychology of Music Performance: Creative Strategies for Teaching and Learning* (pp. 151-165). New York: Oxford University Press.
- Ceman, S. (2005). *Müzik öğretmenleri adaylarının piyano çalışma alışkanlıkları ve piyano çalışmalarını etkileyen faktörler*. Master Thesis, Karadeniz Technical University Institute of Social Sciences.
- Çilden, Ş. (2016). Çalgı eğitiminde usta-çırak yöntemi. *Bolu Abant İzzet Baysal University Journal of Faculty of Education*, 16 (İpekyolu Special Issue), 2208-2220.

- Dick, H. J. (2006). *The relationship between instrumental music achievement and causal attributions for success and failure*. Dissertation, The University of Minnesota.
- Engin, D. T. (2012). *Müzisyenlerin kişilik özellikleri, çalgılarına yönelik tutumları ve motivasyon düzeylerinin incelenmesi*. Master Thesis, Marmara University Institute of Educational Sciences.
- Girgin, D. (2015). Bireysel çalgı dersi motivasyon ölçeği: Geçerlik güvenirlik analizi. *Kastamonu Education Journal*, 23(4), 1723-1736.
- Hallam, S. (2002). Musical motivation: Towards a model synthesising the research. *Music Education Research*, 4(2), 225-244.
- Jørgensen, H. & Hallam, S. (2016). Practicing. S. Hallam, I. Cross & M. Thaut (Eds.), *The Oxford Handbook of Music Psychology* (pp. 449-462). New York: Oxford University Press.
- Jørgensen, H. (2002). Instrumental performance expertise and amount of practice among instrumental students in a conservatoire. *Music Education Research*, 4(1), 105-119.
- Kalaycıoğlu, Ş. G. (2019). *Aktif öğrenmeye dayalı etkinliklerin viyola öğrencilerinin performans başarıları, motivasyon düzeyleri ve derse yönelik görüşlerine etkisi*. Dissertation, İnönü University Institute of Educational Sciences.
- Karasar, N. (2014). *Bilimsel Araştırma Yöntemleri*. Ankara: Nobel Publishing.
- Katzenmoyer, S. P. (2003). *A study of the factors that influence the musical instrument selections of students: A comparison of teacher and student perceptions*. Dissertation, Shenandoah University.
- Kennell, R. (2002). Systematic research in studio instruction in music. R. Colwell & C. Richardson (Eds.), *The New Handbook of Research on Music Teaching and Learning* (pp. 243-256). New York: Oxford University Press.
- Kılınç, S. (2017). *Güzel sanatlar fakültesi müzik bölümü öğrencilerinin çalgı çalışma motivasyonlarını etkileyen unsurlar*. Master Thesis, Erciyes University Institute of Fine Arts.
- Küçükosmanoğlu, H. O. (2013). N.E.Ü. A.K.E.F. Müzik Eğitimi A.B.D. öğrencilerinin bireysel çalgı dersi çalışma durumları hakkındaki görüşleri. *Journal of Art Education*, 1(1), 30-52.
- Mazur, Z. & Laguna, M. (2019). The role of affect in practicing a musical instrument: A systematic review of the literature. *Psychology of Music*, 47(6), 848-863.
- McPherson, G. E., Miksza, P. & Evans, P. (2011). Self-regulated learning in music practice and performance. D. H. Schunk & J. A. Greene (Eds.), *Handbook of Self-Regulation of Learning and Performance* (pp. 181-193). New York: Routledge.
- Moray, E. (2003). *Üniversite müzik öğrencilerinin çalgı çalışma tutum ve alışkanlıklarının incelenmesi*. Master Thesis, Marmara University Institute of Educational Sciences.
- Önder, C. (2009). *Eğitim fakültesi müzik eğitimi öğretmenliği ABD klasik gitar öğrencilerinin çalışma alışkanlıkları*. Master Thesis, Mehmet Akif Ersoy University Institute of Social Sciences.
- Öztürk, G. (2020). Motivation in higher instrumental education: A Survey with music teacher candidates in Turkey. *Educational Policy Analysis and Strategic Research*, 15(3), 70-99.
- Sichivitsa, V. O. (2001). *College choir members' motivation to persist in music: Application of the Tinto model*. Dissertation, Auburn University.
- Yıldırım, A. & Şimşek, H. (2006). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri*. Ankara: Seçkin Publishing.

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EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

CoHE [Council of Higher Education] (2006). M¼zik Öğretmenlięi Lisans Programı. Ankara: YÖK Publishing.

CoHE [Council of Higher Education] (2018). M¼zik Öğretmenlięi Lisans Programı. Ankara: YÖK Publishing.

THE IMPORTANCE OF CEMETERIES AND THEIR PLANNING – DESIGN PRINCIPLES

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Abstract

Cemeteries literally mean the place where the dead are buried and the place of visit. Although it is not known where and when the burial method first appeared in order to bury the dead from the first man, the concepts of graves and cemeteries have been an important concept for many societies throughout history, especially since the beginning of the transition to settled life. The history of cemeteries created in residential areas dates back to ancient period. Cemeteries have been important for every culture throughout history, which has led to different understandings of graves. Social, economic, religious and cultural factors were instrumental in shaping cemeteries.

Cities are ever-growing places where a large part of the population lives in common. The most important factor in the continuous growth of cities is rapid population growth. The fact that mortality rates increase in parallel with the population growth rate, as well as the spiritual value of cemeteries as a place of visit in many societies, is among the factors determining the importance of cemeteries in cities. The cemeteries, which were previously planned outside the cities, remained in the cities and intertwined with other urban spaces as the cities grew horizontally over time. With urbanization, the need for urban open green space has increased with the increasing number of houses, and this situation has increased the importance of the cemeteries in the city as urban open green space. In this study, the importance of cemeteries in urban landscapes was informed and evaluations and recommendations were made about the planning and design principles that should be according to the way cemeteries are used.

Keywords: Cemetery planning, cemetery design, urban landscape.

INTRODUCTION

Cities are defined as places where population density is high and which is the focal point of activities such as industry, trade and education. The increase in birth and migration rates increases the population density of cities day by day. Along with this intense increase in cities, a parallel increase is observed in death rates. With this increase in death rates, the capacities of the cemeteries in urban areas have started to be insufficient. This situation necessitated the creation of new and multifunctional cemeteries in these areas.

Cemeteries are important elements of cities and cemetery areas are expanding depending on the level of urbanization (Çakır Sümer, 2020). Cemeteries, which contain many functions, especially hygienic, religious, ecological, cultural and recreational functions, constitute an important part of the green areas of our big cities, which are decreasing gradually (Özkan et al., 1996).

Throughout history, cemeteries have been important for the society in every period and various changes have been observed in the cemeteries over the years. The birth, formation and development of cemeteries took place in line with the beliefs, traditions and habits of societies, population growth, hygiene and social needs. While examining the formation process, it is necessary to define the burial and burial tradition of the society first (Karaoğlu, 2007). Important changes such as different religious beliefs, the process of transition to settled life, urbanization and the gradual growth of cities shaped the perspective on the concept of death, enabled the creation of new burial places, and allowed the change and transformation of these burial places over the years, and the cemeteries have taken their current form. Cemeteries are living spaces contrary to traditional thought, and these living spaces contain many different functions (Aktan, 1999). However, these areas, which do not receive the expected attention in proportion to their importance, can be destroyed for various reasons and are seen as potential areas that can be transformed into other uses at the end of certain periods (Özkan et al., 1996).

Cemeteries constitute the most important part of the green areas that are gradually decreasing especially in our big cities. Although the construction industry and some local administrators see these areas as potential construction areas / concrete areas, cemeteries with their many functions are seen by many as areas that should be protected. The importance of cemeteries is gradually increasing in our country, where the awareness of protecting green areas has begun to settle (Özkan, 2008). However, today, there are various problems regarding the planning and design of cemeteries. The increase in death rates, which develops in parallel with the rapid population growth in all cities of the world, makes the capacities of the existing cemeteries insufficient. Cemeteries have disappeared within the urban settlement and the amount of green space they contain is decreasing day by day. At the same time, the inadequacy of urban recreation areas for the growing population creates the necessity of using cemeteries, which can also be defined as urban open green areas, as recreation, resting spaces, urban parks or historical places, as well as being burial areas. Cemeteries should not only have a role in increasing the amount of green space in the city, meet the need as burial areas, but also be areas where users can meet their needs for urban activities. Planning and design principles in cemeteries are very important in order to meet all these criteria in a single area.

Cömertler (2001), in his study titled “Cemeteries Planning and Design Principles”, states that cemeteries are a form of land use within the urban fabric and require a special planning and design approach that evaluates their functional and hygienic features as well as recreational, ecological, cultural, social and symbolic aspects (Bayrak, 2019). In order to bring our cemeteries, which cover very large areas within the whole of urban settlement, to the level of contemporary examples, various professions and organizations, especially landscape architects and urban planners, need to make efforts both in terms of planning and design (Özkan vd., 1996).

In this study, the concept of cemetery and the development of cemeteries in the historical process were examined, the understanding of cemetery in different cultures was interpreted, and the appropriate planning and design principles in line with the multifaceted functions of cemeteries were explained.

THE CONCEPT OF CEMETERY AND THE HISTORICAL DEVELOPMENT OF CEMETERIES

When the meaning of the word cemetery is examined in different languages, it is possible to have an idea about the attitudes of cultures towards death. For example, the English word “cemetery” derives from the ancient Greek word “koimeterion” meaning “sleeping place” (Aktaş, 2009). The word “friedhof” meaning “place of peace” in German, “cebbân” in Arabic, “mezarat” and “kabristan” in Persian is used. The word cemetery with its usage in Turkish is

derived from the word “mezar”, which means “visiting place”, which comes from the root of the Arabic word for visit, with Turkish suffix.

The pit, which is open or covered with a stone, marble cover etc. and where the dead is buried, is called a grave. The places where the graves are found together are called cemeteries (Özkan, 2008). Cemeteries are places where the bodies of the dead are buried without wasting time and without harming the environment and especially people. They are also symbolic spaces that represent the other dimension of life and are worth memorializing for the rest of the community (Uslu, 2009). The concepts of public cemetery, family cemetery, graveyard of strangers, martyrdom, burial ground, ash cemetery, state cemetery are the names given to different types of cemetery (Özkan, 2008).

The concept of grave and cemetery throughout history has had an important place for every society since the early ages. Societies have left cemeteries as a sign of presenting a trace of their lives for the societies that will come after them (Akten and Özkartal, 2016). The birth, formation and development of cemeteries took place in line with the beliefs, traditions and habits of societies, population growth, hygiene and social requirements. Burial and burial of the dead has continued as an important tradition in the history of humanity. Undoubtedly, “religion” played the most important role in the formation of these traditions. In addition, the unique traditions and customs of each society, combined with their religious beliefs, formed a burial culture. Therefore, tomb structures reflecting a certain architectural understanding were born in every society with their own motifs (Aktan, 1999). According to Bronowski (1975) in the first societies, the dead were buried in caves, which were their living spaces. In the old stone period, the dead were painted red and placed in pits 75 cm deep, with their knees coming to their chins, reminding the position of the baby in the mother's womb. The dead are painted red, the color of life, to show that there is life after death (Uslu, 1997).

Cemeteries emerged after people started to live in groups, and they were born with the need to search for a place to bury the dead. Cemeteries where people are buried after death have always been given great importance (Karaoğlu, 2007). Beliefs of societies have played an important role in the formation of cemeteries and their changes over the years. For example, in civilizations where the belief in rebirth is adopted (China, Japan, Egypt), it is seen that the dead are mummified and placed in temples with their belongings. The belief of the ancient Egyptians that there is life after death has guided the hieroglyphs and images used in the tombs (Uslu, 1997). The construction of the pyramids, with the idea that the dead body would not be dismembered and damaged by the enemies, was a result of the adoption of the belief in rebirth. Over time, death was not seen as a new life or rebirth in Mesopotamian traditions, especially in Babylon and ancient Israel, but it was understood as a gloomy situation in which life came to an end and no return was possible. However, there is information that the Sumerians held funerals and presented gifts to the dead (Aktaş, 2009).

The use of cemeteries in their current form first emerged during the Age of Enlightenment. Due to the hygienic conditions of that period, it was seen that the cemeteries were moved to a location away from the church. The first examples of cemetery design are seen in 1765, when cemeteries were moved to Paris (Halajová et al., 2016). In England, since the 1830s, the creation of new cemeteries has become an important part of urban development and city construction. The cemeteries; Kensal Green (1833), Norwood (1838), Highgate (1839), Abney Park (1840), Brompton (1840), Nunhead (1840) and Tower Hamlets (1840), known as the “Magnificent Seven”, has been an important step for cemetery planning in England. Dunk and Rugg (1994) reported that unused burial sites in England make a valuable contribution to recreational opportunities in the region, and also they host four types of visitors, particularly those interested in history, nature lovers, educational visitors and hikers (Yeşil and Aldeniz, 2021). According to Kienast (1990), in the 60s and 70s, the desire to design the cemeteries as a natural park that creates a feeling of less monotony arose, and cemeteries were avoided from

being distressed places. Thus, cemeteries became an easily visible sign in the urban landscape and the concept of “park cemetery” emerged (Karaoğlu, 2007).

The idea of relaxation with nature, which started with the park cemeteries, developed towards “forest cemeteries”, the cemeteries were positioned in the forest and the proportion of burial areas was considerably reduced and designed in a forest appearance (Aktan, 1999). The forest cemeteries have been a very good example of the changing social outlook and also represent the ecological interest and concern of the new generation. These areas have combined the quiet, peaceful and respected memorial sites within the urban landscape with a new forest and habitat (Akten and Özkartal, 2016). Today, in Europe and America, cemeteries are generally located far from the city, in large green areas with rich vegetation. The Père Lachaise Cemetery in Paris is an example of this. Resting areas are often included in the cemetery, where various works of art and sculptures are located. With this appearance, the Père Lachaise Cemetery, which has the criteria for the definition of a "memorial park", contains important clues about the cemetery planning and design processes in Europe and America.

While cemeteries were open and peaceful places in Ottoman society, integrated with the environment, in cities and daily life, cemeteries in Europe were closed to the environment and the burial of the dead was seen only as a matter of eliminating the deceased. Today, this situation has been reversed. In our country, cemeteries were built with walls, while those of Europe were opened. The feeling that gives people peace has been lost, and fear and trembling have taken its place. Cemeteries were pushed out of the cities, so they remained far from life and hearts (Özkan, 2008).

Cemeteries are living spaces contrary to traditional thought. Apart from their deep philosophical and religious aspects, they are physically important urban green spaces. Due to religious thoughts and prohibitions, the green structure in the cemetery is inviolable compared to other urban green spaces. While other green areas can easily turn into structures in a short time, cemeteries can resist different forms of use for a long time (Uslu, 1997). The reality of graves and cemeteries started with the existence of humanity, and has survived to the present day and will continue by undergoing various changes in terms of physical structure and location in line with some religious sanctions, cultural differences and emotional expectations (Bayrak, 2019).

FUNCTIONS OF CEMETERIES

In general, cemeteries are defined as the burial areas of the city. However, cemeteries have other important functions besides being only burial areas (Bayrak, 2019).

The human body, which has lost its life, should be removed from the environment where life continues as soon as possible due to health reasons. Graves, therefore cemeteries, are the most important and most used methods for the purpose of destroying the dead, and they have a hygienic duty with this feature. It has a religious function as it is a place where one can pray for the lost relatives and feel psychologically comfortable (Özkan, 2008).

Cemeteries are areas with dense vegetation. With these ecological functions, they contribute to the amount of urban green space and play a role in the wildlife cycle. Many nations believed that the graves, and therefore the cemeteries, were the most natural deed of the land and defended the idea that it was an indispensable duty to protect the lands where the graves of their ancestors were found. With the martyrdoms created, it has been tried to be constantly explained to the new generations how the homeland is protected. In this respect, cemeteries are outdoor spaces that tell us our historical heritage and have a cultural function. Along with all these functions, cemeteries also have recreational functions. Developed country planners, who realized their ecological and cultural functions years ago, decided to rearrange these places and turned them into areas that offer passive and even active recreation opportunities

(as in the United States of America) besides their main functions. Thus, the cemeteries in the city were no longer regarded as unnecessary areas that consume valuable lands, and serious progress was made towards the preservation of old cemeteries (Özkan, 2008).

Today, a city cemetery basically has two functions. The primary function is that the burial ground is a place of burial and memorial. Its secondary function is to support green infrastructure, to have the potential to create an area that will integrate with nature in the city, and to be used as a resting, recreation and exhibition area. Cemetery areas also serve biodiversity and ecosystem with these functions (Grabalov, 2019). Primary and secondary functions are interconnected and need to be considered together in planning - design studies.

PLANNING - DESIGN PRINCIPLES OF CEMETERIES

Cemeteries are a form of land use within the city, and therefore they should be considered as an important physical planning issue (Aktan, 1999). Cemeteries are areas that will not be changed in the zoning plans because they are protected both in terms of religion and by special conservation law (Özkardaş, 2010). In European countries, planners realized the cultural, ecological and recreational functions of cemeteries as well as their religious and psychological functions, rearranged these places or considered them as a priority issue in planning (Akten and Özkartal, 2016). In line with various planning and design principles, ecological bridges were created and the green texture of the city was planned as a whole. Thus, with the development and expansion of the city, the cemeteries that remained in the urban living area were removed from being worthless areas (Uslu, 1997).

Recently, modern cemeteries are established as part of the city plan and complement the green infrastructure (Halajová et al., 2016). Cemeteries and churchyards are areas that contain many potential possibilities apart from their current use. For example, cemetery areas designed as city parks can also be used as walking areas, and cemetery areas with an old history can be visited for academic studies. Since they contain so many different functions, they allow each user to bring their own interpretation to these fields (Deering, 2012).

The use of cemetery areas also differs from country to country. Usage differences also lead to functional differences. For example, Scandinavian cemeteries are often well-maintained green spaces that could potentially be attractive recreational areas. In addition to burying the dead and solving sanitary problems, urban cemeteries are designed to improve the quality of urban life by contributing to aesthetic values and wildlife. In Scandinavian countries, it is seen that urban cemeteries are used both as places of remembrance and mourning, and for daily activities such as crossing to the city center, walking the dog, resting for a short time or experiencing cultural heritage (Evensen and Nordh, 2018). Since cemeteries are also used as recreation areas in France, they are located in places away from visual pollution. With this usage, it has become a tradition in France to set up cemeteries against the view (Akten and Özkartal, 2016). Cemeteries in other European countries and England, including France, are designed with the idea of a "memorial park". In the face of the increasing urban land shortage, the vertical urbanization trend, as well as the process of building vertical cemeteries, has begun. Memorial Necropol Ecumenica, which was built in 1983 in the coastal city of Santos, Brazil, was the first example in this regard as the world's highest cemetery (Çakır Sümer, 2020). In Turkish culture, unlike European and Scandinavian countries, the limited use of cemeteries for different functions draws attention. Cemeteries are used as "visiting places" only in accordance with the content of the word meaning.

Cemetery planning includes the selection of land of sufficient size and quality, and the design and implementation phases of the selected land, by adhering to the population growth rate and death rate statistics in cities. In addition, these plans to be made should be realized with a dynamic approach that can adapt to factors such as the city's requirements, change process

and character (Bayrak, 2019). Cleveland divides the cemetery planning and design process into three categories: physical principles, social principles, and site planning principles. Since cemeteries have a functional use in terms of social aspects, they should be included in the planning and design process, taking into account the cultural characteristics of the region. According to the principles of land use, the area is expected to be compatible with the geography of the region and to have an increasing effect on the urban open green space. According to the physical principles, the effects of access, water element and vegetation in the design process should be considered. The concept of aesthetics, which should be found in a good design, should not be ignored (Cooper, 2012).

The first factor to be considered in the planning of an effective cemetery area is site selection.

While determining the locations of the cemeteries public lands should be chosen as much as possible, and expropriation should not be made unless necessary (Özkan et al., 1996). The selection of a sufficiently large area has an important role at this stage of planning. In addition, another important issue is that the areas to be preferred should be evaluated in terms of alternative usage possibilities, taking into account the housing and road industry pressure that will occur with the development of the city in the coming years. For this reason, urban development plans and land use plans should definitely be considered before site selection (Bayrak, 2019). While calculating the cemetery area size for the city, birth and death rates should be made by considering the required unit burial area. The population projection and the number of possible deaths in the city after 20-25 years should be measured (Uslu, 1997). While choosing the place where the cemeteries will be built, the calculation of adult, child and family graves should be done separately, and the demographic data of the city should not be ignored.

Geographical data should also be used when choosing the location of cemeteries. While determining the locations of the cemeteries, which allow for use as burial and recreation areas, attention should be paid to the fact that the prevailing wind is in the opposite direction of the settlements. The soil of the cemeteries should not hold water, it should be permeable and its microbiotic activities should be at a sufficient level. Land structure with very soft or rocky and very hard ground is also not suitable. Soil properties are important in terms of easy digging of graves and quick dissolution of dead bodies. For this reason, andesite, soilless surfaces should not be preferred (Uslu, 2009). The fact that the selected area is far from underground and surface water sources against possible natural disasters and that the soil structure is not wet also plays an important role in the cemetery planning process.

Cemeteries must comply with accessibility standards. The distance from the settlements, the border of the zone where buildings are built for residential or other purposes, to the cemetery border should be at least 500 meters (Akten and Özkartal, 2016). Cemeteries should ideally be built within the green space surrounding urban settlements and in places easily accessible by public transport. Cemetery areas, which are planned far from cities, do not fulfill most of the functions expected from them (Özkan et al., 1996). For this reason, an area close to transportation vehicles should be preferred in order for the urban residents to reach easily and to use the place actively.

Another factor in site selection of the cemeteries is the topography of the land. Very flat lands are not suitable as a burial ground due to drainage problems. Areas that are so sloping as to require excavation and filling should not be preferred. As a general principle, areas with a slope of more than 15% should not be chosen as burial sites (Özkan et al., 1996). It is ideal for the cemetery to have a slope of 0–10%. The slope can increase up to a maximum of 15% when used for purposes such as roads. The more sloping areas of the site, which are not suitable for burial, should also be reserved for water surfaces, seating and resting places or other structural elements (Uslu, 1997).

With the completion of the design process of cemeteries, it is expected that there should be no visual pollution, areas suitable for recreational activities should be created, habitat for wildlife should be created, a design suitable for cultural and historical heritage should be adopted, and the natural environment should be protected. Cemeteries also need to serve the cultural ecosystem. Cultural ecosystem services describe the physical experiences of users (McClymont and Sinnett, 2021).

Cemetery entrances are very important in structural design. When entering a space, the first impressions affect the perception in other parts as well. Considering the psychology of the people while entering the cemeteries, it reveals the importance of the view that the entrance to the cemetery should “give a divine melody to the place like the gates of the world opening to heaven”(Bayraktar, 1973).

In cemetery designs, sufficient parking should be placed at each entrance, administration and service buildings and religious buildings should be built near the main entrance and in harmony with the environment (Özkan et al., 1996).

From the cemetery entrance, transportation and access within the cemetery should be uninterrupted. Pedestrians should be given priority in the design, but a circulation network consisting of main and secondary vehicle roads reaching all parcels of the cemeteries should be created and a ring system should be preferred (Özkan et al., 1996). The main axis of the cemetery should be suitable for vehicle and pedestrian traffic during the burial. Arrangements should be made for pedestrians on the side of the main axle, which is open to vehicular traffic. There should be a green band between the pedestrian paths and the burial areas (Uslu, 1997). The main and secondary roads in the cemetery should be connected with each other and the roads should be designed wide enough to allow vehicle passages.

Cemeteries are divided into islands by main axis and secondary roads. Islands are divided into parcels within themselves, and parcels are divided into burial places by numbers. The size of the island and parcels may vary according to the size of the land and its topographic structure (Özkardaş, 2010). Grave sizes and distances between graves should be taken into account in the design of the grave plots separated by main and secondary roads (Özarslan, 2007). Cemetery’s island and parcels are a formation that is necessary to find the recorded graves and the people in the graves more easily (Moda, 2019).

In order for the visitors to pray at any time, a small mosque should be built in the cemetery areas and a mosque should be built in the large-scale cemetery areas (Moda, 2019).

Places of worship should be active at all hours of the day. It should be ready for use not only for cemetery visitors, but also for users of the area where the cemetery is located.

When planting throughout the cemetery, plants should be preferred for road afforestation, surrounding the cemetery area, preventing bad vision or noise, shading in sitting and resting areas, emphasizing the entrances and planting the parking lot (Bayrak, 2019). The combination of coniferous and broad-leaved trees enriches the appearance with their decorative features (leaf, flower, fruit, stem, autumn colouration, etc.). Broad-leaved trees create a peaceful atmosphere, evoking the feeling of a park. With the contrast effect provided by broad-leaved and dark-colored conifers, they focus attention on plants rather than graves. Grass areas, on the other hand, create an open landscape and expand the space (Uslu, 1997).

Lighting in cemeteries should be in a hierarchical order provided with different distances, heights and intensities. For this purpose, intense lighting at a height of 6 to 15 m should be preferred at main roads and entrances, and medium lighting at a height of 3 to 5 m on secondary roads. In addition, spot lighting should be made on coniferous and broad-leaved plants in the cemetery area with a light source to be given from above and below. Lighting should be taken into account, where the tombstones and tombs will not be perceived, but the vegetal elements will be emphasized (Uslu, 1997).

Seating units are the most missing equipment element in our country, as the belief that cemeteries are not used as recreation areas or the visitors who come to the cemetery do not spend much time. Seating units should be placed less frequently directly on the main road and more frequently on the side road than on the main road. Seating units should not be placed on the roads, but by creating pockets on the roads (Moda, 2019). Seating units are specified as the most necessary reinforcement elements in cemeteries.

Fountains, which are mostly built by the grave owners with different types and materials, create problems in terms of aesthetics and are functionally inadequate because they are randomly positioned (Akten and Özkartal, 2016). Fountains produced in sufficient numbers and with durable materials should be placed in the cemetery areas.

CONCLUSION

Cemeteries are areas that have the task of increasing the green structure in the city, have different functional properties, have a role in the ecosystem balance and should be suitable for use of the city residents. Cemeteries, which have an important role for the city in the world cities where the rate of urbanization is gaining momentum day by day, should not only be used as burial areas, but also as an element suitable for recreational activities and supporting green infrastructure, and these areas should be given these identities with the right planning and design principles.

When the use of cemeteries in our country in line with these functions is examined, it is seen that they only serve as burial areas, they are not considered as a special design issue, and the existing designs do not go beyond the determination of burial areas and the construction of the intra-area circulation system. In addition, it is possible for these places to contribute to the urban green structure after the grave owners bring the plants in the form of trees to the area with their own means and after these plants develop over time and reach a certain maturity level.

Considering the inadequacy of urban open green spaces and the need for recreational areas in our country, defining cemeteries as places that are multifunctional, have high aesthetic quality and reflect the cultural characteristics of the region should be determined as the main goal in cemetery planning and design. The transformation of these areas into city parks / recreation areas / memorial parks that can be used actively in every period, instead of being used only during visit periods, will also make significant contributions to the urban identity and image of the city.

REFERENCES

- Akten, N. G. (1999). Fiziksel Planlama Yönünden İzmir ve Frankfurt Kent Mezarlıklarının Karşılaştırılması. Ege Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, İzmir, 183s.
- Aktaş, R. (2009). İstanbul'daki Mezarlıkların Nitelik ve Nicelik Açısından İncelenmesi ve Çağdaş Mezarlık Planlaması Örneği Olarak Bahçeşehir Mezarlığı. Bahçeşehir Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, 145s, İstanbul.
- Akten, M., Özkartal, N. (2016). İzmir İli Soğukkuyu Mezarlığının Planlama Kriterleri ve Peyzaj Tasarımı Açısından İrdelenmesi, Süleyman Demirel Üniversitesi Mimarlık Bilimleri ve Uygulamaları Dergisi, 1(2):9-20.
- Bayrak, M. İ. (2019). Peyzaj Planlama ve Tasarım İlkeleri Açısından Bursa Kent Hamitler Mezarlığı Değerlendirilmesi (Yayımlanmamış yüksek lisans tezi). Uludağ Üniversitesi/Fen Bilimleri Enstitüsü, Bursa

- Bayraktar, A. (1973). İzmir Şehrinin İmarında Peyzaj Mimarisi ile İlgili Problemler ve Prensiplerin Tespiti. İzmir: Birlik.
- Cömertler, S. (2001). Cemeteries - Planning and Design Principles, Master Thesis, İzmir Institute of Technology, City and Regional Planning, 352 pp.
- Cooper, D. L. (2012). H.W.S. Cleveland's Landscape for Oak Hill Cemetery: A Design Analysis, Iowa State University Ames, Iowa.
- Çakır Sümer, G. (2020). Kentlerde Mezarlık Alan Yetersizliği ve Çözüme Yönelik Uygulamalar: Dünyadan ve Türkiye'den Örnekler. Ankara Hacı Bayram Veli Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 22(3), 750-764.
- Deering, A. (2012). Over Their Dead Bodies: A Study of Leisure Andspatiality in Cemeteries, PhD Thesis, University of Brighton, Brighton.
- Grabalov, P. (2019). Urban Cemeteries as Public Spaces. University of Norwegian, Norway.
- Halajová, D., Bihuňová, M., Lančarič, Š. (2016). The Potential of Cemeteries to Improve Urban Green Infrastructure - A Case Study in Nitra, Slovakia. Landscapes and Greenways of Resilience, 5(2), 483-490.
- Karaoğlu, D. (2007). Kent Mezarlıklarının Yeşil Doku İçindeki Önemi ve Ziyaretçi Memnuniyetinin Belirlenmesi- Karacaahmet Mezarlığı Örneği. İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, 121s, İstanbul.
- McClymont, K., Sinnett, D. (2021). Planning Cemeteries: Their Potential Contribution to Green Infrastructure and Ecosystem Services. Frontiers in Sustainable Cities, 3,1-17.
- Moda, A. (2019). Kent Mezarlıklarının Kentsel Yeşil Alanlar İçindeki Önemi ve Ziyaretçi Memnuniyetinin Belirlenmesinde- Kayseri Asri Mezarlığı Örneği. Selçuk Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, Konya.
- Nord, H., Evensen, K. H. (2018). Qualities and Functions Ascribed to Urban Cemeteries Across the Capital Cities of Scandinavia. Urban Forestry & Urban Greening, 33, 80-91.
- Özarlan, E. (2007). Mezarlıkların Peyzaj Planlama ve Tasarımı Açısından İncelenmesi: İstanbul Zincirlikuyu Mezarlığı Örneği. İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, İstanbul.
- Özkan, M. B. (2008). Kentsel Rekreyasyon Alan Planlaması. Ege Üniversitesi Ziraat Fakültesi Peyzaj Mimarlığı Bölümü, Basılmamış Ders Notu.
- Özkan, B., Küçükerbaş, E. V. ve Kaplan, A. (1996). Açık-yeşil Alan ve Rekreyasyon Alanı Olarak Mezarlıkların Planlama ve Tasarım Sorunları ile Çözüm Olanakları İzmir Kenti Örneğinde Araştırılması, Ege Üniversitesi Ziraat Fakültesi Peyzaj Mimarlığı Bölümü, E.Ü. Araştırma Fonu Araştırma Raporu, Proje No: 1994/006, Bornava-İzmir.
- Özkardaş, V. (2010). İstanbul Mezarlıklarının Peyzaj Planlama, Tasarım ve Bakım Çalışmaları Açısından İncelenmesi Karacaahmet Mezarlığı Örneği. Bahçeşehir Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, İstanbul, 409 s.
- Uslu, A. (1997). Tarihi Süreç İçerisinde Anadolu Mezarlıkları ve Çağdaş Bir Yaklaşımla Ankara Kenti için Örnek Bir Mezarlık Planlaması Üzerinde Bir Araştırma. Ankara Üniversitesi Fen Bilimleri Enstitüsü, Doktora Tezi, Ankara.
- Uslu, A. (2009). Çevreye Dost Mezarlık (Ekolojik Mezarlık) Planlama Yaklaşımları ve Dünya Kentlerinden Örnekler. 5. Uluslararası İleri Teknolojiler Sempozyumu, Karabük.
- Yeşil, P., Aldeniz, M.M. (2021). An Investigation of City Cemeteries in Terms of Landscape Architecture, a Case of Ordu Province. Türk Tarım – Gıda Bilim ve Teknoloji Dergisi, 9(3): 498-507.

THE PLACE OF URBAN IMAGES IN URBAN SILHOUETTES AND THE
CHANGES IN THEIR PERCEPTIONS

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Abstract

Urban images, which can also be defined as the historical, social, and cultural accumulations of cities, are the most important elements that are unique to cities, make a city different from others, increase its recognition in the non-urban environment, and create a perception of cities by identifying their names with those cities. With these important functions, urban images gain a place in the memory of the individual and society with the concrete appearances they have gained in the historical process. When the spatial and social elements that make up the living environment, including the urban images, are viewed as a whole, city silhouettes emerge with the perception and reflection of this memory. Spatial and social elements that change depending on various conditions also change the silhouette of the city they create. Especially in cities with high population density today, as a result of rapidly increasing regular and irregular construction activities, the wide vertical-horizontal spread of settlements, changes in building typologies, as well as planning, design, and implementation decisions, rapid and undeniable changes are experienced in urban structures that experience various processes. At this point, along with the changing silhouette perception, changes will inevitably occur in the perceptibility of the urban images in the silhouette.

In this study, cities and the elements that make up cities; urban images were discussed, and how the environment was perceived was questioned by taking into account the factors affecting the perception and perception process. Changes in the perceptibility of city silhouettes and urban images have been revealed over time, especially with the effect of industrialization and the rapid construction it brings.

Keywords: Urban silhouettes, urban images, perception

Özet

Kentlerin sahip oldukları tarihi, sosyal ve kültürel birikimler olarak da tanımlayabileceğimiz kentsel imgeler, kentlere özgü olup bir kentin diğerlerinden farklılaşmasını sağlayan, kent dışı çevrede tanınırlığını arttıran ve isimlerini o kentlerle özdeşleştirerek kentlere ait birer algı oluşturan en önemli unsurlardandır. Bu önemli işlevleriyle kentsel imgeler, tarihsel süreç içerisinde kazandıkları somut görünüşler ile birey ve toplum belleğinde yer edinirler. Bu belleğin algılanması ve yansıtılması ile kentsel imgelerde dâhil olmak üzere yaşanan çevreyi oluşturan mekânsal ve sosyal unsurlara bütün olarak bakıldığında kent silüetleri ortaya çıkmaktadır. Çeşitli koşullara bağlı olarak değişim gösteren mekânsal ve sosyal unsurlar beraberinde oluşturdukları kent silüetini de değiştirmektedir. Özellikle günümüzde yüksek nüfus yoğunluğuna sahip kentlerde hızla artan düzenli ve düzensiz yapılaşma faaliyetleri, yerleşim birimlerinin dikey-yatay doğrultulu geniş yayılımı, yapı tipolojilerinin değişmesi ayrıca planlama, tasarım ve uygulamaya yönelik kararlar neticesinde çeşitli süreçler yaşayan kent yapılarında hızlı ve göz ardı edilemeyecek büyüklükte değişimler yaşanmaktadır. Bu

noktada değişen silüet algısıyla birlikte, silüette yer alan kentsel imgelerin algılanabilirliklerinde de değişimlerin yaşanması kaçınılmazdır.

Bu çalışma ile kentler ve kentleri oluşturan unsurlar; kentsel imgeler ele alınmış, algı ve algılama sürecini etkileyen faktörler dikkate alınarak çevrenin nasıl algılandığı sorgulanmıştır. Özellikle sanayileşme ve beraberinde getirdiği hızlı yapılaşmanın etkisiyle zaman içerisinde kent silüetlerinin ve kentsel imgelerin algılanabilirliklerinde yaşanan değişimler ortaya konulmuştur.

Anahtar sözcükler: Kent silüeti, kentsel imge, algılanabilirlik

GİRİŞ

Bireylerin yaşam biçimlerini düzenlemek amacıyla meydana gelen en önemli ve büyük fiziksel yapı kentlerdir. Kent yapısının biçimlenmesinde birey ve toplum hareketliliği esastır (Cansever, 2010). Bu hareketliliğin zaman içerisinde değişimi ise kaçınılmazdır. Geçmişten günümüze kentlerin yaşadığı en büyük değişimlerden biri olan sanayileşme, kentlere göç olgusunu ortaya çıkarmış ve kent yoğunluklarını hem sayısal hem de yapısal olarak arttırmıştır. Artan talebi karşılayabilmek amacıyla kentler, dikey ve yatay doğrultuda genişleyen yerleşim birimlerine dönüşmüşlerdir. Kentlerdeki bu dönüşüm kent ve kentle ilişkili kavramları da değiştirmiş, ayrıca birçok yeni kavramında ortaya çıkmasına neden olmuştur.

Birer değer birikimi olarak kentler, oluşum süreçlerinden itibaren sahip oldukları tarihi, kültürel ve sosyo-ekonomik unsurlarla kimlik kazanmaktadır. Kazandıkları kimlik, kentin varoluşu ve işleyişinin önemli bir parçasıdır (Schulz, 1984). Ayrıca kenti kullanan bireyler tarafından kentin doğru algılanması, mekâna değer yüklenmesi ve oraya bağlanmaları ölçüsünde anlam kazanmaktadır (Tekeli, 1991).

Kent kimliklerini ve imgelerini yansıtan kent silüetleri, araştırmanın odak noktasını oluşturmaktadır. Kentin görsel açıdan kavranabilmesini sağlayan silüet, konumundaki topoğrafik yapının, bitki örtüsünün, kent imgelerinin, yapı tipolojisinin, açık-kapalı kullanım alanlarının kendi aralarında ve birbirleriyle olan ilişkisinin algılanmasını sağlamaktadır (Kozaman, 2007). Kent silüetlerinde yer alan öğeler, kentlerin tanınırlığını arttırması ve kentlere ilişkin çağrışımlar yaratmasıyla ayırt edici bir görev üstlenerek kent imgesi haline gelmektedirler. Kentte yaşanan olumlu ve olumsuz tüm değişikliklerden de etkilenmektedirler. Tarih içerisinde yansıttıkları görünümüler açısından dönemlere, o dönemlerde yaşanan kente ve kentli hayatına da ışık tutarak kültürel miras olarak ifade ettiğimiz değerlerin algılanması, korunması ve geliştirilmesine yönelik bir kaynak olmaktadır. Günümüzde tarihi ve kültürel birikimin silüet unsurları ile modern ve çok katlı yapıların oluşturduğu silüet aynı görüş alanı içerisinde yer almaktadır. Böylelikle belirli bir bakış açısı içerisinde giren farklı unsurların oluşturduğu karma bir silüet ortaya çıkmaktadır. Oluşturulan yeni mimari dokular, kent imgesi haline gelen yapılar çevresinde artış göstermekte ve bu durum imgelerin bireyler tarafından algılanabilirliklerini değiştirmektedir.

KENT KİMLİĞİ VE KENT İMGESİ KAVRAMLARI

Kent, binlerce yıllık bir oluşum süreci ve hala potansiyellerinin tam olarak anlaşamadığı bir olgudur (Mumford, 1961). Anonim bir üründür, içinde yaşayan ve art arda gelen nesillerin katılımıyla meydana gelir. Varlığının temelini insandan alan yapı fiziksel bir çevre, sosyal ve kültür birikimidir (Bilgin, 1999). Sürekli değişim ve gelişim içerisinde olan bu yerleşim birimleri, doğal ve onu kurgulayan çevrenin ilişkiler bütünüdür (Cullen, 1971).

Kimlik; kişiye, topluma ya da nesneye özgü olma durumudur. Dolayısıyla kentlerin, toplumların, kurumların ve mekânların kimliklerinden bahsedilebilir (Balamir, 1993). Kent

kimliği, toplumların yaşam biçimleri ile çevre etkileşiminin fiziksel mekâna yansıtılmasıdır. Kent potansiyellerinin mekâna nasıl yansıtıldığı ve kullanıcılar tarafından nasıl algılandığı ile ilgilidir. Yani, kentin “ne olduğu” sorusu kadar, “nasıl algılandığı” sorusu da o kentin kimliği açısından oldukça önem taşımaktadır. Kent hangi yapısal ve işlevsel donanımına sahip olursa olsun, bireyler kenti algılayabildikleri ölçüde kente yönelik sonuç olgusu oluştururlar (Sağlık ve Kelkit, 2019).

Kentlere yönelik bir imgenin oluşturulmasında kentin somut unsurları, soyut unsurları ve kent ile özdeşleşen unsurlar bir bütün olarak yer almaktadır. Bu bağlam kent insanlarının deneyimlerini, inançlarını ve davranışlarını kapsamaktadır (Özdemir ve Karaca, 2009). 1960’lı yıllarında başlarında çıkan ve doğal, tarihi, kültürel kent hafızasından beslenerek soyut ve somut bilgilerin temsil ettiği imge,

- Çevre-insan ilişkisinde çevrenin anlaşılması,
- Fiziksel ve psikolojik davranışların şekillendirilmesi,
- Kentlilerin kent yaşamı içerisinde kendilerini konumlandırabilmeleri,
- Kente dair aidiyet duygularının güçlendirebilmeleri,

açısından önemli bir yere sahiptir (Eraydın, 2016). İnsanın mekânı anlaması, şekillendirmesi, konumlandırması ve mekâna ait aidiyet duygusunun altında da mekânı ve çevreyi algılaması yatmaktadır (Altuntaş, 2016).

İnsan-çevre etkileşimi, Gestalt’a göre duyular ile başlar. Sürecin ilk aşaması evrenseldir ve çevresel veriler doğrultusunda değerlendirilir. İkinci aşamayı ise algı ve biliş oluşturmaktadır. Bu aşama bireylerin yaş cinsiyet, eğitim gibi fizyolojik ve sosyolojik özelliklere göre değişkenlik göstermektedir. Lynch (1960) imgenin belirlenmesinde mekânsal faktörlerin etkili olduğunu ve beş bileşenden meydana geldiğini ortaya koyarak bu bileşenleri; kenar/sınır, bölge, yol, düğüm/odak noktası ve nirengi/işaret ögesi olarak ayırmıştır. Lynch’e göre bu beş ögenin algılanması ve bir araya gelme formları bir bütün oluşturarak güçlü bir kent imgesi yaratmaktadır. Dolayısıyla insan-çevre ilişkisinin sağlıklı gerçekleşebilmesi ve sürekliliğinin sağlanabilmesi için bu bütünün doğru algılanıp yorumlanabilmesi önemlidir (Eraydın, 2016).

- Kenar/sınır bileşenleri; ayırıcılardır ve doğrusal düzlemde ilerleyen birer kesintidir. Kullanıcılar tarafından kentlerin mekân olarak adlandırabilmesi için sınırlarının olması gerekmektedir. Böylelikle bölgeler ayrılabilir ve çevrenin daha kolay algılanabilmesi sağlanarak bir geçiş alanı oluşturulabilir. Sınır bileşenleri yollar, akarsular ya da yüksek duvarlar gibi fiziksel unsurlar olabilir (Erkaya, 2012). Ek olarak kullanıcının zihninde oluşturulmuş sanal sınırlarda bu kapsamda değerlendirilmektedir (Ocakçı, 2018).
- Bölgeler; başlı başına kentli eylemlerinin gerçekleştiği alanlardır. İçinde bulunulan konumun mekânsal karakteristiklerine göre nerede bulunduğu hakkında bilgi verir (Ocakçı, 2018). Fiziksel olarak doku, mekân, form, detay, sembol, yapı, kullanılış amacı, faaliyet ve topoğrafya gibi birleşenleri barındırır (Güley, 2001). Tayyare’e göre 2007 sosyal yönüyle ele alındığında nüfus yoğunluğu, kültür, süregelen alışkanlıklar vb. özellikleri öne çıkarmaktadır Bütün olarak fiziksel ve sosyal unsurların şekillendirdiği bu konumlarda kentlere ait karakterler ve tanımlı bölgeler ortaya çıkmaktadır (Erkaya, 2012).
- Yollar; kentin eylem alanları arasındaki ilişkiyi sağlayan akslardır. Lineer düzlemde bireylerin mekânı ve çevre öğelerini anlamalarını böylelikle kent bütününe kavrayabilmelerini sağlamaktadır (Erkaya, 2012).
- Düğüm/odak noktaları; bir bölge içerisinde bulunan ve o bölgenin simgesi haline gelen konumlar şeklinde tanımlanmaktadır. Yoğunlukla toplanma ve dağılma alanları olarak kullanılmaktadır (Lynch, 1960). İşlevlerine göre farklı isimlerle (meydan, açık

alan, park vb.) anılabilen bu noktalar, kullanıcı tarafından kentte ilk keşif edilen yerlerdendir (Krier, 1979).

- İşaret öğeleri/nirengiler; kentlere noktasal referans sağlamaktadır. Genel olarak kentin her yerinden görülebilen dış mekâna ait noktasal kaynaklardır. Kule, minare, kilise, gökdelen gibi anıtsal ve sivil mimari yapılar ile dağ, tepe vb. doğal unsurlar olarak örneklendirilebilirler (Erkaya, 2012). Güley'e (2001) göre işaret öğeleri, yapısal kompozisyonda güçlü ve baskın karakteristik özellikleriyle içinde yer aldıkları ortamda diğer unsurlardan farklılaşırlar. Kent kullanıcılarına bu açıdan kaynaklık eden birer yönlendirici görevini üstlenirler. Lynch (1960) bu noktada isimleri buldukları kentler ile özdeşleşen imgelerden söz eder. Eiffel Kulesi Paris ile San Marco Meydanı Venedik ile Manhattan gökdelenleri New York ile özdeşleşmiş imgelerdir. Tolstoy, Balzac, Chopin, Dostoyevski ve Tchaikovsky'nin sahip olduğu yazınsal ve sanat kimliklerine benzer şekilde kentlerin de kendilerine özgü bir bütün oluşturan mekânsal, toplumsal, kültürel ve fiziksel kimlikleri bulunmaktadır (Keleş, 1998) (Şekil 1.).

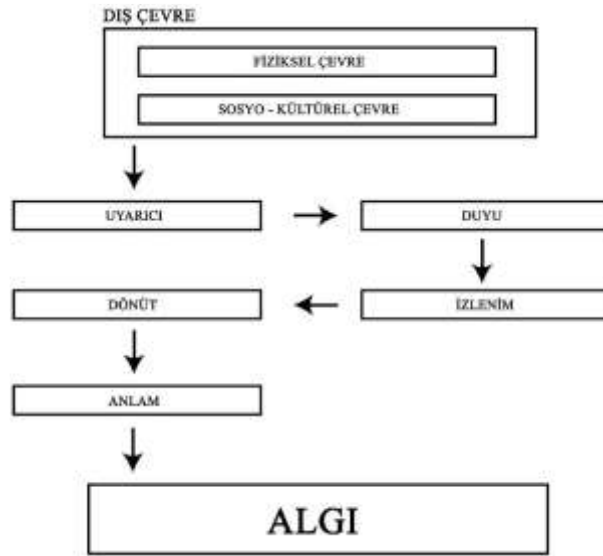


Şekil 1. Kent imgeleri a) San Marco Meydanı, Venedik (Anonim, 2019), b) Eyfel Kulesi, Paris (Anonim, 2018)

1968 yılında Warr ve Knapper, 1977 yılında Rapoport ve 1987 yılında Lang, kimlik ve imge çalışmalarında, kültür ve toplum belleğinin, farklılaşmanın temelini oluşturduğunu ve çevreye yüklenen anlamların değişkenlik gösterdiğini vurgulamışlardır. Araştırmacılar imgenin mekânsal boyutunun yanı sıra anlamsal boyutunun da irdelenmesi gerektiği, hatta anlamsal boyutun mekânsal boyuta göre daha ön planda olduğu sonucuna ulaşmışlardır. Buna yönelik Relp (1976), “yerin kimliği” konusundaki çalışmasında ve Rapoport (1977), insan-çevre ilişkisini değerlendirdiği kitabında mekâna yüklenen anlamları vurgulamıştır (Eraydın, 2016). Pocock ve Hudson (1978) fiziksel elemanlarla tanımlamanın imge için yeterli olmadığı görüşüne ortak olmuş ve imgenin anlamsal boyutla birlikte ele alındığı sürece güçlü ve bütüncül bir etki yaratacağından söz etmiştir (Lang, 1987; Lynch, 1981). Lynch (1981) de kentsel imgeyi yeniden değerlendirdiği kitabında, duyu kavramını ele alarak mekânsal değerlerin yanı sıra mekânsal olmayan değerlerinde kentsel imge oluşumunda önemli bir yere sahip olduğunu belirtmiştir.

Yapılı çevre ve beraberinde ortaya çıkan anlamlar kentin kimliğiyle ilişkili olarak oluşturulan imgeyi ve sosyo-kültürel değerlerini etkilemektedir. Bu noktada dikkat edilmesi gerekenler; kent birikimlerini görebilmek, tanıyabilmek ve sahiplenebilmek; elde edilen birikimi birer kimlik unsuru olarak kültürel, eğitsel, turistik veya ekonomik yönlerde kullanabilmektir. Aynı zamanda kentte yaşayanların katılımını sağlayarak canlı ve sürdürülebilirliği yüksek kent dokusu anlayışını yaygınlaştırabilmektir (Kuzay Demir, 2015).

Gözlemcinin gözlemleri sonucunda bir unsura yönelik düşünceler geliştirmesi, o unsuru algılamasıyla ilişkilidir. Stefanou'ya (1992) göre okunabilirlik, anlamlılık, gözlemci üzerinde imge oluşturabilme ve çağrışım uyandırabilme, özgün karaktere sahip olma, mevcut dokuyla uyumlu olma ve mekânsal öğelerin çeşitliliği gibi öğeler bireyleri psikolojik olarak etkilemektedir. Downs ve Stea (1973) da algılamayı, mekânsal çevreden elde edilen bilgilerin zihinde kodlanması, hatırlanması ve kodların çözülme süreci olarak ifade etmiştir (Kahvecioğlu, 1998). Algılama süreci olarak adlandırılan bu süreç, bireylerin duyu organları ile verilere ulaşmasıyla başlar, verilerin özümsemesi, kişinin bilgi birikimi ve kültürü doğrultusunda bu verileri yorumlamasıyla devam eder. Kişinin değerlendirmeleri ışığında olguya karşı uygun davranış ya da düşünce geliştirmesiyle de sonuçlanır. Lang'a (1987) göre; algılama, duyumsal ve zihinsel süreç olmak üzere iki süreçten oluşur. Duyumsal süreç; duygulara dayalıdır ve kişi, çevreden duyularıyla edindiği verileri yorumlar. Zihinsel süreç ise bilgiye dayalıdır ve kişi edindiği çevresel bilgiyi geçmiş deneyimlerini üzerinden duyu durumu, tutum, amaç, ihtiyaç ve dürtülerine göre yorumlayarak algılar, kavramsallaştırır (Altuntaş, 2016).



Şekil 2. Algılama süreci (Karadan, 2020)

Algılama süreci, uyarıcılarla başlar. Uyarıcılar, duyu verileri arayıcılığıyla algılanan her şeydir. Duyular, dış çevreden elde edilen olguları özümseyerek beyine iletir ve olgular beyinde işlenir. Bazı durumlarda duyu organları algılamaya yetecek duyu özümseyemediğinde bireyde izlenim bırakırlar. İzlenim, uyarıcıların tam anlaşılması etkileridir. Dönüt/geri bildirim, olgunun yorumlanması ve değerlendirilmesi aşamasıdır. Anlam aşamasında duyumsanıp yorumlanan veriler doğrultusunda algı oluşur ve böylelikle algılama süreci tamamlanmış olur (Şekil 2.). Algılama bir mekân üzerinde değerlendirildiğinde Gezer (2012), mekânların duyu ve duygular arayıcılığıyla iki şekilde algılandığından bahsetmiştir. Duyularla algılamada imge, doku, koku, tat ve ses gibi faktörlerin etkili olduğunu, duygularla algılamada ise zaman, süreklilik, farkındalık ve idrak gibi faktörlerin etkili olduğunu ortaya koymuştur. Aynı zamanda kültürel birikim, deneyim, ekonomik, işlevsel ve sosyal eğilimlerin de önemini vurgulamıştır. Kentsel mekân algılamalarını anlık ve görme temelli olarak ikiye ayırmak mümkündür. Anlık algılamalar, fotoğrafik ve geçicidir, kullanıcının öğeye bakmasıyla oluşan duyu ve düşüncelerdir. Görme temelli algılamalar ise bir süreçtir ve semboliktir. Verinin (görüntünün) süzülmesi, irdelenmesi ve hafızada yer edinmesiyle gerçekleşmektedir (Bilgin, 1999). Zihin örüntülerini yorumlama şekilleriyle ilgilenen Gestalt psikolojisinin prensiplerine göre; yalınlık, süreklilik-

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kapalılık (yakın-büyük figür), yineleme (tekrar) ve şekil-zemin (bütüncül algı) ilişkisi olarak sınıflanmaktadır. Roth'a (2013) göre; yakınlık, bireylerin nesnelere olan mesafesine bağlıdır. Yineleme, tekrarlı aralıklarla bulunan elemanların arasındaki uzaklık ve boşluğun eşit olmasa bile, eşit gibi algılanacağını öngörmektedir. Bu da zihnin algılamayı en basite indirgemeye meyilli olmasından kaynaklanmaktadır. Süreklilik ve kapalılık, zihnin daha önce deneyimlediği öğelere ait nitelikleri en yakın ve büyük figüre tamamlamak istemesidir. Şekil ve zemin ilişkisi ise Gestalt'ın mekân algılamasının temelini oluşturan öğedir. Bütün algı çerçevesinde zemin ve zemin üzerinde dikkat çekici bir şekil yer almaktadır. Zihin dikkat çekici şekle yönelip onu hemen algılamaya meyillidir. Bu noktada kent silüetleri şekil-zemin ilişkisinin en belirgin biçimde algılandığı görünümledir. Kent düzlemi üzerine inşa edilen dikey-yatay doğrultulu öğeler ile aynı düzlemde mevcut olan doğal öğeler bir araya gelerek bir görüntü oluşturmaktadır. Bu görüntüde en belirgin ve dikkat çeken yapılar zihin tarafından hemen algılanır ve kente yönelik birer imge olarak kodlanır (Şekil 3.).



Şekil 3. Şekil - zemin ilişkisi, New York kent silüeti (Valentino, 2019)

Mekânların algılanmasında uzaklığa ve ölçek boyutuna dikkat çeken Akarsu'ya (2009) göre mekân ölçeğinde nesne-nesne ile nesne-mekân ilişkisinin algılanması ve yorumlaması bireyin görme duyusu, bakılan noktaya olan uzaklığı, konumu ve ölçeğiyle yakından ilişkilidir. Ölçek, alttan üste olacak şekilde sırasıyla insan-kişi (yakınlık) ölçeği, kentsel ölçek ve anıtsal ölçek olarak tanımlanmaktadır. Buna göre; insan-kişi ölçeğinde insan ve diğer nesnelere ait tüm detay özellikler, konut dokuları net olarak ayırt edilebilir. Kentsel ölçekte çevre şartlarının da elverişli olması durumunda bireylerin cinsiyet, kıyafet vb. özellikleri saptanabilir; kent meydanlarının biçim, form ve yapısal özellikleri anlaşılabilir. Son olarak anıtsal ölçekte ise sadece anıtsal yapılar ve açık alanlar algılanabilir ayrıca bakılan noktanın konumu ve biçimsel bazı özellikleri ayırt edilebilir. Çevre dokusunun bir bütün olarak algılanması açısından bakıldığında anıtsal ölçekteki yapılar, simgesel olarak değer taşımaktadır.



Şekil 4. Anıtsal ölçek, a) Kız Kulesi, İstanbul (Akçin, 2020), b) Eyfel Kulesi, Paris (Yılmaz, 2019)

KENT SİLÜETİ

Kent silueti, kent portresi ya da kentin panoraması olarak ifade edilebilir (Kostof, 1999). Bostancı'ya (2008) göre kent silueti, kenti oluşturan öğelerin birbiri üzerine dizilerek ortaya çıkardığı görünümüdür. Bu görünümde alt sınırı yeryüzü, üst sınırı ise gökyüzü oluşturmaktadır ve sınırlar arasında ortaya çıkan görüntü, kentin imajını yansıtmaktadır. Siluet, kenar çizgileriyle tek renk olarak belirtilen görünümün anlamına gelse de kentler için tanımlandığında, renklerin belirgin olduğu temsiller veya fotoğraflar için kullanılmaktadır. Bu fotoğraflar kente ait tüm bileşenleri tek seferde okumayı sağlar ve zihnimizde kente ait bir imge yaratılması yönünde algı oluşturur (Gül ve Şevkin, 2017). Ocakçı (1993) kent silüetlerini doğal, beşeri ve yapay çevreler olarak sınıflandırmıştır. Topografya, iklim, bitki örtüsü, su ögesi, jeolojik ve genel durum, doğal çevre verilerini oluşturmaktadır. Beşeri çevre; insan ve toplum ile bunların birbiriyle olan ilişkilerini kapsamaktadır. Yapay çevre ise insanın gereksinimlerinden doğan hareket alanlarını biçimlendirmek amacıyla inşa ettiği öğelerdir. Bu noktada tarihi ve kültürel birikim taşıyan, görsel bir kompozisyon bütünü olarak ortaya çıkan kent silüetleri, çevreye dair akılda kalıcı görsel etkinin yaratılması için bir referans sunmaktadır (Bostancı, 2008).

Kent kimliğinin güçlü bir yansıtıcısı olan kent silüetleri, her kent için eşsiz olduğundan ayırt edici bir unsurdur (Arslan, 2019). Bu sebeple kent silüetlerinin önemli yapı taşlarından biri kentte hâkimiyet kuran, baskın ve konum algılaması sağlayan yapılardır. Bu yapılar küresel platformlarda kentlerin pazarlanması, yerel değerlerin öne çıkarılması ve kentler arasındaki rekabet açısından da oldukça önemlidir (Akarsu, 2009). Genel olarak kentin bütününe etki eden kent girişleri, meydanlar, işaret öğeleri ve sokaklar kent belleğinde yer edinen imgelerdir. Kostof'a (1991) göre, kent silüetini oluşturan kentin doğal peyzaj özellikleri ve kentte var olan hâkim yapılardır. Bu yapılarla kentlerin doğal topoğrafyasının insan eliyle değişimi sağlanmaktadır (Gül ve Şevkin, 2017). Akarsu (2009) benzer şekilde kent silüetinin, doğal nitelikler ile kent içerisinde yer alan odak noktaları tarafından yansıtıldığını belirtmiştir. Erses'e (1999) göre ise silüet, kentsel peyzajla kent kimliğini oluşturan tarihsel ve kültürel değerleri ortaya koymaktadır. Ayrıca kentte bulunan simge öğelerin yansıdığı bir olgudur. Kent ile özdeşleşmiş yapıların silüet içerisindeki yerini ve üstünlüğü korumak, kent kimliğini korumak ile aynı değerdedir. Griouard'a (1985) göre de silüetler hâkim yapılarla şekil kazanmaktadır ve farklı süreçlerin eseridir (Akarsu, 2009). Pugin (1836), "Contrasts" kitabında, bir kentin 1440 ile 1840 yıllarına ait kent silüetini karşılaştırmış ve yeni kent görünümünün endüstri ardında kaybolan geleneksel değerlerin yansımaları olduğunu savunmuştur. Bu kayboluş 19. yüzyılın sonlarında gökdelenlerin inşa edilmeye başlanmasıyla büyük bir hız kazanmıştır (Arslan, 2019). Günümüz silüetlerinde simge haline gelen yüksek yapılar kendilerine katmanlar ekleyerek çoğalmaktadır. Bugün İstanbul'un da içerisinde bulunduğu New York, Londra, Sydney, Dubai, Hong Kong gibi birçok kentin silüetinde yüksek yapılar ön plandadır. Ancak Ford'a (1992) göre Customs House kulesi (Şekil 5.), William Penn heykeli, Washington anıtı gibi bazı geleneksel değerler hala kent silüetlerinde hâkimiyetlerini yükseklik yönüyle diğer yapılar arasında korumaktadır (Gül ve Şevkin, 2017).



Şekil 5. Customs House kulesi ve çevre yapılar, Boston (Viola, 2017)

Tanımlar çerçevesinde kent silüetleri doğal, kültürel, sosyal, mekânsal ve mekânı yönlendiren unsurlar tarafından oluşturulan bir bütün şeklinde ifade edilebilir. Doğal unsurlar; jeolojik özellikler, bitki örtüsü, iklim, su varlığı insan-çevre etkileşimi, mikroklima gibi doğal çevre öğeleridir. Fiziksel mekân içerisinde yer alan koy, vadi, dağ, yamaç, yeşil alan, akarsu vb. peyzaj öğeleri doğal sınırları oluşturarak silüeti şekillendirmektedir (Kozaman, 2007). Sosyo-kültürel unsurlar; kent tarihi, kentin oluşumu, kültür geçmişi, nüfus durumu, etnik yapısı, yaşam biçimi, göç öyküleri ve politik yapıları gibi özellikleri kapsamaktadır (Altuntaş, 2016). Kozaman'a (2007) göre silüet, insan-çevre etkileşimindeki kültür ve yapı birikiminin yansımasıdır. Kentlerin gelişim süreçleriyle yoğun ve düzensiz nüfus artışı kent silüetlerini olumsuz etkileyerek doğal yapı ve kaynakların bozulmasına yol açmaktadır. Ek olarak barınma, kirlilik, altyapı ve donatı yetersizliği gibi problemler ortaya çıkmakta, bu durum tarih, kültür ve sosyal dokunun zarar görmesine yol açmaktadır. Mekânsal unsurlar; kentlerin sahip olduğu yaşam biçimlerini ifade etmektedir. Geçmişten günümüze farklı medeniyetlere ait kültürel ve tarihsel dokuyu barındırıp kendilerine özgü bir imaj yansıtan kentler, zaman içerisinde, özellikle sanayi devriminin etkisiyle küreselleşmiştir. Sonuç olarak sosyal, ekonomik ve kültürel özellikleriyle benzeşmeye başlayan tekdüze bir tarz benimsenmiş, yerel dokudan bağımsız kent silüetleri ortaya çıkmıştır (Erses, 1999). Mekânı yönlendiren unsurlar, kentlerin fiziksel açıdan biçimlenmesini sağlamaktadır. Yasal ve yönetsel kararlar olarak ifade edebileceğimiz bu unsurlar, mekâna yüklenen işlevler, yapısal kısıtlamalar vb. konuları içeren plan ve mevzuatlardır. Silüet üzerinde etki eden faktörlerden biri de zamandır. Zamana bağlı olarak silüet ve silüetin algılanması değişmektedir. Akarsu'ya (2009) göre zaman ve zamanın silüete etkisi öğelerin inşa edildikleri tarihlere, mevsimlere ve gün içerisindeki farklılıklara bağlı olarak değişmektedir. Yeni yapıların eklenmesi, var olan yapıların zaman içerisinde zarar görmesi, algılanabilirliğinin azalması veya yok olması (yıkılması) gibi durumlar söz konusudur. Mevsimsel farklılıklar da yaşanan sis, yağmur, kar vb. hava olayları kent silüetinin tam ve doğru algılanmasına engel oluşturabilmektedir (Şekil 6.). Bu olaylar yüzey kavramının farklılaşmasına sebep olduğu için şekil-zemin arasındaki ilişki değişmektedir. Son olarak gün içerisindeki farklılıklar ise gece ile gündüz dilimleri arasındaki farkı ortaya koymaktadır. Gündüz görülen silüetin renk, belli başlı öğeler ve bütüncül algılanabilme oranı daha yüksekken akşamüzeri güneşin geliş açısına bağlı olarak havanın

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kararmasıyla silüet görüntüsü değişmekte ve karartı halini almaktadır. Akşamları da kentlerin ışıklandırılmasından dolayı silüet, daha değişik formda yansımaktadır. Özellikle kıyı kentlerinde, su yüzeylerinin yansıtma özelliği sayesinde oluşan silüet, üçüncü boyutta bir derinlik kazanmaktadır.



Şekil 6. Mevsimsel farklılıklardan kaynaklı algı değişimi a) Ocak, b) Haziran (Karadan, 2020)

Kent silüetlerinin algılanmasında bakış noktası, bakış doğrultusu ve bakılana olan uzaklık gibi kavramların değerlendirilmesi ile kentte yer alan tasarım elemanlarının nasıl kullanıldığı da önem taşımaktadır. Kentte biçim, doku, denge, tekrar, egemenlik vb. tasarım öge ve ilkelerinin kullanılıp kullanılmadığı ya da nasıl kullanıldığı kent silüeti üzerinde etkin rol üstlenmektedir (Akarsu, 2009).

SONUÇLAR

Kentler açısından önemli birer algı mekanizması olan silüetler, mekânsal olarak birçok ögeyi barındırmakta, bağımlı-bağımsız birçok mekânsal ve anlamsal faktöre göre de değişkenlik göstermektedir. Silüetlerin yansıtılmasında en önemli öğelerden kentsel imgelerin algılanabilmesi de bu noktada değişkenlik göstermektedir. Silüetin algılanmasında mevcut koşullara (topografya, bakış açısı, hava durumu vb.) göre farklılıklar yaşanmaktadır. Ek olarak süreç içerisinde kentlerin tarihi, kültürel ve sosyal birikimleri de olduğu halleriyle günümüze ulaşmamakta ya da yeni oluşturan ögeler tarafından gölgelenebilmektedir. Özellikle artan kentleşme ve yapılaşma olgusu kent silüetleri açısından bir kırılma noktasıdır. Çünkü artan kat yüksekliği, yoğunlaşan yapı alanları, sınırlandırılan açık alanlar, kültürel değerlerin algılanabilirlik durumlarında kayıplara yol açmış ve kent silüetlerini büyük oranda değiştirmiştir. Bu etki günümüzde de giderek artan bir şekilde var olmaya devam etmektedir.

Kentte yer alan imgelerin tamamının kent silüetinde ön plana çıkarılması ve gözle görülebilir kılınması mümkün değildir. Ancak mevsimsel farklılıklar, gece-gündüz ayrımı ve iklim olayları gibi doğal akışın dışında yapay müdahaleler noktasında bu durum değişkenlik gösterebilir. Kent silüetlerinin yapay sebeplerle meydana gelen değişimlerinin önüne geçilmesinde;

- Kent potansiyellerinin kavranması,
- Kültürel değerler ve yeni oluşturulacak değerler arasındaki bağlantının iyi kurulması,
- Yapı- imar yönetmeliklerinde izin ve sınırlandırmaların kesin olarak belirlenmesi,
- Yer seçiminde kentin topoğrafik ve iklim özelliklerinin iyi değerlendirilmesi,
- Şekil-zemin ilişkisinin iyi kurgulanması,
- Kent dokusuna uygun olarak hareket edilmesi gerekmektedir.

KAYNAKLAR

- Akarsu T 2009. Tarihi yarımada silüetinin kent kimliğine etkilerinin Salacak-Harem-Haydarpaşa bölgesinde irdelenmesi. Yıldız Teknik Üniversitesi, Yüksek Lisans Tezi, 136s.
- Akçın Ö 2020. İstanbul'un en kapsamlı gezi rehberi. Erişim tarihi: <https://ozlemkesifte.com/istanbul-gezi-rehberi/> [15.03.22]
- Altuntaş ZB 2016. İstanbul kent silüetindeki değişikliklerin incelenmesi: Zincirlikuyu aksı örneği. Yıldız Teknik Üniversitesi, Yüksek Lisans Tezi, 122s.
- Anonim 2018. Eyfel kulesi hakkında muhtemelen hiç duymadığım ilginç bilgiler. Erişim tarihi: <https://blog.flypgs.com/eyfel-kulesi-hakkinda-muhtemelen-hic-duymadigin-ilginç-bilgiler/> [22.03.22]
- Anonim 2019. San Marco meydanı. Erişim tarihi: <https://yolculukgunlukleri.wordpress.com/2019/02/16/san-marco-meydani/> [22.03.22]
- Arslan E 2019. Kent silüetlerinin kentsel miras açısından değerlendirilmesi: İstanbul örneği ve koruma önerileri. Kadir Has Üniversitesi, Yüksek Lisans Tezi, 216s.
- Balamir AK 1993. Mimarın kimlik, meşrutiyet, etik sorunları ve mimarlığın disiplinler buhranı. Ankara, 24-30s.
- Bilgin MT 1999. Kimlik ve imajın değerleri açısından kent omurgasının değerlendirilmesi Manisa örneği. Mimar Sinan Üniversitesi, Lisans Tezi, İstanbul.
- Bostancı SH 2008. Kent silüetlerinin entropi yaklaşımı ile değerlendirilmesi. İstanbul Teknik Üniversitesi, Doktora Tezi, 210s.
- Cansever T 2010. Sonsuz mekânın peşinde: Selçuk ve Osmanlı sanatında sütun başlıkları. Klasik Yayınları, İstanbul, 239s.
- Cullen G 1971. The concise townscape. The Architectural Press, Oxford, 200p.
- Eraydın Z 2016. Kentsel markalaşma stratejilerinin kent bellliği ve kent imgesi üzerine etkileri: Ankara örneği. İdeal Kent Dergisi, 7(20):830-855s.
- Erkaya Ş 2012. İstanbul'un kentsel peyzaj değişimlerinin silüet kapsamında değerlendirilmesi. Yıldız Teknik Üniversitesi, Yüksek Lisans Tezi, 172s.
- Erses S 1999. Kent kimliği ve kuruluşundan günümüze metropolleşme sürecinde İstanbul'un kimlik analizi. Yıldız Teknik Üniversitesi, Doktora Tezi, 575s.
- Güley K 2001. Kent kimliği değişim sürecinin Gazimağusa örneğinde incelenmesi. Mimar Sinan Üniversitesi, Yüksek Lisans Tezi, 176s.
- Gül M, Şevkin E 2017. İstanbul silüetindeki değişim. Tasarım ve Kuram Dergisi, 23:1-14s.
- Karadan D 2020. Kentsel imgelerin kent silüetindeki yerinin tarihsel süreçte değerlendirilmesi: İzmir kenti örneği. Ege Üniversitesi, Yüksek Lisans Tezi, 146s.
- Kahvecioğlu HL 1998. Mimarlıkta imaj: mekânsal imajın oluşumu ve yapısı üzerine bir model. İstanbul Teknik Üniversitesi, Doktora Tezi, 152s.
- Kozaman S 2007. Boğaziçi'nde silüet ve silüetin belirlenmesinde fotogrametri. Yıldız Teknik Üniversitesi, Yüksek Lisans Tezi, İstanbul 184s.
- Keleş R 1993. Kentleşme politikası. 2. Basım, İmge Kitabevi Yayınları, Ankara, 767s.
- Kostof S 1999. The city shaped: Urban patterns and meaning through history. Thames&Hudson, Boston, 352p.
- Krier CR 1979. Urban space. Rizzoli International Publications, New York, U.S.A., 174P.

- Kuzay Demir G 2015. Kent imgelerinin değerlendirilebilmesi bakımından Manisa. CBU Sosyal Bilimler Dergisi, 13(1):500-512s.
- Lynch K 1960. The image of the city. The MIT Press, Cambridge ve çeviren: Başaran İ 2013. Kent imgesi. 5.Basım Kültür Yayınları, İstanbul, 215s.
- Lynch K 1981. A theory of good city form. The MIT Press, U.S.A., 524p.
- Mumford L 1961. The city in history: Its origins, its transformations, and its prospect. Harcourt, Brace & World, U.S.A., 657p.
- Ocağcı M 1993. Şehir kimliği ve çevre ilişkileri. 17. Dünya Şehircilik Günü Kolokiyumu Bildiriler Kitabı, 163-170s.
- Ocağcı M 2018. Sözlük'ten: kent imgesi (imajı). Erişim tarihi: <https://kentstratejileri.com/2018/01/31/sozlukten-kent-imesi-imaji/> [15.03.22]
- Özdemir Ş, Karaca Y 2009. Kent markası ve marka imajının ölçümü: Afyonkarahisar kenti imajı üzerine bir araştırma. Afyon Kocatepe Üniversitesi İ.İ.B.F. Dergisi, 11(2):113-134s.
- Pugin A 1836. Contrast or a parallel between the noble edifices of the Middle Ages and corresponding buildings of the present day; showing the present decay of the taste. John Grant, Edinburg. Available at: <https://archive.org/details/contrastsorparal00pugi> [15.03.22]
- Roht LM 2013. Understanding architecture: Its element, history, and meaning. Routledge, U.K., 816p.
- Sağlık E, Kelkit A 2019. Kentsel kimlik bileşenlerinin kent kullanıcıları tarafından belirlenmesi: örnek kent Çanakkale. Çanakkale Onsekiz Mart Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 5(1):63-79s.
- Schulz CN 1984. The concept of dwelling on the way to figurative architecture. Rizzoli International Publications Inc., New York, 140p.
- Stefanou J 1992. Environmental iconology – A tool for analysis for the qualitative improvement and touristic development of places. Tourism and the environment. Erişim tarihi: http://link.springer.com/chapter/10.1007/978-94-011-2696-0_4 [12.03.22]
- Tekeli İ 1991. Kent planlaması konuşmaları, bir kentin kimliği üzerine düşünceler. TMMOB Mimarlar Odası Yayınları, Ankara, 79-89s.
- Valentino A 2019. What's left of New York's Dutch past?. BBC Travel. Erişim tarihi: <https://www.bbc.com/travel/article/20191118-whats-left-of-new-yorks-dutch-past> [16.03.22]
- Viola M 2017. Boston skyline North end and financial district. Fineartamerica. Erişim tarihi: <https://fineartamerica.com/featured/boston-skyline-north-end-and-financial-district-melanie-viola.html> [22.03.22]
- Yılmaz M 2019. Fransa'da eğitim. Erişim tarihi: <http://banadanis.com/fransada-egitim/> [15.03.22]

**A REVIEW ON WORKPLACE VIOLENCE AGAINST HEALTHCARE WORKERS:
CONSEQUENCES AND PREVENTION**

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Abstract

The increase in violence around the world continues to be an important issue for societies. Workplace violence (WPV) toward healthcare workers in the healthcare sector, is a global public health problem. As it is clearly stated in the literature, health workers are more likely to be exposed to violence or aggressive attitudes and behaviors than other workers. This situation is a potential source of risk for experts working in this sector in terms of safety and health. It is observed that the rate of exposure to workplace violence is higher for experts who working in developing countries where condition of care and service is very poor. So what are the consequences of violence against healthcare workers? As victims of violence and aggression, how healthcare workers are affected by physically, psychologically and emotionally? What kind of preventive actions is being done to prevent workplace violence against healthcare workers? This study includes a literature review which is seeking valid answers to the existing problems stated in the questions. The aim of the research is contributing to the development of new strategies and preventive actions for workplace violence against health workers as a critical risk in terms of public health and to be a source for future studies on violence against healthcare workers. In this context, concept such as violence, workplace violence (WPV), healthcare workers and preventing are mentioned. In addition, findings about Workplace violence (WPV) toward healthcare workers around the world are explained by using the literature.

Keywords: Violence, workplace violence (WPV), healthcare workers, preventing.

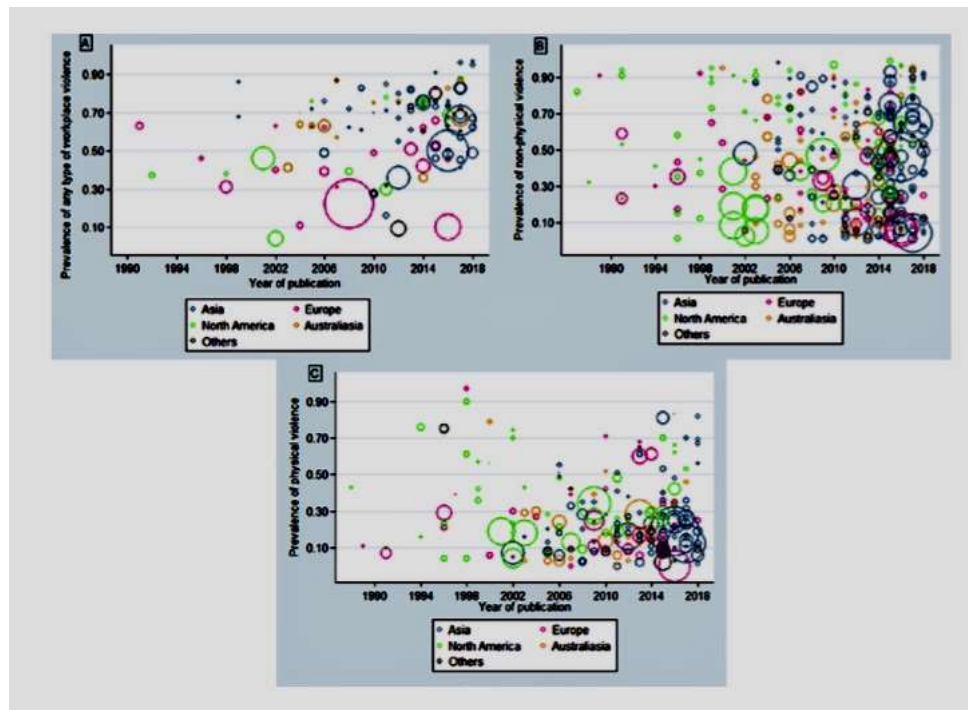
INTRODUCTION

Violence is a very important problem for humanity. While defining violence, many different types of violence such as verbal, physical, psychological and sexual can be mentioned. Also, which behavior is defined as violence may change for societies in terms of cultural differences. The World Health Organization defines violence as: “The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation” (WHO, 1996). The intentional use of physical force or power against someone causes a safety issue for humans. Living in safety is one of the most basic human needs. Focusing on the causes of violent behavior continues to

be an important research area today as in the past. According to the social learning theory, violence which is a behavior obtained by seeing, imitating, copying and taking a role from the environment; It is an acquired behavior like other social behaviors. It is affected by the individual's information process as well as by their environmental relationships. The reason for an individual's violent behavior may be related to his/her previous experiences, environment, personality structure and thoughts about violence (Tedeschi and Felson, 1994). For a worker who is exposed to workplace violence, the workplace turns into a "toxic environment" and this becomes a complex problem for the individual's continuity to work (Guay and Lanctot, 2014). According to Occupational Safety and Health Administration (OSHA), definition of Workplace violence (WPV) is any behavior or threat of physical injury, harassment, intimidation, or other threatening disruptive behavior at the workplace. (OSHA, 2015). The results from many studies conducted around the world support that workplace violence has an important place in terms of violence cases and it is a common problem for many societies. According to the findings of a study conducted in Europe, the prevalence of physical violence in the workplace is 5%. (Parent-Thirion et al., 2007). In Canada, 17% of violence cases reported by victims of violence is related with workplace violence. (Guay and Lanctot, 2014). Exposure to workplace violence may differ depending on the country of measurement, sectoral differences or preventive maintenance. Studies emphasize that the health sector is more risky than most sectors in terms of exposure to workplace violence (Foley and Rauser, 2012). The World Health Organization (WHO) defines healthcare workers as: "Health professionals study, advise on or provide preventive, curative, rehabilitative and promotional health services based on an extensive body of theoretical and factual knowledge in diagnosis and treatment of disease and other health problems. They may conduct research on human disorders and illnesses and ways of treating them, and supervise other workers. The knowledge and skills required are usually obtained as the result of study at a higher educational institution in a health-related field for a period of 3–6 years leading to the award of a first degree or higher qualification." (WHO, 2010). It is stated that the risk of exposure to violence among healthcare workers is 16 times higher than other sector workers (Kingma, 2001). A study conducted on healthcare professionals supports this findings. To clarify, most of the health workers who participated in a recent study stated that they had been exposed to at least one physical violence event in the previous year. The rate of exposure to physical violence according to various countries are; 75.8% Bulgaria, 67.2% Australia, 61% South Africa, 60% Portugal, 54% Thailand, 46.7% Brazil (Di Martino, 2002). Workplace violence is also a global problem for developed countries. However, the risk ratio for developing countries are more critical due to poor developing health systems. For instance, researchers indicate that the rate of exposure to various forms of violence among healthcare workers in developing countries is 88%. (Abodunrin et al., 2014). In a study examining of workplace violence against physicians and nurses in state hospitals in Palestine, the majority of respondents (80.4%) reported exposure to violence in the previous 12 months (Kitaneh and Hamdan, 2012). Also, in a study conducted in Turkey, the rate of exposure to violence among nurses in the recent year was found to be 85.9% (Gökçe and Dündar, 2008). A study conducted in China emphasizes that the rate of WPV victims is 70.3% for doctors and 67.6% for nurses (Chen and Wang, 2004). Moreover, the 12-month prevalence of WPV found as 39% in a large cross-section of healthcare workers in a study from USA (Pompeii et al., 2015). As it is clearly seen in the literature, WPV is a global public health problem. It is very important to study the consequences of this problem and to develop preventive policies. Preventive maintenance is "a routine for periodically inspecting" with the goal of "noticing small problems and fixing them before major ones develop (Hinds, 1985). A meta-analysis study by Liu et al. in 2019 showed that while studies on WPV were mostly conducted in Europe before 2006, studies in this area increased after 2006 in Asia, North America, and Australia. In addition, figure 1 shows that published studies on physical violence before 2010

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were mostly conducted in Asia and North America. However, after 2006, research on this subject tends to increase in Europe and Australasia as well (Liu et al., 2019).



Note. Liu et al., (2019)

Figure 1. (A) Data for any type of workplace violence set by year and study location. (B) Data for non-physical violence set by year and study location. (C) Data for physical violence set by year and study location. The size of the circle is proportional to the sample size

Although healthcare providers are concerned about the increase in workplace violence, reporting rates are low and there is limited evidence to support this concern (Gates, 2004). The workplace environment has important effects on individuals in terms of psychological well-being and quality of life as well as physical (Rousseau et al., 2017). Steffgen emphasizes that workplace violence has consequences that affect not only the workers, but also the organization and even society as a whole (Steffgen, 2008). So what are the consequences of violence against healthcare workers? It is clear that it will be important to focus on preventive policies, considering the consequences of violence and its impact area. The aim of the research is contributing to the development of new strategies and preventive actions for workplace violence against health workers as a critical risk in terms of public health and to be a source for future studies on violence against healthcare workers.

CONSEQUENCES

It is clear that the work environment with a safety risk of health workers and the high rate of exposure to workplace violence lead to many physical, emotional and psychological consequences. Even though the type of violence is different, the negative effects on health workers does not change. The productivity and health of employees who are victims of violence are affected to a great extent (Di Martino, 2002). Also, being exposed to violence in the workplace can lead to a lost time period for workers which interest, productivity and confidence in the work decrease (Phillips, 2016). In addition, healthcare workers who are

victims of violence may make a higher rate of medical errors, which may lead to worse patient outcomes (Camargo et al., 2012). Violence in the workplace does not effect on the healthcare workers only. It also effects on the organizations, such as reduced production, loss of specialists and payment of compensation (Boafo and Hancock, 2017). Employee well-being; It is expressed as a positive or negative emotional state that an individual develops depending on the job he/she works in (Locke, 1976). Continuing to work with a violence risk can also have negative emotional and psychological effects on individuals. There is no doubt that the well-being of the employees who are negatively affected emotionally and psychologically will not be high. This situation will cause various problems in terms of organizations and employers. According to studies in the literature, WPV causes damage to social relationships and professional life. In addition, it negatively affects the motivation and work engagement of the workers (Barling,1998). Encountering aggressive attitudes reflects on our emotions, and victims experience feelings of anxiety, helplessness, and decreased self-confidence. The frequency and intensity of the aggressive attitude may cause increased emotional reactions and psychological disorders such as mood and anxiety disorders (Merecz, Drabek and Moscicka, 2009). Considering all these consequences, it is seen how wide the impact of violence against health workers is. It is very important for public health that employers and politicians increase preventive maintenance practices. Among the responsibilities of employers, it can be stated that protecting the rights of employees, working to increase their safety and developing preventive strategies in the workplace. Organizations consist of the thoughts and behaviors of the employees, apart from concrete elements such as buildings and people. For this reason, it is critically important to consider the opinions of the employees (Gazell, 1970). In other words, the problems of the employees should not be ignored and their victimhoods should be considered. In addition, politicians should develop various political processes and establish legal mechanisms in order to prevent the emergence of consequences that will adversely affect public health and the deterioration of the health system. Consequently, what kind of preventive actions is being done to prevent workplace violence against healthcare workers? In the prevention section, the preventive strategies on WPV are examined within the scope of the literature.

PREVENTION

The information given in the consequences section shows that violence against healthcare workers has critical importance on individuals, societies and institutions. Therefore, it is imperative to develop preventive policies, procedures and strategies in order to contain the situation. Many countries are developing various policies to protect employee rights and safety. According to the OSHA's Guidelines for Preventing Workplace Violence for Health and Social Service Workers, hospitals should have a written WPV prevention program that includes management commitment and employee participation prevention, worksite analysis, hazard and control, safety and health training, and record keeping and program evaluation as part of their overall safety and health program. In addition, It is emphasized that policies for reporting and observing incidents, as well as carrying out a comprehensive medical and psychological counseling and interrogation program for workers who are victims of violence, are very important (OSHA, 2016). In 2011, the Ministry of Health in Turkey started the white code application as an emergency management tool to prevent violence against healthcare workers. With this application, it is aimed to protect the workers who exposed to violence (Tuncer, 2013). In addition, measuring and reporting incidents of workplace violence by employers is crucial to accurately assessing the extent of the problem and the adequacy of interventions. In order to prevent workplace violence, training activities including stress reduction techniques, management of aggressive behaviors and protective and preventive information for attacks should be carried out. (Robinson, 2019). The findings in the literature

show that some preventive practices are carried out against workplace violence. However, increasing in violence cases shows that these strategies are insufficient and more preventive strategies are needed in this regard.

CONCLUSIONS AND RECOMMENDATIONS

As it is clearly stated in the literature, health workers are more likely to be exposed to violence or aggressive attitudes and behaviors than other workers. Violence against healthcare professionals has a critical importance and it is not affecting only the victims of violence. It also affects societies and institutions. This problem covers both developing and developed countries. In this context, the fact that violence against healthcare professionals is a global public health problem also overlaps with the findings in the literature. Being exposed to violence causes many negative social and psychological consequences on individuals. This situation also has many negative effects for employers in terms of reduced production, loss of specialists and payment of compensation. It is very important to consider violence as a public health problem and to increase social awareness about it in order to reduce violence. Although it is seen in the literature review that rate of studies on workplace violence in health sector have increased, it has been observed that there is still a need for studies on the causes of violence. It is thought that researches which are focusing on organizational factors such as inadequacies in the health system and working conditions that may cause violence will help to develop future policies, procedures and strategies.

REFERENCES

- Abodunrin, O.L., Adeoye, A.O., Adeomi, A.A., Akande, A.A., (2014). Prevalence and forms of violence against health care professionals in a South-Western city, Nigeria. *Sky Journal of Medicine and Medical Sciences* 2 (8), 67–72. Retrieved from. <http://www.skyjournals.org/SJMMS>.
- Barling J. (1998). The prediction, experience and consequences of workplace violence. In: VandenBos GR, Bulatao EQ, editors. *Violence on the job*. Washington D.C.: APA. 29–49
- Boafo, I.M., Hancock, P., (2017). Workplace violence against nurses: a cross-sectional descriptive study of Ghanaian nurses. *SAGE Open* 7 (1).
- Camargo, C.A., Tsai, C.L., Sullivan, A.F., et al. (2012). Safety climate and medical errors in 62 US emergency departments. *Ann Emerg Med*. 60: 555–63.
- Chen, Z.H., Wang, S.Y., (2004). Psychiatric hospital and general hospital workplace violence study comparison. *China of Public Health*. 20:1316–1317.
- de Léséleuc, S. (2007). *La victimisation criminelle en milieu de travail*. Ottawa: Statistique Canada, 19.
- Di Martino, V. (2002). *Workplace violence in the health sector - country case studies (Brazil, Bulgaria, Lebanon, Portugal, South Africa, Thailand, and an Additional Australian Study)*, Synthesis Report. Geneva: ILO/ICN/WHO/PSI Joint Programme on Workplace Violence in the Health Sector.
- Foley, M., Rauser, E. (2012). Evaluating progress in reducing workplace violence: Trends in Washington State workers' compensation claims rates, 1997–2007. *Work*, 42, 67–81.
- Gates, D.M. (2004). The epidemic of violence against healthcare workers. *Occupational and Environmental Medicine*. 61, 649-650.

Gazell, J. A. (1970). Authority-flow theory and the impact of Chester Barnard. *California. Management Review*, 13(1), 68-74.

Gökçe, T., DüNDAR, C. (2008). Samsun ruh ve sinir hastalıkları hastanesinde çalışan hekim ve hemşirelerde şiddete maruziyet sıklığı ve kaygı düzeylerine etkisi. *İnönü Üniversitesi Tıp Fakültesi Dergisi*. 15: 25-28.

Guay, S., Lanctot, N. (2014). The aftermath of workplace violence among healthcare workers: A systematic literature review of the consequences. *Aggression and Violent Behavior*. 19, 492-501.

Kingma M. (2001). Workplace violence in the health sector: a problem of epidemic proportion. *International Nursing Review*. 48: 29-130.

Kitaneh, M., Hamdan, M. (2012). Workplace violence against physicians and nurses in Palestinian public hospitals: a cross-sectional study. *BMC Health Services Research*. 12:469 <http://www.biomedcentral.com/1472-6963/12/469>.

Occupational Safety and Health Administration. (2015). Workplace violence in healthcare: Understanding the challenge. Retrieved from <https://www.osha.gov/Publications/OSHA3826.pdf>

Occupational Safety and Health Administration. (2016). Guidelines for preventing workplace violence for health and social service workers. Retrieved from <https://www.osha.gov/Publications/osha3148.pdf>

Parent-Thirion, A., Macias, E. F., Hurley, J., and Vermeulen, G. (2007). Quatrième enquête européenne sur les conditions de travail. Dublin: Fondation européenne pour l'amélioration des conditions de vie et de travail, 154

Phillips, J.P. (2016). Workplace violence against health care workers in the United States. *N Engl J Med*. 375:e14.

Pompeii, L. A., Schoenfisch, A. L., Lipscomb, H. J., Dement, J. M., Smith, C. D., and Upadhyaya, M. (2015). Physical assault, physical threat and verbal abuse perpetrated against hospital workers by patients or visitors in six U.S. hospitals. *American Journal of Industrial Medicine*, 58(11), 1194-1204. doi:10.1002/ajim.22489.

Robinson, I. (2019). Prevention of workplace violence among health care workers. *workplace health and safety*. 67(2). DOI: 10.1177/2165079918810669.

Rousseau M.C., Baumstarck K, Leroy T, et al. Impact of caring for patients with severe and complex disabilities on health care workers' quality of life: determinants and specificities. *Dev Med Child Neurol* 2017; 59: 732-7

Steffgen, G. (2008). Physical violence at the workplace: Consequences on health and measures of prevention. *European Review of Applied Psychology/Revue Européenne de Psychologie Appliquée*, 58(4), 285-295, <http://dx.doi.org/10.1016/j.erap.2008.09.011>.

Tedeschi, J. T., Felson, R. B., (1994). Violence, aggression, and coercive actions. *American Psychological Association*. <https://doi.org/10.1037/10160-000>

World Health Organization (1996). Global consultation on violence and health. Violence: a public health priority. World Health Organization.

World Health Organization (2010). Classifying health workers: Mapping occupations to the international standard classification. 1-14. www.who.int/hrh/statistics/workforce_statistics.

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EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

Locke, E. A. (1976). The nature and causes of job satisfaction. M. D. Dunnette (Ed.), Handbook of industrial and organizational psychology (s. 1297–1349). Chicago: Rand McNally.

Micharl Decourcy Hinds (1985). Preventive maintenance: A checklist. The New York Times. <https://www.nytimes.com/1985/02/17/realestate/preventive-maintenance-a-checklist.html>

Tuncer, S., (2013) Yardımcı Sağlık Personeli Açısından Çalışan Güvenliği ve Mesleki Risk Faktörleri (Yüksek Lisans Tezi), Gazi Üniversitesi, Sosyal Bilimleri Enstitüsü, Ankara. YÖK: Ulusal Tez Merkezi (Tez No. 332475), ss. 10.

Liu, J., Gan, Y., Jiang, H., et al (2019). Prevalence of workplace violence against healthcare workers: a systematic review and meta-analysis. *Occup Environ Med* 0:1–11. doi:10.1136/oemed-2019-105849.

Merecz, D., Drabek, M., and Moscicka, A., (2009). Aggression at the workplace psychological consequences of abusive encounter with coworkers and clients. *International Journal of Occupational Medicine and Environmental Health*. 22(3):243–260 DOI 10.2478/v10001-009-0027-2

ASSESSMENT OF DEPRESSION AMONG OLDER INMATES

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Abstract

To assess depressive symptoms, level of depression among elderly prisoners in correctional facilities, to determine reasons, and trigger factors those influence emotional state of the older population in the prison. The next aim of the study was to find out association of depression and environmental factors. The main hypothesis of the research was there will be significant correlation between level of depression and self-esteem of the older convicts (H_1).

The explanatory research approach, structured examination was conducted with 200 elderly prisoners in correctional facilities. The data about demographic variables was collected by questionnaire form, and depressive symptoms of the participants were measured by Patient Health Questionnaire-9 (PHQ-9). SPSS program version was used to find out the correlation and regression factors between variables.

Majority of the participants suffered various health problems, geriatric symptoms and disease. Various factors influence aging prisoners' well-being and mental state, so aging process begins in that group before than other population of the society. Depression score was 9.08 ± 3.5 and this figure fluctuated between mild and moderate level of depression (PHQ-9). Only 9.5% (19) of participants weren't observed any depressive symptoms. There was negative correlation between increasing age factor and self-esteem at 0.05 ($r = -0,148^*$), and moderate negative correlation between depression and self-esteem ($r = -0,439^*$), and it was statistically significant at 0.001 level.

Long-lasting and with moderate or severe intensity, depression may become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. At its worst, depression can lead to suicide (WHO, 2018). Considering the results of survey and comparing different literatures the some recommendation were made, that can be used in different programs and future researches.

Keywords: depression, geriatric symptoms, older prisoners, correctional facilities.

Introduction

Older inmates are members of vulnerable group in the prisons. Their physical and mental health problems have been examined by international organizations, committees, universities, and individual researchers. ICRC (International Committee Red Cross) discussed ageing prisoners' problem in International Review in 2016 (ICRC, 2016). The committee mentioned experienced profound stress or trauma, substance use disorder, limited access to quality health-care and education as the reasons of the accelerated ageing (ICRC, 2016). Another hand, correctional facilities structure, environmental factors, daily regime influence their mental-health and well-being. Majority of the prisons were designed considering young people's health opportunities. So correctional facilities don't provide optimal care for the older inmates.

WHO (World Health Organization) and ICRC highlighted the rise in the number of aging populations in community, and prisons. This increase has led some prisons to improve environmental opportunities for inmates with physical disabilities, and this reconstruction contributes high costs. Geriatric health-care model requires comprehensive assessment, interventions, and support to elderly population in the correctional settings.

Older population experience “geriatric syndromes”, and these syndromes affect negatively on their physical function and quality of life. Geriatric syndromes:

- Frequent falls;
- Cognitive impairment;
- Dementia;
- Incontinence;
- Sensory impairment
- Polypharmacy (S. Landefeld et al.,2004).

Older inmates suffer not only physical health problems, and also mental health condition. Doris J. James, Lauren E. Glaze, B. A. Williams, C. Ahalt, L. Aronson, Tina Maschi and other researchers studied older prisoners’ mental problem in different years. They defined posttraumatic stress disorder, anxiety, distress, high rates of depression and suicidal ideation. Isolation in the facilities, and fewer visits by relatives and family members affected their daily mood, and interpersonal relationship (B. A. Williams et al., 2010).

The purpose of the study is to assess depression symptoms, and examine relation between independent variables (age, regime, family visits) and depression level.

According to American Psychiatric Association (APA) depression (major depressive disorder) defined as a common and serious medical illness that negatively affects how a person feels, thinks and acts. Depression causes feelings of sadness and/or a loss of interest in activities person once enjoyed. It can lead to a variety of emotional and physical problems and can decrease ability to function at work and at home.

Depression symptoms can vary from mild to severe and can include (APA, DSM-5, 2013):

- Feeling sad or having a depressed mood;
- Loss of interest or pleasure in activities once enjoyed;
- Changes in appetite — weight loss or gain unrelated to dieting;
- Trouble sleeping or sleeping too much;
- Loss of energy or increased fatigue;
- Increase in purposeless physical activity (e.g., inability to sit still, pacing, handwringing) or slowed movements or speech (these actions must be severe enough to be observable by others);
- Feeling worthless or guilty;
- Difficulty thinking, concentrating or making decisions;
- Thoughts of death or suicide.

These symptoms must last at least two week, and influence different aspects of person’s life. Depression can affect anyone—even a person who appears to live in relatively ideal circumstances.

The main causes of depression are biological, psychological, and social factors. Several factors can play a role in depression:

- Biochemistry: Differences in certain chemicals in the brain may contribute to symptoms of depression.
- Genetics: Depression can run in families. For example, if one identical twin has depression, the other has a 70 percent chance of having the illness sometime in life.
- Personality: People with low self-esteem, who are easily overwhelmed by stress, or who are generally pessimistic appear to be more likely to experience depression.

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- Environmental factors: Continuous exposure to violence, neglect, abuse or poverty may make some people more vulnerable to depression (APA, 2020).

Considering crime, previous life style, social relationship, lack of family support and visits, role conflicts, prisons environment, officers' attitude, interpersonal relationships with inmates, and other factors, aging prisoners population have high risk of depression.

Darrick Jolliffe and Dr Zubaida Haque present their view about basic human conditions of prison, have brought together the findings about mental health of inmates in the article "Have prisons become a dangerous place? Disproportionality, safety and mental health in British Prisons". Authors find significant links between a facility's population size, the presence of mental disorders, prisoners' distress, time in cell, lack of contact with family, lack of staff support and death from suicide. Research suggest combination of cognitive behavior therapy and dialectical behavior therapy, access to educational courses and jobs, special trainings for prison officers in mental health literacy and benefits of these programs for preventing self harm and suicide (Darrick Jolliffe and Dr Zubaida Haque, 2016).

Doshi Dhara and colleagues examined psychological wellbeing and depression level in old age. Authors revealed a significant correlation ($r=0.70^{**}$, $p<0.01$) between the variables (Dhara et al.,2012). Vesile Senol and colleagues learned this problem in 2013, and realized a cross sectional study. They mentioned that there were negative correlations between depression evel and social participation, intimacy (Vesile S.et al., 2013).

Srinivasan P., hospital staff members, and other researchers in Nagpur highlighted moderate depression, negative correlation between quality of life and depression score in the study finding about elderly population (Srinivasan P. et al.,2015).

Methodology

The research was conducted based on an interpretive/ constructivist paradigm, quantative approach. The survey questionnaire and screening scale for depression were developed based on the review of available researches relevant to the study topic, to cover risk factors, addressing important variables. Elderly inmates in 3 prisons regime of Azerbaijan participated in the survey.

The survey is divided by 8 following components related to the prison life and relationships:

- 1) The environmental factors in prisons,
- 2) Health conditions
- 3) Level of interpersonal relationships with prison staff and other inmates
- 4) Level of support and communication with family members,
- 5) The type visits (short and long visits),
- 6) Daily mood,
- 7) Depression level,
- 8) Hope for future

Long-lasting and with moderate or severe intensity, depression may become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. At its worst, depression can lead to suicide (WHO, 2018). Considering that it is short and easy for respondents, and can be applied in multiple patient populations, I used Patient Health Depression Questionnaire (PHQ-9) to determine depression level of inmates.

Table 1. Depression score and level

Total Score	Depression Severity
0-4	None
5-9	Mild depression
10-14	Moderate depression
15-19	Moderately severe depression
20-27	Severe depression

The result of the survey was analyzed using SPSS program.

Result and conclusion

Depression score of the participants was examined by using PHQ-9 measurement scale (Appendix 1).

Table 2. Descriptive statistics of depression score

				Descriptive	
				Statistic	Std. Error
depression score	Mean			9,08	,253
	95% Confidence Interval for Mean	Lower Bound	8,59		
			Upper Bound	9,58	
	5% Trimmed Mean			9,04	
	Median			9,00	
	Variance			12,842	
	Std. Deviation			3,584	
	Minimum			1	
	Maximum			19	
	Range			18	
	Interquartile Range			5	
	Skewness			,271	,172
	Kurtosis			-,022	,342

According the table the depression score was $9,08 \pm 3.58$; and changed between 1-19. The difference between mean and median was 0,08; skewness value was positive, and it changed between [-1;1]; these figures show normal distribution, and let continue analyzing.

So, we can say that participants emotional state change between mild and moderate level of depression.

The first relation was checked between *aging and depression score*. The cut point was 60 years old, and determine two groups, till 60s, and above 60s.

H_0 (there isn't any relation between increasing age and depression result).

Table 3. Increasing age and depression score

Age group	Depression score	Independent sample t-test	Correlation coefficient
≥ 60	$9,35 \pm 3,3$	$F=7,38; t=2,9; df=198; p<0,01$	$r=-0,174^*; p<0,05$
< 60	$7,12 \pm 4,86$		

According the statistics the relation between aging and depression level was determined, in this situation H_0 rejected.

The next independent variable was environmental factor in prisons. The participants' attitude to medical care was assessed in survey questions. Their results were checked ANOVA test, and based on Tukey HSD, Scheffe, LSD, Bonferroni and Dunnett (2-sided) the difference among participants was significant. People who were satisfied medical care their depression score was lower than partially satisfied, and unsatisfied group members ($0,29; -6,86; p<0,05$).

Regime and depression score. The prisons were differentiated in 3 groups – common, strict and severe.

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Table 4. Regime and depression score

regime	N	M±SD	Test of normality (kolmogorov-smirnov)	df	Sig.	Pearson correlation	sig
Common regime	83	9,36±2,8	,141	83	0.000		
Strict	97	7,76±3,3	,142	97	0.000		
Severe	20	14,35±2,3	,191	20	0.055		
						,179*	,011

Rejime: 1=common; 2=strict; 3=severe
p<0.05

Table 5. Multiple Comparisons ANOVA test results

	(I)	(J)	Mean difference (I-J)	Sig (p<0.05)
Tukey HSD	common	strict	1,599*	,002
		severe	-4,989*	,000
	strict	common	-1,599*	,002
		severe	-6,587*	,000
	severe	common	4,989*	,000
		strict	6,587*	,000
Bonferroni	common	strict	1,599*	,002
		severe	-4,989*	,000
	strict	common	-1,599*	,002
		severe	-6,587*	,000
	severe	common	4,989*	,000
		strict	6,587*	,000

Based on the statistics there is significant difference and positive correlation between groups.

Depression score and satisfaction. Satisfaction of the participants was assessed WHO QOL survey, question N-5, 19, 20.

Q 5 – How much do you enjoy your life?

Q 19 - How satisfied are you with yourself?

Q 20 - How satisfied are you with your personal relationships?

Table 6. Depression score, self-esteem and personal relationship.

Satisfaction	Mean	SD	Spearman correlation (r)	Sig (p<0.01)
Very dissatisfied with yourself	13.75	3.84		
dissatisfied with yourself	9.66	3.14		
Neither satisfied nor dissatisfied with yourself	7.19	3.07		
satisfied with yourself	4.67	1.75		
Very satisfied with yourself	-	-		
			-,439**	0.000
Very dissatisfied personal relationship	11.6	3.33		
dissatisfied personal relationship	8.71	3.00		
Neither satisfied nor dissatisfied personal relationship	4.71	2.8		
satisfied personal relationship	4.80	1.9		
Very satisfied personal relationship	-	-		

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			-,530**	0.000
How much do you enjoy your life? Not at all	-	-		
A little	9.4	3.2		
A moderate amount	6.77	4.1		
Very much	-	-		
An extreme amount	-	-		
			-,273**	0.000

Older adults who were satisfied themselves their depression score were less than who were dissatisfied, and very dissatisfied. According to figures there is significant negative correlation between variables, increasing depression was observed low level of satisfaction.

Older adults who were satisfied their personal relationship, their depression score were less than who were dissatisfied, and very dissatisfied. According to figures there is significant negative correlation between variables, depression and satisfaction personal relationship. So older adults who didn't get family support their depression score were higher than others.

Aging factor and satisfaction

Older prisoners aging factor and personal satisfaction about themselves and relationship were examined and shown table 7, 8. There was significant difference and negative correlation between increasing age and satisfaction factor.

Table 7. Aging and satisfaction t-Test results

	N	Mean	SD	t	p
>60	176	2.22	.575		
<60	24	2.67	.761		
				-3.456**	.001

Table 8. Correlation between variables

	Aging	Satisfaction relationship personal	Self-esteem
Satisfaction about themselves	-,148*	,570**	1
Satisfaction relationship personal	-,153*	1	,570**

*p<0.05; **p<0.01

- Aging factor influence older adults daily mood, emotional state and depression symptoms, there is significant positive correlation between these two variables;
- Different regime conditions influence prisoners' depression symptoms, too. There is a significant difference and positive correlation among three regime factors and depression score;
- Older inmates' satisfaction with themselves and personal relationships can be different by increasing age. Significant negative correlation was observed between increasing age and satisfaction factor.

Recommendation:

- Enlightenment about geriatric syndromes (frequent falls, cognitive impairment, dementia, incontinence, sensory impairment, and polypharmacy) should be realized among prisoners and staff personnel. People aging in prisons should receive periodic medical and psychological care to identify new geriatric syndromes as they arise. It was emphasized in the International Review of the Red Cross in 2016.

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- Prison staff should be informed about risk factors and warning signs on the risk of self-harm, depression symptoms, and future effects. This can be the main topic of the seminar with officers.

- Psychologists should involve elderly inmates in group therapy to prevent social isolation and make connections with relatives. Social isolation can lead to diminished functional capacity or may be exacerbated by it, putting older adults at a risk for subsequent loneliness and other diseases (Perissinotto, C. M., et al. 2012).

-Prisons can be staffed in part by prisoners-volunteers, who may receive extensive training and mentored experience in hospice practices as in other countries (Human Rights Watch, Heath C., et al 2011).

Limitation of the study

The attendance at the study was voluntary, so some of the elderly prisoners didn't want to participate in interviews. This is the first limitation, due to numbers, and there wasn't other culture's member. So, the results can be valid and reliable only for that population.

Another limitation is due to variables; during the research limited numbers of variables were chosen and checked the correlation between these factors. Based on these data, in the future, the qualitative study could be realized related to the subjective attitude of participants. In addition, we could pay attention to socio-demographic and professional information about participants to hypothesis correlations with the categories that are identified by this research.

The next limitation of this work's due to gender, so only male prisoners were involved, for future female elderly inmates' need to take into account, too.

Considering this project as a first local experiment, in the future, the study can be focused to other prisons of regions with more participants, and different point of view

Conflicts of Interest

The authors declare that there is no conflict of interest.

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References

- Aday, R. H., & Krabill, J. J. (2012). Older and geriatric offenders: Critical issues for the 21st century. *Special needs offenders in correctional institutions, 1*, 203-233. DOI: [10.4135/9781452275444.n7](https://doi.org/10.4135/9781452275444.n7)
- Aldwin, C. M., & Levenson, M. R. (2001). Stress, coping, and health at midlife: A developmental perspective. In M. E. Lachman (Ed.), *Handbook of midlife development*, John Wiley & Sons, Inc.. (pp. 188–214).
- Aldwin, C. M., Spiro, A. III, & Park, C. L. (2006). Health, Behavior, and Optimal Aging: A Life Span Developmental Perspective. In J. E. Birren & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 85–104). Elsevier. <https://doi.org/10.1016/B978-012101264-9/50008-2>
- Aldwin, C. M., Park, C. L., Choun, S., & Lee, H. (2018). The impact of military service on stress, health, and well-being in later life. In A. Spiro III, R. A. Settersten, Jr., & C. M. Aldwin (Eds.), *Long-term outcomes of military service: The health and well-being of*

- aging veterans (pp. 167–186). American Psychological Association. <https://doi.org/10.1037/0000061-010>
- Aldwin, C. M., Igarashi, H., Gilmer, D. F., & Levenson, M. R. (2017). *Health, illness, and optimal aging: Biological and psychosocial perspectives*. Springer Publishing Company.
- Beck, A. J., & Harrison, P. M. (1991). Prisoners in 2000. *change*, 6(51,640), 49-153. <https://bjs.ojp.gov/content/pub/pdf/p00.pdf>
- Bedard, R., Metzger, L., & Williams, B. (2016). Ageing prisoners: An introduction to geriatric health-care challenges in correctional facilities. *International Review of the Red Cross*, 98(903), 917-939. doi:10.1017/S1816383117000364 <https://international-review.icrc.org/sites/default/files/irrc-903-12.pdf>
- Berlim M.T., Fleck M.P. (2007) Quality of Life and Major Depression. In: Ritsner M.S., Awad A.G. (eds) Quality of Life Impairment in Schizophrenia, Mood and Anxiety Disorders. Springer, Dordrecht. https://doi.org/10.1007/978-1-4020-5779-3_12
- Birren, J. E., & Schaie, K. W. (2006). Handbook of the Psychology of Aging (6th edn, pp. 261–287). https://www.researchgate.net/profile/Catherine-Bowen/publication/234013321_Aging_in_the_Work_Context/links/5f75d61092851c14bca48371/Aging-in-the-Work-Context.pdf
- Blazer, D. G., Hybels, C. F., & Pieper, C. F. (2001). The association of depression and mortality in elderly persons: A case for multiple, independent pathways. *The Journals of Gerontology: Series A: Biological Sciences and Medical Sciences*, 56(8), M505–M509. <https://doi.org/10.1093/gerona/56.8.M505> <https://psycnet.apa.org/record/2001-18111-005>
- Brown, A. D. (2017). Identity work and organizational identification. *International Journal of Management Reviews*, 19(3), 296-317. https://www.researchgate.net/publication/318656583_Identity_Work_and_Organizational_Identification
- Chiu, T. (2016). It's about time: Aging prisoners, increasing costs, and geriatric release. https://www.vera.org/downloads/Publications/its-about-time-aging-prisoners-increasing-costs-and-geriatric-release/legacy_downloads/Its-about-time-aging-prisoners-increasing-costs-and-geriatric-release.pdf
- Comfort, M., McKay, T., Landwehr, J., Kennedy, E., Lindquist, C., & Bir, A. (2016). The costs of incarceration for families of prisoners. *International Review of the Red Cross*, 98(903), 783-798. doi:10.1017/S1816383117000704 <https://international-review.icrc.org/sites/default/files/irrc-903-5.pdf>
- Friedman H. S. (2000). Long-term relations of personality and health: dynamisms, mechanisms, tropisms. *Journal of personality*, 68(6), 1089–1107. <https://doi.org/10.1111/1467-6494.00127> <https://pubmed.ncbi.nlm.nih.gov/11130733/>
- Fiske, S. T., & Taylor, S. E. (1991). *Social cognition*. McGraw-Hill Book Company. <https://psycnet.apa.org/record/1991-97723-000>
- Fujita, K., Carnevale, J. J., & Trope, Y. (2018). Understanding self-control as a whole vs. part dynamic. *Neuroethics*, 11(3), 283–296. <https://doi.org/10.1007/s12152-016-9250-2> <https://psycnet.apa.org/record/2016-10119-001>
- Halsey M, Deegan S. In Search of Generativity in Prison Officer Work: Balancing Care and Control in Custodial Settings. *The Prison Journal*. 2017;97(1):52-78. doi:[10.1177/0032885516679380](https://doi.org/10.1177/0032885516679380)

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

- Hummert, M. L. (2011). Age stereotypes and aging. In K. W. Schaie & S. L. Willis (Eds.), *Handbook of the psychology of aging* (pp. 249–262). Elsevier Academic Press. <https://doi.org/10.1016/B978-0-12-380882-0.00016-4>
- Ibsen, A. Z. (2013). Ruling by Favors: Prison Guards' Informal Exercise of Institutional Control. *Law & Social Inquiry*, 38(2), 342–363. <http://www.jstor.org/stable/24545901>
- Kawachi, I., Sparrow, D., Vokonas, P. S., & Weiss, S. T. (1994). Symptoms of anxiety and risk of coronary heart disease. The Normative Aging Study. *Circulation*, 90(5), 2225–2229. <https://doi.org/10.1161/01.cir.90.5.2225>
- Khurana, H., & Raj, A. (2018). Aging and suicide. In B. Vijaya Prasad & S. Akbar (Eds.), *Handbook of research on geriatric health, treatment, and care* (pp. 409–429). IGI Publishing/IGI Global. <https://doi.org/10.4018/978-1-5225-3480-8.ch023>
- Kiriakidis, S. (2015). Elderly suicide: risk factors and preventive strategies. *Annals of Gerontology and Geriatric Research*, 2(2), 1–6. <https://www.jscimedcentral.com/Gerontology/gerontology-2-1028.pdf>
- Lespérance, F., Frasure-Smith, N., Talajic, M., & Bourassa, M. G. (2002). Five-year risk of cardiac mortality in relation to initial severity and one-year changes in depression symptoms after myocardial infarction. *Circulation*, 105(9), 1049–1053. <https://doi.org/10.1161/hc0902.104707>
- Liebling, A. (1999). Doing research in prison: Breaking the silence?. *Theoretical Criminology*, 3(2), 147–173. DOI: [10.1177/1362480699003002002](https://doi.org/10.1177/1362480699003002002)
- Loeb, S. J., & Abudagga, A. (2006). Health-related research on older inmates: an integrative review. *Research in nursing & health*, 29(6), 556–565. <https://doi.org/10.1002/nur.20177>
- Mroczek, D. K., Spiro, A. III, & Griffin, P. W. (2006). Personality and Aging. In J. E. Birren & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 363–377). Elsevier. <https://doi.org/10.1016/B978-0-12-101264-9/50019-7>
- Metzner J. L. (2002). Class action litigation in correctional psychiatry. *The journal of the American Academy of Psychiatry and the Law*, 30(1), 19–32. <https://pubmed.ncbi.nlm.nih.gov/11931366/>
- Mitchell, A. J., & Dennis, M. (2006). Self harm and attempted suicide in adults: 10 practical questions and answers for emergency department staff. *Emergency medicine journal : EMJ*, 23(4), 251–255. <https://doi.org/10.1136/emj.2005.027250>
- Owen, G., Fulton, R., & Markusen, E. (1982-1983). Death at a distance: A study of family survivors. *Omega: Journal of Death and Dying*, 13(3), 191–225. <https://doi.org/10.2190/2PW7-ARQ8-Y4L8-B3YW>
- Psick, Z., Simon, J., Brown, R., & Ahalt, C. (2017). Older and incarcerated: policy implications of aging prison populations. *International journal of prisoner health*, 13(1), 57–63. <https://doi.org/10.1108/IJPH-09-2016-0053>
- Ricciardelli, R., & Perry, K. (2016). Responsivity in practice: Prison officer to prisoner communication in Canadian provincial prisons. *Journal of Contemporary Criminal Justice*, 32(4), 401–425. <https://doi.org/10.1177/1043986216660004>
- Perissinotto, C. M., Stijacic Cenzer, I., & Covinsky, K. E. (2012). Loneliness in older persons: a predictor of functional decline and death. *Archives of internal medicine*, 172(14), 1078–1083. <https://doi.org/10.1001/archinternmed.2012.1993>
- Schaie, K. W., & Willis, S. L. (Eds.). (2011). *Handbook of the psychology of aging* (7th ed.). Elsevier Academic Press. <https://psycnet.apa.org/record/2010-26788-000>
- Spiro, A. III. (2007). The Relevance of a Lifespan Developmental Approach to Health. In C. M. Aldwin, C. L. Park, & A. Spiro III (Eds.), *Handbook of health psychology and aging* (pp. 75–93). The Guilford Press. <https://psycnet.apa.org/record/2007-03414-005>

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

World Health Organization. (2017). WHO guidelines on integrated care for older people (ICOPE). *WHO World Health Organization, Geneva.*

<https://www.who.int/publications/i/item/9789241550109>

Williams, B. A., Goodwin, J. S., Baillargeon, J., Ahalt, C., & Walter, L. C. (2012). Addressing the aging crisis in U.S. criminal justice health care. *Journal of the American Geriatrics Society, 60*(6), 1150–1156. <https://doi.org/10.1111/j.1532-5415.2012.03962.x>

Woo, Y., Stohr, M. K., Hemmens, C., Lutze, F., Hamilton, Z., & Yoon, O. K. (2016). An empirical test of the social support paradigm on male inmate society. *International Journal of Comparative and Applied Criminal Justice, 40*(2), 145-169. <https://doi.org/10.1080/01924036.2015.1089518>

Appendix 1.

Quick Guide to the Patient Health Questionnaire - 9 (PHQ-9)

Description	The items on the PHQ-9 follow the criteria for a Major Depressive Episode listed in the DSM-IV. Symptom severity is rated by indicating the frequency that depressive symptoms have been experienced during the last 2 weeks on a scale of 0 “ <i>Not at all</i> ” to 3 “ <i>Nearly every day</i> ”. An additional single item is rated to determine the impact of depressive symptoms on psycho, social, and occupational functioning.												
Purpose:	The PHQ-9 is used to screen for depression, aid in diagnosis, and monitor change in symptoms over time.												
Target Population:	Adolescents, adults, older adults												
Languages:	The PHQ-9 has been translated into over 30 languages and can be downloaded from the PHQ website: www.phqscreeners.com												
Scoring and Interpreting:	<p>The total score is computed by first producing a sum for each column (e.g. each item chosen in column “<i>More than half the days</i>” = 2), then summing the column totals. Total Scores range from 0 to 27, and indicate the following levels of depression severity:</p> <table align="center"> <thead> <tr> <th>Total Score</th> <th>Depression Severity</th> </tr> </thead> <tbody> <tr> <td>0-4</td> <td>None</td> </tr> <tr> <td>5-9</td> <td>Mild depression</td> </tr> <tr> <td>10-14</td> <td>Moderate depression</td> </tr> <tr> <td>15-19</td> <td>Moderately severe depression</td> </tr> <tr> <td>20-27</td> <td>Severe depression</td> </tr> </tbody> </table> <p>In addition to the patient’s Total Score, the responses to Question #9 (suicidality) and Question #10 (the impact of symptoms on the patient’s daily functioning) should be reviewed to determine appropriate treatment interventions.</p>	Total Score	Depression Severity	0-4	None	5-9	Mild depression	10-14	Moderate depression	15-19	Moderately severe depression	20-27	Severe depression
Total Score	Depression Severity												
0-4	None												
5-9	Mild depression												
10-14	Moderate depression												
15-19	Moderately severe depression												
20-27	Severe depression												
When to use:	As indicated to screen for depression												
Recommended Interventions:	Ask patient about preferences for addressing troubling symptoms. Offer behavioral strategies (for example, planning and engaging in more pleasurable, social, and mastery activities as well as exercise) and cognitive behavioral strategies (for example, taking a systematic approach to solving life problems). For patients with higher levels of severity and/ or with greater negative impact on ability to function, explore patient interest in combined treatment.												

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PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: _____ **DATE:** _____

Over the last 2 weeks, how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly everyday
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, irritable, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite, weight loss, or overeating	0	1	2	3
6. Feeling bad about yourself - or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as school work, reading, or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3

add columns: + +

TOTAL:

10. If you checked of any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	_____
	Somewhat difficult	_____
	Very difficult	_____
	Extremely difficult	_____

PHQ-9 is adapted from PRIME MD TODAY, developed by Drs Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke, and colleagues, with an educational grant from Pfizer Inc. For research information, contact Dr Spitzer at rls8@columbia.edu. Use of the PHQ-9 may only be made in accordance with the Terms of Use available at <http://www.pfizer.com>. Copyright ©1999 Pfizer Inc. All rights reserved. PRIME MD TODAY is a trademark of Pfizer Inc.

ZT274388

GOD CHARACTER IN AZERBAIJANI LITERATURE

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Abstract

Since their creation humans have been eager to perceive the things around them. Events brought questions and when they couldn't find answers they thought of the existence of supernatural forces and found the solution of despair in them. They idolized, divinized and worshipped to Him. Till Creator sent His messenger and informed people, efforts for searching and perceiving continued. These were reflected in literature. Since the day literature was created it has been the sign of humans' faith. Gods, demigods, characters with god-like features have been described in world literature differently. God characters created in Azerbaijani literature is mainly studied here. It becomes obvious that canons had been one of the main issues of Azerbaijan literature till the XIX century and gradually developed. Koran and Sunnah stood on the basis of religious views and writers presented the information they got from there in a literary way. Geopolitical processes occurring after the XIX century in the world and in Azerbaijan changed literature's direction. Though various methods and movements appeared, realism dominated. The character *human* came forward and was described as a creative force. Azerbaijan's north being inside Russia strengthened the leaning of literature towards Europe. The theme of God was forgotten; it became the object of criticism even irony. And in the Soviet period absolute atheism dominated and atheistic worldview was reflected in literature. Although faith in God lived in the spirit of people, it seems faded in literature.

Though mainly samples of the Soviet Era (1920-1990 and afterwards) were explored in the article, the previous centuries were considered too, historical change in cognition was viewed in literary samples, the essence of the issue and the causes of the change were studied in detail. Considering the problem on the plane of literary samples and literary criticism the view of the spiritual and moral values in Azerbaijan especially in the past two centuries is revived in the ideological context of Russian Empire.

Keywords: God, faith, half-truth, canon, religious enlightenment, Sunnah.

INTRODUCTION

In the early nineteenth century, Russia occupied Azerbaijan. Russia captured the territory, appropriated its wealth, and subjected peoples to perpetual problems by settling Armenians in their territories. By treating them as slaves Russia was not even satisfied to expose our compatriots to any kind of disasters and by altering our mindset it aimed to make a change in our morality and ethics. Russia's successor – USSR dealt a serious blow to religious values by causing them to forget all national and moral values. Inconceivable viruses were injected into the subconscious and spirit of people via prohibitions and cunning plans without being felt. Unconsciously we channeled into our deeper subconscious mind the sayings like “Grandpa God”, “Ahmadi Bigum”, “Why are you standing like Mikhmammad?”, stories like “Fairy tale about Ahmad who is afraid of the fox”, “Fairy tale of lazy Ahmad”. Why did not we think of other names for such situations? When was God personified and became “our grandfather”? A film made in Baku was named “Ko mne Muxtar” which means “Come to me Mukhtar”.

Mukhtar is the name of the leading actor's dog in the movie. The film was made by Russians, the events took place on the border and the actors were Azerbaijanians. The word Mukhtar is derived from Arabic and has the same root as the word "Ikhtiyar". Why was the dog named Mukhtar? Without even realizing it we watched this film with a sense of pleasure.

This tendency led the way to the literature. The literature with outstanding figures such as Nizami, Nasimi, Fuzuli who started each of their writings with the word "Bismillah" and each of their creative works with the praise to God- munajat. In Soviet literature God was made to be forgotten and became the target of derision. And during the years of independence, both knowledgeable and unknowledgeable people wrote about God and talked about religion. As a result, God was presented not the way he was, but the way he was imagined and perceived. From this perspective even in Bakhtiyar Vahabzadeh's works, who never disguised his sincere devotion to God and wrote religious poems, we could evidence some incomprehensible presentations. Let's switch our attention to an interview of the journalist Mirshahin with B. Vahabzadeh: Poet: "I believe in the existence of spirit. I have not got the slightest hesitation about it, but I do not know how it is. It is aware only to this Man – "to God". (32. "Transparent talk" Channel 2.19.02.2009). The event occurred on the threshold of the twentieth century. *I am the son of Azerbaijan. I have supposed that the fire is God. My father is earth, my mother is fire, and I was created from fire.* (8. p.30). These were said by B. Vahabzadeh too. At a time when bolshevism and atheism were so rampant. Maybe at some points, we can even perceive these ideas as a devotion to the nationality and roots of the nation, but this will be like getting out from one marsh (sin) and falling into another one. To what extent is it historically acceptable to tie our roots to Zoroastrianism in order to become Azerbaijanian or Azeri. The most frightening point in this context is that "FIRE" "is considered" to be God. The poet says, "is considered", hence the reader accepts it as "fire is God". This, of course, is a completely different and gentle approach from Kemal-ud-Doula's (Akhundov 17 p.1-184) perception and presentation of God.

Since a man perceived himself, he wanted to understand the origin of life. He became entangled in magic, fetish, totem, zoomorphism anthropomorphism. From time to time he compared the Creator and killer either with a human, or a half-human, or a man with the Creator. He either carved thing from wood and called it God and together with his hope laid the will of everything on it. Sometimes he worshipped and showed reverence to the horse, the fish, the ox, and sometimes the Moon, the Sun, the Star. Competed on making the best idols for tyrants he deified. "The picture of a man that whenever you look at him you will get frightened". (R.Rza 27. p.19). Then you would become panic-stricken. Now you would reminisce statues of "human figures". Take a wreath to their special days such as birth and death days, bow to and kneel in front of them by standing respectfully. A man created a thousand kinds of divine characters in his imagination until God sent his Messenger and revealed his essence and attributes. A Prophet appeared and presented the Creator, some time they believed in him, then they started worshipping their previous idols. Until Khatam-Al Anbiya God sent a new messenger, then another one. However, a man chose one of the sanctified stones, bronze, granite, gold, etc., and deified, idolized, sculptured them. A man is not satisfied with the thoughts of those sent by God. Inner doubts and diabolical feelings made them ask themselves "Maybe they are deceiving you, you haven't seen Him with your own eyes!!!", Is there anyone who came from that world?". God started continuously sending his messengers. Even though the number of the messengers reached 124 thousand, slaves did not change their views. From time to time either they called their deified Creator "grandfather", "man", or "father". "One played *zurna* this way, one played *zurna* that way, and another played for no reason" (This is an Azerbaijani folk saying used when people do an action while they don't know how to do it, or they don't have any reason for doing that.)

It has a classical period we call it, prior to Fuzuli, and a post-classical period. The classical period features sincerity and divine love. It was perceived and presented. After Fuzuli the essence of it changed. While the thoughts from Koran are conveyed into “our language” in the form of expression and interpretation, in the poetry of Nasimi, the perception of His figurative embodiment, the character was revived. *I on my way to that sea that has no end, I am suffering but with no damage to mend, I have seen that sea with no flaw, I have found that young who has no sorrow* (6. p.304) or *wherever you look see God, - Nasimi (6.p.53) –I have existed from the very outset, even before the emergence of skies and earth-Khatai (30, p.148).* The poetic presentation of Fuzuli’s lover who waited for his beloved with a bated breath was described like, *“Oh Divine, my admiration whenever I see your image makes me mute, one who sees me and feels my state of mind considers me a shadow”,* (21. p.300). I wonder whether Fuzuli could see “the image” of her beloved and lost her speech and became an image. Maybe he fantasized!!! In the ascension behind closed doors, it was manifested only to Prophet Musa (pbuh) and to Prophet Muhammed (pbuh) in the form of divine light. Among all human beings only Imam Ali (a.s) said: *If all the curtains between me and God are removed, my belief in God (is so firm that it) will not increase any further.* (1. Garden of virtue of Amir al-Mu'minin Ali ibn Abi Talib. Abul-Fadl Shazan ibn Jabrail al-Qummi is known as ibn Shazan al-Qummi. He passed away in about Hijri 600, It was published in the press Al-Amin in Hijri 1423 in the Qom city of Islamic Republic of Iran. p.235). That is, I will see Him as I imagine, and it will be manifested the way I have fantasized. What is the hidden wisdom of Fuzuli’s poetry? Or from intoxication of powerful love Fuzuli caught on the horns of a dilemma of *“I am so ecstatic that, I am not able to perceive the world and to realize who I am, who a cupbearer is, what a drink table is?”* (21. p. 196)

After classics a man didn’t worship sky- gods, however, he didn’t deny sanctity. He revered “holiness upon the Earth” (? S.H). (A. Afandiyev 5. p.128)

Yes, he didn’t deny sanctity (the God he worshipped), he idolized Him. So that, as during the Soviet period it was instilled into the subconscious of people, a man is not an almighty and a nearly deified holy being. He is an extremely rickety, destitute, wretch creature “who builds and creates” and becomes a villain, violent dictator who eagers to gobble up the world whenever he faces the faithless. A. Afandiyev, who during those periods was thought to be “the faithless”, spoke about reverencing sanctity, hence he didn’t deny putting God on a pedestal so that father Asif was aware that a man couldn’t exist without worshipping. (Afandiyev). The holies whom they idolized were the Pharaoh, Lenin, then Stalin, and others. If the one is gone a human being will deify another one. This constant alteration, like changing outfits, will continue until human being finds and perceives their real idols.

A little bit later while A. Afandiyev setting J. Jabbarli’s Ogtay on a pedestal addressed him like “Ideal- Makka, God, Okhtay shrine” (9. p.131). From this perspective, it is still obscure for us how J. Jabbarli sees Ogtay. Ogtay who killed Firangiz says.... *“Let this befuddled humanity at least once face the truth, let them see that it is nothing. You are nothing and neither the ones you have created. Don’t create if you are not able to, if you create let it live forever. Firangiz whom you created does not exist anymore, hence the one I created is eternal. No one can kill her, she neither fades nor grows older, she grows more beautiful with every passing day. He asked: “Tell me, who is a greater craftsman you or me?”* (9.p. 288-289). The first obscurity for us is the author’s intention when he says the word “truth”. Is it God, a supernatural being, or an ethical norm in the imagination of people? And how can Firangiz who was killed at the hand of Ogtay blossom out in real life? Is it a contrast of Ogtay’s thoughts between semi-truth, lie, and truth who is in search of reality or an attempt to confirm the product of his imagination or the highest aesthetics-philosophical expression of

his mood at that time? Or maybe Aydin's "...rebellion even towards God Himself"? (9. p.230) Maybe it was the way that started from these misunderstandings leading J.Jabbarly to the ideas in the famous monologue by Elkhan in "Bride of Fire". The monologue of Elkhan which is the peak of philosophy of the perception of the world by Jabbarly, maybe Ogtay who murdered Firangiz was the author himself, he murdered himself in the example of Elkhan with this monologue. "... these mountains, these birds, these flowers, swords that shed blood, spilled blood, cut heads tell that God exists, but I say God doesn't exist." (9. p.356) Which God? The way starting with "being crossed with to all old gods, considering beauty his God" is ended like "I am the God! I am the creator of life and happiness on the Earth" by Elkhan in "Bride of Fire" (9. p.356). While Elkhan who said "For the sake of love of God" to Solmaz when he swore, once says to Arabic knight Agshin that "I don't bow to gods who suck blood, who gnaw bones (maybe it is a pastiche to people who are sculpted in front of whom wreaths are laid and people bow)" (9. p.353), he repeats the same sentence when he is about to be hung, but then governments and armies replace the word God. And the final words of Elkhan – maybe of J.Jabbarly are "God is inside me" (9. p.356).

In a period when H.Javid saw that fairness and justice are smashed under the feet, blasphemy is considered justice and ignorance is considered talent, "the dead are enlightened from the dead, the mankind listens to Satan" (15. p.254-333), human ignores God the more the beliefs were prohibited, even in the most dangerous times (1937), S.Vurghun could tell "Oh Divine the case of human is bad, what we went through is clear to you, ... Open, open the face of the truth..." (29, p. 7) in the name of poet Vidadi raising his hands to the sky while performing Salah in the drama "Vagif".

From "Satan": The Old man says when his daughter Khaver is killed: Where?.. But show me God once, Oh I have some things to tell Him. (H.Javid. 15. p.313).

As much as a human sets something and someone on a pedestal, in the depths of his heart he feels the existence of the real one whom he needs to put on a pedestal, openly or secretly he accepted Him, called his guiding God when he suddenly got in trouble. The biggest egos, the biggest tyrannies said that "I fear only God", but miserables didn't understand Him, and for this reason they became the slave of their passion, ego and this became their disaster and end. Both in this world and the other "a human's denying religion who isn't aware of Koran equals to a critic's words who is uninformed and who is unaware of literature in a broad sense. (A.Mammadov. 7. p.198.)

"All these processes aren't main. There is a major process, the real process happens in the sub-layer of these views and God rules this process. Main life of a human is the ones happening in the spiritual layer." Link.Afag Masud.(live talk.)

Asad Jahangir: Justice and conscience are related to human's inner world. Whose belief in God is profound(? S.H.) he is fair, and whose isn't profound he is unfair...God engraves to our brains what he gets written to us (that is to say, we write it with light and inspiration). I believed in God and the day of judgement anyway, but there wasn't... something like torment of the grave for me. Inspiration is the sign given from the sky, it means the benediction of God. (33. https://525.az/?name=xeber&news_id=5318)

Nisabayim:

A right you don't understand,

Grief you can't bear,

With unforgivable sin

Do not offend God. (12. 53)

Nisabayim's this a-couplet poem is a very perfect generalization and assessment in terms of atmosphere of the period. It is the total of spiritual-moral, ethic-aesthetic, religious-philosophical views and image of today's Azerbaijani character. It is also correct literary reflection of the artistic process.

Anar. In 1970's Ogtay's (Anar's character) imagination about God is as follows: "I used to say that there is no *god* (italic is ours S.H.), but once I heard Him (?S.H.) I heard him from the bells of the keys (although keys don't ring but jingle S.H.). He knocked us-people in the solitude cells with these keys and now he walks himself jingling his keys. But in these solitude cells people see the same things-stars, the moon, the pick of the crucified sky, a sip of it, the rain, our entire space". (1. p.62) And Anar's hero-Ogtay expresses the phrase "he walks himself" so easily as if he tells this about Anar's other hero Tarik Targaldi (2. P.259-330), the chef who tears the money there or the person who is kidding with Kabirlinski. (1; p.159-202)

"Everyone's truth is locked inside him.

When a man dies, he is buried with his keys. When we die, we will be buried like dressers which have never been opened"(1.63) As it is seen the issue is not thoughts about God, the word has an episodic essence. The author used the character to express his thoughts after God. But in his following works the issue deepens. Anar's thoughts about God widen in a large scale.

Since his childhood Malik believed in life after death-another world as he also believed in God. Maybe because of his grandmothers' influence Malik believed in God sincerely as soon as he opened his eyes in the world. He didn't perform religious rituals, although he praised for God every evening as his gratitude to God for all and at last he used to say: "Let our day last till the end. Almighty God. Amen!"(3; p.354-356)

Anar in his work "Charm" gives Yunus Emre's poem as an epigraph about his stance after the death "*The world will be frozen once and the murdashir will wash my body, at the end it will be put into grave. What will my condition be*" (4; p.22). Ahliman is thinking in the grave: Only the miracle (S.H.) called God can save me from this grave. If there is God, it means there is the other world. (4; p.29) The author quotes from Movlana, Gazali on signs (ayahs). Ahliman thinks if he can exit from here (the grave), he can serve Him in his entire life. (In Koran: My God, return me back maybe I will do something good on behalf of my life that I spoiled. Scripture (Surah) Mu'minun sign (ayah) 99-100 S.H.) Anar exhibits the condition of a Soviet man in the name of Ahliman who rose from the grave and beg to God like "What happened, you rejected me, refused me? No, in reality I believed in You in the depth of my heart, but the environment was so that I had to say "I don't believe". (4.p.29)

God character in Ramiz Rovshan's works

In this field R.Rovshan seems as a pampered child who is pampered by his mother whom he can easily persuade. Just as the child who gets naughty around his mother, and climbs and finds shelter in his mother's lap after his mother's slap, he sees and presents his God like that.

"My poems are my prayers. These prayers are a little angry, but that anger isn't to God. We'll live whatever God wrote – whatever we are destined to be. I believe in God. I believe that human doesn't only consist of his body. When I write I feel that there is a hand on my hand. God remembers me when I write but I remember Him all the time". R. Rovshan whom God couldn't tie to the world, who was offended and left the world, who was only offended and left while he could reveal his secret, and who was with Him even if he was crossed, who wished God's eyes to be on him till the end – till he reached the last point of the world.

Ramiz Rovshan who said "Oh Divine! You broke my heart too, *You are the number one in the list who made me cross. You are the farthest and most unreachable bite in the world that we can't swallow.* –Oh God, I'm coming, hear my words, I have no hope of anyone but You, console me!" and who threw himself into the emptiness and told Him "*hold me yourself*" relying on Him (25.p.88-89). (36. <https://www.youtube.com/watch?v=aY6Qwatq5uk> (the poem God. "When one dies only a word is uttered by him: God, God. Or Thank God again").

R.Rovshan often used the addresses such as Divine and God. As though divine spirit is absorbed to all his works. But with its own strangenesses. In the poem "Game" he wants God "to change cards", as if he plays a game with Him and he says when he goes being crossed from his bad luck –"mix (the cards)... But don't cheat, Play right, Play honestly. I'm going to Hell, play without me, oh Divine!..". (24. p.173, 174-175) In the poem "Breath" everyone is suffocated from polluted air. Only God and the poet remain. He "gets exhausted" in the sky, and the poet on the land and he concludes that "When the last poet is suffocated and dies dead God will drop from the sky...". And sometimes he exhibits controversial ideas (24.p.68-69) such as "He loses his hope in God, babies will lead us out of darkness" (24.p.177) And in the poem "Old words" he deifies the WORD, as if human "shared the world with God" and this human "is the slave of God, and God of the WORD" (25. p.80-82)

Like in many poet's In Vagif Samadoglu's poetry divine thoughts appear not from main sources, but from parsimony of mentality. But fortunately, he is closer to the source differing from many poets. "God gives people a temporary life as soon as he takes a man from one world and leads to another world. To live this life...". Many say, "May God forgive you". (who believe, who don't believe, who is doubtful about His existence inside). To the question "Do you believe in God?" he answers "he wants God to trust human rather than human to God "Vagif Samadoglu knows exactly that he will die. He accepts this as the death of an individual. "But God keeps people alive. So He believes them. He prefers the hell of this world than paradise of the other world." "The wars are God's deeds. For me God doesn't tell the religions only, he is another thing" he says (35. <https://www.youtube.com/watch?v=I-y7NzeOy5Q>) But he doesn't say anything about "what is another thing", "how is it", maybe he can't say anything. Because imagination, mentality and fantasy are limited. No matter how intelligent you are.

While speaking about the writer's worldview Asif Afandiyev says:"One of the issues that is not solved is the relation of aesthetic and public opinion. The difference between them isn't noticed and "Therefore our classics are modernized artificially, and many of them are presented as atheists and maybe dialectic materialists... They can't be judged biased and hurriedly. Maybe a poet, or a writer believes in religion, devotes himself to God, reveres respect and esteem to religious thoughts. But if he is a real writer, he reveres aesthetic attitude to life. He expresses cognitive research, creative power and dignity of a man, not divine

might.” (As it is seen the last three claims about a human come exactly from the requirement of the era, bolshevik thinking. Nizami, Nasimi praised human, divine power too. Also they were real authors too) A.Afandiyev expresses his thoughts about religion very precisely. “The religion is opposite to the aesthetic attitude of a man about life. If the religion insults a man and considers a man as a shadow of divine power, the aesthetic attitude to life will empower a man. It means there will be a contradiction between artistic thinking and religious thinking. The conflict determines the contradiction between author’s artistic creativity and worldview. The issue is not whether Nizami or Nasimi is atheist, but should be about their humanism and their affection to the world. Not to consider them atheists doesn’t decrease their value.”(5; p.88)

Yet in the 70s Asif Afandiyev generalises classics’ attitude to love as “in the meaning to be man of intelligence” and “the praise as the way leading to reality”. There he mentions that the world, society are expressed in the characters of Layla, Majnun and Shirin. By this he secularizes the love and evaluates it not only as a psychological but socially psychological issue. Moreover, it may be concluded that “evaluation of the love as a way leading to the reality” shows that A. Afandiyev conceived many realities beginning from that time but he could mention only so called part of it.

And great DELUSION. Although A.Afandiyev was at the top of social, political and scientific thinking of that era, he was the child and hero of his era- Although he thought “My world-that is changed by my hands, becomes beautiful, (such a dream of the Soviet era that sounds very beautiful and charming S.H), gains wisdom, grows! Me, the other one and the world reality isn’t becoming one out of two, finding your soul in another body, but seeing yourself in the world and the world inside. The only alternative of the loneliness is public activity. This is a simpler reality. But there is no other reality of happiness” (5, p.116) the realities crashed him at last. Although they didn’t break him, they made him half-dead. At last it directed him to the way surrender and dervishism. He was thought “hearing the voice” as Isa Muganna and was prophitized as being the author of “10 secure Irk Bitig” that his students considered divine. He was sentenced to the ending that was unreadable and unconcievable. But what happened it was himself. Being unconcievable was not his guilt-it was guilt of the regime that wanted to crash him and elite that couldn’t reach his might or the environment.

From the eponymous film shot based on the novel named “Mahmud and Maryam” (11) by Elchin: Mahmud-So blessed is God, the Best of Creators - Will you not be sacrificed to your Creator? Maryam-What does it mean? Mahmud-It means I love you. The dialogue between Mahmud and Maryam isn’t a matter for us. These serve to clarify the author’s thoughts at that time. The problem is in the explanation of the ayah. The explanation of the ayah is “Glory be to God, Who made all things beautiful” Maryam said to his father: “If this love is a guilt, Why God made me fall in love, father!” This is Maryam’s thought. But these stylish questions are revolt, it derives from not understanding the essence in some terms. Because the one who believes in God entirely, has an advanced knowledge in religion can’t ask such a question. There is no problem considering the work and author. The problem is the readers’ approach to the issue. Anyone who reads Maryam’s thought can think like this. (If the priest doesn’t have a satisfied answer, - he doesn’t have) the author gives a reason to form these false thoughts.

In the film Mahmud says to his father: If anyone does any guilt, his guilts will surround him, then they will burn in the fire, and then Allahul azim...

Parenthetically: The day will come when the creature’s perception and cognition of Creator will be thrown to cosmogenic black hole in a parabolic line and if we mention it straightforwardly, human will judge God. And the day came. While the young poetess Sahar Ahmad: makes a reference to the way leading to God from Layla and Majnun’s love describing the loved’s bringing the loving closer to God in her study entitled “Love triangle”,

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(28. p.9) in another work she "... presents God as a high-flyer writer who annoys and kills His positive characters in order to make His work readable"(28 p.33). Ideas about God are multangular and contradicting in her works: *Oh Divine, may be you don't see as well just as we don't see you, don't suspect, we exist, may be we all are guilty, but believe us we all are desperate...* "My double six dice dies in my hand, You don't let it drop. Oh Divine, answer me if my asking this isn't shame, whose side are you in?" (37. <https://www.qanun.az/iksitapmaq-seher-ehmed-1189> *That's enough, Oh Divine, stop questioning me, I'm innocent. Give me punishment, let me go, your queue is long and I have no time...* (38.<https://kayzen.az/tag/S%20Əhməd/>) found courage to tell these. Here I imagine that one day cars go for a walk and let's say Zhiguli sees and gets jealous of Mercedes and says "*Oh Divine, whose side are you in?*". Though the people who made Zhiguli and Mercedes are different people, as a result they're people. Though they aren't divine, they have "created" something. When we can't find courage to ask the question "Whose side are you in?" ranging from a junior officer to senior ones we address it to God. Because we perceive our Creator like this. Just as Zhiguli "perceives" its "creator".

Tural Turan makes God familiar for people's thinking. He calls Him "big brother". And he considers that "Creator came to the world for a hundred twenty four thousand times in the messenger face. He appointed a head to every community for them not to leave their paths and then left. (31. p.61)." Or "There is one difference between Creator and God; one is in our common veins, the other says He is closer to us than our major vein." (31. p.59)

Last couplets from "Sahandiyya" by M.Shahriar. The poems "Customer of belief", "Oh God", "Oh Turkish man, it is time for honor" or the sayings

*Anyone who doesn't bow to his God will be an animal,
You show your humanity to animals.
Everyone is asleep, only God is awake and me,
There is no one below me and above Him...
If there isn't loyalty in the decision about love,
I don't know why nature made this decision. (italic is ours) (23. p.27)*

express religious views.

While B.Vahabzadeh says "If I had an authority of nature, I would give the life of thistle to flower." (8. p.260.) Shahriar tells such ideas

School is a pleasure and happiness to us,
It introduces God all the time.
Longing word would touch hearts
Trees would bow to God too
I heard the light of God is shining
Let God be companion to him wherever he is. (23. p.10)

See how we underwent to Babi, bolshevik, See how disgusting we became being polluted with every excrement.

God should give (23. p.40).

Shahriar's this "God should give" is the same as the one said by Maryam (Elchin) to her father. But it's not the only matter. The thing is the decision of nature. If we take B.Vahabzadeh's following outlook and his confession "I've carried a party membership card in one patch pocket, and Koran in the other", and if we once ask him the explanation of the matter of thistle and flower, maybe he would leave his previous pantheistic thoughts and say "I thought of it as *If I had God's authority*, not nature's. But I wrote like that because we were obliged in those days". In this case, the issue becomes more complex. Human claims to be God then. He attributes a partner to God (shirk). What does it mean? "If I had His authority?" But Shahriar's telling like this is a real miracle of God. Because Shahriar lived in a different

place and in a political atmosphere. He was a dervish, lived in seclusion, unlike us he was well-informed of Koran and religious knowledge since his childhood. Maybe he tells his pantheistic ideas too. The line “There is no one below me and above Him...” (23. p.27) possibly needs an explanation in volumes, takes us to very various worlds. From a world from which we fell apart for a long time, and we were made to forget, from a world where we “were happy” to our “dark”, “unhappy” world. To the dark world in which Mirza Jalil saw himself since he “was born” (10. p.95-184). To the dark world where “the first thing he heard was the sound of Allahu akbar”. Was it the voice transforming Mirza Jalil’s world to darkness, or was it the branch which was the only thing to hold on to to brighten darkness and waking Muslims, only source of light, a call to a new day, a new call of resurrection from the evening’s dream of death piercing darkness while the world was pitch-dark and while non-Muslim world was asleep?!. And what is more, he talked about dunderheads who lost their paths, “thick-necked, fat bastard” like Sabir, “deer, gadfly, vampire, nymph magic”(13. p.135-178) like A.Hagverdiyev. He didn’t talk about God and His Messenger like that 20. p.50-51, 77-78, 80-82. esp.84) like Mirza Fatali (The founder of realistic prose, literary criticism, the genre of drama in the XIX century Azerbaijani literature. State officer of Tsarism. Colonel. He rejects all the religions in his philosophical treatise “Three Letters of the Indian Prince Kemal-ud-Doula”. He especially criticizes the religion of Islam. Though he acquired a perfect education in religion in his youth).

The wish to rejoin to “Absolute Beauty” and rise to “Absolute Being” in H. Javid’s works. Angel (Malak) says: In order to perceive Him listen to the voice inside you. Listen to the Universe. Observe. Every Sun is a beam...from Him, Every tiny particle, every little leaf will tell you about this symbol very clearly”(16. p.10) That’s to say every creation shows its Maker-Creator, and His might. When our Prophet invites “our ancestors who deviated from the right path” to the right path he says “...There is only one invisible God, He is the beginning and end of every creation, All the universe sanctifies Him” (16. p.15)-. “...The light of justice shining with the love of God” (59), “He is a friend and leader to His Messenger”, “Dragged insect can’t hear Him”, To him “a sultan and a black slave were made from the same mud.”(16. p.25) You miserable human, confused human, “The one who wants to show Him is confused, stupid who wants to deny Him is unruly”. Because as he said above one of His attributes is invisibility. There are prayers among the swears made by the people even today such as “For the sake of that Invisible” or “Let me be sacrificed for that Invisible”. Senior Chief in the work “Prophet” says while talking about our Prophet’s “untouchable God who lives high in the sky”: “It is said God is invisible, He has no body or essence or something opposite to His nature...He who has no associate begets not, nor was He begotten, He is beyond place...”. (16. p.37) That is to say the perception of God and His character we can imagine (in literature) is limited to what He said about Himself in Koran. Apart from this, it exceeds the cognition level of human. After Kaaba is conquered and deities, idols are destroyed Kaaba gets its real value and Rasulullah makes there the home of God and says: “Now only that invisible Creator will help you if He does” (85) and finally he mentions a perfect idea about mankind’s perception of himself, world, Creator, in general about cognition: “Though mankind is the same in nature, the one who knows isn’t equal any way to the one who doesn’t”. (16. 92) But to know what? As Hamlet said, “that’s the question”. While the work “Prophet” by H.Javid written in 1922 ends with adhan-kalima-shahadat, J.Jabbarly who considers Javid a master to himself with great love finishes the work “Bride of Fire” written in 1927 with the remarks such as “There is no God” (9. p.632) of the character Elkhan.

Isa Huseynov (Mughanna). He addressed Nasimi in “The Day of Judgement” (17), ends up with “swimming” in the “sea” of Hurufism, hears “voice” in “Ideal”(18)..., he starts towards “Pure White Hand”, faces the question “if hell exists, which cold-blooded creator would need to put a human whose life passes already in tortures in hell for eternal torment?” (19. p.5) in

“Hell”. So many human beings have asked this question and it is familiar to us from M.F.Akhundov too. (20. p.84)

One’s thoughts get upside down here. He drowns in blood and sweat like children who have nightmares. He can open the doors covered in fog in no way. Closed doors continue till the 40th room, then the 1st one stands in front of him again. The cycle finishes, dilemmas, closures, desperate attempts begin again...

From the work “From one country to another” by Aziza Jafarzade: Shirinbayim prays like this when she visits Imamhusayn: “- Oh Imam... Help me, have mercy on me...” (14. p.18) “Seek refuge in God, want what you wish from Him” (14. p.24) These two ideas are in contrast. The *ayah* (sign) “Amr bil Maroof – Nahi anil Munkar” was written like this: “Amr ba Ma’ruf, Nahi az Munkar”(14.p.24) “Mohammad (pbuh) said that working on the way of knowledge for a day is more beneficial than three-month voluntary fasting.” (14. p.28.) – the hadith has been falsified. *The surah* (scripture) “Hadi Aliyyen mahzarul-acayib” (14. p.29) There isn’t such a *surah*. It is said that our Prophet (pbuh) was born on sacred Friday. (14. p.124) This is also wrong. He was born on Thursday. or “Direct me towards the world, oh Aisha” (14. p.156) This is wrong too. There is such an idea too: “...he was living for Love (Love in capital letter S.H.) that has might just as god (god in lowercase S.H), maybe even more than god.” (14. p.203) Here he considers love more mighty than God.

In “Stone Dreams” (39. Baku 2007) by Akram Aylisli as if religious tolerant and multi-cultural values are promoted, the postmodern presentation of religions is exhibited, but this presentation is in such a chaotic atmosphere that is covered with delirium of fevered patient and lies, godlike thoughts horify readers...

CONCLUSION

As it is obvious, return to God in human nature and its reflection in fiction appears in different forms:

1. The notions of God and religion are indeed given as they are or in alike way till the XIX century in literature, since the XIX century when Azerbaijan was occupied, and was integrated to Russian enlightenment and world literature they began to be forgotten, to be falsified and secularism and philosophical ideas took their place.
2. Leaning to europeanisation is carried out at state level in the occupation period of Tsarism, national-spiritual and religious values undergo to change, start to lose their essence and to give their place to Western thinking style, in some cases face irony and criticism, become the object of laugh; and this is implemented covered with the curtain of enlightenment most of the time. Religious figures and ignorance are criticised more in the texts. This line starting with M.F.Akhundov, S.A.Shirvani reaches the peak with M.A.Sabir, J.Mammadguluzadeh and the magazine “Molla Nasraddin”. Though the target is religious members reader loses his love to religious values in the example of them and turns away from and leaves the faith in God.
3. In the Soviet period “...Bolsheviks forcedly eliminated Islamic enlightenment with prohibiting religion.” (26. s.46), promotion of atheism and Communist-Marxist-Leninist ideology paralyze moral-religious values in literature. This tendency becomes the leading ideology of literature; forms the character and spirituality of a Soviet human.
4. As it is seen from the texts, with the impact of ideology might of creating has already started to be referred to human. Notions such as “creating human”, “creative human” take root in brains.

5. Since 1990 – the movement of independence euphoria of returning to God has been in control of literature too, God character, religious ideas that are deprived of original resources and full of unsystematic quoted information have been brought to literature and a chaotic atmosphere has been established: the presentation of various religious movements, views such as faithlessness and atheism etc. have been widely covered. Even ignorant ironic phrases such as “Message to Big Brother God” (Tural Turan 31.) exist too.

6. Several religious organizations and movements dominate in Azerbaijan, people get confused, literature, official religious members, foreign religious missionaries (Islamic or non-Islamic) increase this, heresy takes over.

Finally, there appears a reference (pastiche) to the ideas of Nasimi “I am a particle, I am the Sun”: *Oh Great Nasimi, particle, the Sun and God went away from me, there is a huge emptiness inside me, as if I'm surrounded with a very thick fog, and energy of lightning of 300 volts shakes and acutely quivers my body...*

REFERENCES

1. Anar. Selected Works. in 2 volumes. 1st v. Baku: Azerneshr (Azərnəşr), 1988. 400 pages.
2. Anar. A Person's Person. Baku: Azerneshr (Azərnəşr), 1977, 504 pages.
3. Anar. Selected Works. Baku, Lider (Lider), 2004, 416 pages.
4. Anar. Charm. Baku, Yazichi (Yazıçı), 2014, 162 pages.
5. Asif Afandiyev. The authority of Wisdom. Genclik (Gənclik). Baku. 1976. 190 pages.
6. Library of Azerbaijani Literature in 20 volumes. V v. Baku, Elm (Elm), 1985. 365 pages.
7. Aydin Mammadov. Till We Are Heard. Baku. Yazichi (Yazıçı), 1988, 245 pages.)
8. Bakhtiyar Vahabzadeh Selected Works in 2 volumes. I v. Azerneshr (Azərnəşr), Baku, 1974 383 p. 30
9. Jafar Jabbarly. Works. in 4 volumes. II v. Baku, Sherg-Gerb (Şərq-Qərb), 2005, 360 pages.
10. Jalil Mammadguluzadeh. Works: in 6 volumes. 6th volume. Baku: Azerneshr (Azərnəşr), 1985-311 pages
11. Elchin. Selected Works, in 2 volumes, II v. Baku, Azerneshr (Azərnəşr), 1987. 208 pages.
12. Elnara Akimova. New Thinking and Literary Criticism. MBM (MBM) Baku 2012, 280 pages.
13. A. Hagverdiyev. Selected Works: in 2 volumes. -1st volume. Baku: Azerneshr (Azərnəşr), 1956, 548 pages.
14. Aziza Jafarzade. From One Country to Another. Baku.” Genclik (Gənclik), 1992. 353 pages.
15. Huseyn Javid. Works. 4 volumes. II v. Baku. Yazichi (Yazıçı), 1982, 393 pages.
16. Huseyn Javid. Works. 4 volumes. III v. Baku. Yazichi (Yazıçı), 1984, 377 pages.
17. Isa Huseynov (Mughanna) The Day of Judgement. Baku. Genclik (Gənclik), 1978, 294 pages.
18. Isa Huseynov (Mughanna) Ideal. Baku. Yazichi (Yazıçı), 1988. 536 pages.
19. Isa Mughanna. Hell, Baku. Hedef (Hədəf) 2013. 271 pages.
20. Mirza Fatali Akhundov. Works in 3 volumes. II v. Azerbaijan SSR Academy of Sciences publication. Baku. 1961 574 pages.
21. Mahammad Fuzuli. Works. 6 v. I v. Sherg-Gerb (Şərq-Qərb), Baku, 2005. 400 pages.
22. Mahammad Fuzuli. Works. 6 v. I v. Sherg-Gerb (Şərq-Qərb), Baku, 2005. 337 pages.
23. Mohammad-Hosseini Shahriar. Selected Works, Baku: Elm (Elm), 2000. -492 pages
24. Ramiz Rovshan. Let's Go to the Place Which We Are Not There. Chirag (Çırağ), Baku, 2006, 177 pages.
25. Ramiz Rovshan. Breath is a Book of Books. Ganun (Qanun). Baku. 2006. 760 pages

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

26. Rahim Aliyev. Literary Theory. Mutercim (Mütərcim), Baku, 2008, 360 pages
 27. Rasul Rza. Selected Works. Baku. Chashioglu (Çaşıoğlu), 2005, 480 pages
 28. Sahar Ahmad. Republication of Life. Elm ve təhsil (Elm və təhsil). Baku 2016. 248 p.33
 29. Samad Vurgun Selected Dramas and Poems. Azərnəşr (Azərnəşr), Baku, 1974. 493 pages.
 30. Shah Ismail Khatai. Works. Baku, Sherg-Gerb (Şərq-Qərb), 384 pages
 31. Tural Turan. Message to Big brother God. ŞapArt (ŞapArt), Baku, 2017. 70 pages.
- Online resources
32. Transparent talk. Channel 2. 19.02.2009
 33. Asad Jahangir. https://525.az/?name=xerber&news_id=5318
 34. https://www.youtube.com/watch?v=2n6f_tH9UHY (Bakhtiyar Vahabzadeh. Poem God. With hiw own voice) .
 35. <https://www.youtube.com/watch?v=I-y7NzeOy5Q>
 36. <https://www.youtube.com/watch?v=aY6Qwatq5uk>
 37. <https://www.qanun.az/iksi-tapmaq-seher-ehmed-1189>
 38. <https://kayzen.az/tag/S%20Əhməd/>
 39. (file:///C:/Users/user/Desktop/t%C9%99nqid/%C6%8Fkr%C9%99m%20%C6%8Fylisli%20-%20da%C5%9F%20yuxular.pdf)

**THE PROLIFERATION OF MOBILE LEARNING: AN OVERVIEW OF LEARNING
TOOLS, OPPORTUNITIES AND LIMITATIONS**

Veli BATDI

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Abstract

With the reflection of technology, which we feel its presence in every field, innovations have also been experienced in educational activities. In particular, with the introduction of Internet technologies into our lives, the use of computers has increased and computer-based instruction has become widespread. With the widespread use of computer-based instruction and the development of technology, the foundations for mobile learning have been laid. Mobile learning refers to the use of mobile devices in learning environments. The fact that mobile devices, which are used extensively in daily life, have wireless connectivity, are portable and easily accessible, has led to the use of these tools in education. As mobile learning offers individuals the opportunity to continue their education anytime and anywhere, it has shifted learning activities out of the classroom in a short period of time. Especially in the pandemic process in the last few years, mobile learning has become a model of distance education that plays a central role in our lives. This study is a literature review that highlights mobile learning, mobile learning tools, and the strengths and weaknesses of mobile learning. The content analysis method was used for the study. In creating the content of the study, articles and dissertations on the related topic were examined in various databases. Some of the main advantages of this type of learning are that the learner can access information in the environment of his/her choice and at any time. This form of learning can be used as a supplement to the traditional teaching method or as distance learning. According to the concept of mobile learning, any place can be a learning environment as long as the learner is next to the learning tool. Even if we think of learning tools as a few common tools, we can say that there are many learning tools in this form of learning. However, many of these tools can be expensive tools that have entered our lives thanks to technology. We expect that the results of this study will be a resource for researchers, educators, and practitioners, and will contribute to the literature.

Keywords: Mobile Learning, Seamless Learning, E-Learning, Distance Education.

MOBİL ÖĞRENMENİN YAYGINLAŞMASI: ÖĞRENME ARAÇLARI, FIRSATLAR VE SINIRLILIKLARLA İLGİLİ BİR İNCELEME

Özet

Her alanda varlığını hissettiğimiz teknolojinin eğitime yansımalarıyla beraber eğitim-öğretim faaliyetlerinde yenilikler yaşanmıştır. Özellikle internet teknolojilerinin hayatımıza girmesiyle bilgisayar kullanımı artmış, bilgisayar destekli eğitim yaygınlaşmıştır. Bilgisayar destekli eğitimin yaygınlaşması ve teknolojinin de gelişmesiyle mobil öğrenmenin temelleri atılmıştır. Mobil öğrenme, mobil cihazların (tablet, dizüstü bilgisayar ve akıllı telefonlar gibi) öğrenme ortamlarında kullanılması anlamına gelmektedir. Günlük hayatta yoğun olarak kullanılan mobil cihazların kablosuz bağlantı olanağının olması, taşınabilirlik ve kolay ulaşılabilirlik özelliği bu araçların eğitim-öğretim faaliyetlerinde kullanımını gündeme getirmiştir. Mobil öğrenme, bireylere her an her yerde eğitim alma şansını sağladığından kısa sürede öğrenme faaliyetlerini sınıf ortamının dışına taşımıştır. Özellikle son yıllarda yaşadığımız salgın sürecinde mobil öğrenme, hayatımızın merkezine yerleşmiş bir uzaktan eğitim modeli olmuştur. Mevcut çalışma, mobil öğrenme, mobil öğrenme araçları ve mobil öğrenmenin güçlü ve zayıf yönlerinin vurgulandığı literatür taramasıdır. Çalışmada içerik analizi yöntemi kullanılmıştır. Çalışmanın içeriği oluşturulurken çeşitli veri tabanları kullanılarak konuyla ilgili yapılan makale ve tezler incelenmiştir. Öğrenenin kendi belirlediği ortamda ve istediği zaman aralığında bilgiye ulaşması bu öğrenme türünün en büyük avantajlarından bazılarıdır. Bu öğrenme biçimi geleneksel öğretim yöntemini desteklemek veya uzaktan eğitimi sağlamak için kullanılabilir. Mobil öğrenmeye göre öğrenme aracının yanında olduğu sürece her yer öğrenme ortamıdır. Öğrenme aracı denilince yaygın olarak kullanılan birkaç araç aklımıza gelse de bu öğrenme biçiminde birçok öğrenme aracının bulunduğu söylenebilir. Ancak bu araçların birçoğu teknoloji sayesinde hayatımıza girdiği için maddiyatları yüksektir. Araştırmadan elde edilen sonuçların araştırmacılara, eğitimcilere ve uygulayıcılara kaynak teşkil edeceği ve alanyazına katkı sunacağı düşünülmektedir.

Anahtar Kelimeler: Mobil Öğrenme, Kesintisiz Öğrenme, E-Öğrenme, Uzaktan Eğitim.

GİRİŞ

Tarih boyunca toplumlar eğitime önem vermiş ve eğitimi geliştirmek için çeşitli yollar denemişlerdir. Bunun için yeni yöntem ve teknikler bulmuş ve geliştirmişlerdir. Özellikle son yıllarda bu yöntemlerin gelişmesinde bilgi-iletişim teknolojilerinden oldukça fazla yararlanılmıştır. Teknoloji sürekli gelişen bir yapıdadır, eğitim de teknolojinin bu gelişimine ayak uydurmaktadır. Bilginin hızlı üretildiği; aynı hızda erişebilmenin ve uygulayabilmenin önem kazandığı, internet aracılığıyla bilgiye çok hızlı ulaştığımız günümüzde mobil teknolojiler ile öğrenme arasında bir bağın oluşması kaçınılmazdır (Sharples, Taylor & Vavoula, 2016). Teknolojinin gelişimi eğitime pozitif yönde katkı sağlamış ve eğitim ortamlarında değişiklikler yaşanmıştır. 1980'li yıllarda bilgisayarın gelişmesiyle beraber bilgisayar destekli eğitim ortaya çıkmıştır. 1994'lü yıllarda internetin gelişmesi ile internet de eğitime dâhil olmuştur. İnternet destekli eğitimin gelişmesi ile 2000'li yıllardan sonra hayatımızın her alanında kullandığımız teknoloji e-öğrenme olarak hayatımıza girmiştir. E-öğrenmeyi kısaca elektronik ortam aracılığıyla yapılan öğrenme (Gunasekaran, McNeil & Shaul, 2002) olarak ifade edebiliriz. Siemens (2002) ise e-öğrenmeyi, teknoloji ve eğitimin birleşimi şeklinde tanımlamıştır. Diğer taraftan Kinshuk (2003) mobil öğrenmeyi teknolojinin gelişimiyle doğru orantılı gelişen e-öğrenmenin bir başka boyutu olduğunu ifade etmiştir. Mobil öğrenme, zaman ve mekân sınırı olmadan bağımsız öğrenme olarak tanımlanabilir (Bozkurt, 2015). Bu öğrenme biçimi geleneksel öğretim yöntemini desteklemek veya uzaktan eğitim sağlamak için kullanılabilir (Mutlu, Yenigün & Uslu, 2006).

Günümüzde eğitim alanında yoğun bir teknolojik gelişim yaşanmaktadır. Yaşanılan teknolojik gelişmelerin sonucu olarak önce bilgisayar sonrada mobil araçlar eğitimde kullanılmaya başlanmıştır. Yeni neslin teknolojiyi yakından takip etmesi, telefon ve tablet bilgisayarların çabuk benimsenmesi ve kullanılması mobil öğrenmenin ortaya çıkmasını ve yaygınlaşmasını sağlamıştır. İnternet teknolojisinin gelişmesiyle mobil öğrenme ortamlarının artması da doğru orantılıdır (Korucu, Usta & Coklar, 2019). Mobil öğrenme aracına sahip olunan her mekân, mobil öğrenme ortamı olarak ifade edilebilir.

Mobil öğrenme araçları çeşitlilik açısından oldukça geniştir ancak hangi aracın hangi amaç ve eğitim için kullanılacağı tartışmaya açık bir konudur. Ancak Trifonova ve Ronchetti (2003)'ye göre mobil öğrenme araçları genel olarak; boyutu dikkat çekmeyecek küçüklükte, her an kullanabileceğimiz işlevsellikte ve öğrenme ortamında içeriğe erişebileceğimiz donanıma sahip herhangi bir teknoloji olarak tanımlanmıştır. Diğer yandan Kazi'ye (2005) göre, öğrenme ortamında kullanılan materyallerin depolandığı ağ bağlantılı bir mobil cihaz ve bir web sunucusuna ihtiyaç vardır. Dizüstü bilgisayarlar, ultrabooklar, netbooklar, akıllı telefonlar, kişisel dijital asistanlar (PDA), taşınabilir MP3 oynatıcılar, taşınabilir video oynatıcılar, oyun konsolları, taşınabilir sabit diskler, USB bellekler ve tablet bilgisayarlar mobil öğrenme araçları olarak kullanılmaktadır. Bu araçlar özelliklerine göre farklı mobil öğrenme tasarımlarında kullanılmaktadır (Şener, 2016). Bunun yanı sıra bu araçlar farklı özelliklere ve donanımlara sahip olduğu için öğrenme konusuna ve becerisine göre değişiklik gösterebilir. Yapılan araştırmalara göre mobil öğrenmede en yaygın olarak kullanılan mobil öğrenme aracı cep telefonlarıdır. Öğrenen bireyin mobil öğrenme araçları ile uzun süre zaman geçirmesi de bizleri mobil öğrenmenin yarar ve zararları hakkında düşünmeye yönlendirmektedir.

Şüphesiz ki mobil öğrenmenin en büyük artılarından biri zaman ve mekân kısıtlaması olmadan öğrenmeye imkân sağlamasıdır. Zaman ve mekân kısıtlaması olmaması eğitimde fırsat eşitliğini sağlamakta ve farklı mesafelerdeki insanların işbirliği içinde çalışmasını kolaylaştırmaktadır. Dolayısıyla mobil öğrenme işbirliğine dayalı öğrenmelere olanak sağlamaktadır. Mobil öğrenmenin en büyük artılarından bir diğer de geri bildirim ve anlık değerlendirmedir. Ayrıca insanlara anında iletişim sağlar ve bilgileri paylaşma süresini azaltır. Bu özellik günlük yaşamda zaman tasarrufu yapmamızı ve mobil öğrenme ölü olarak nitelendirdiğimiz boş zamanlarımızı değerlendirmemizi sağlar. Bir yolculuk esnasında istediğimiz bilgiye mobil öğrenme ile ulaşabilmemiz buna bir örnektir. Mobil öğrenmenin avantajları olduğu gibi dezavantajları da bulunmaktadır. Uzaktan eğitim sürecinde de yaşadığımız en büyük sorunlardan bir tanesi öğrencilerin mobil öğrenme sağlayabilecekleri araçlara ulaşabilecek maliyete sahip olmamalarıdır. Sürekli değişim ve gelişim yaşayan teknolojiye ayak uydurabilmek için sahip olunması gereken araçların maliyetindeki artışlar insanları maddi olarak zorlamaktadır. Mobil öğrenme araçlarına sahipken kullanılan internete ödenen ücret de insanları maddi olarak zorlamaktadır. Mobil öğrenme aracı olarak en yaygın kullanılan cep telefonlarıdır. Cep telefonlarının küçük ekranından yazıları okumanın zor olması insanları daha büyük ekrana sahip araçlara yönlendiriyor. Bu araçların taşınması da sorun haline geliyor. Bu araçlar ile uzun süre zaman geçirmek, belli bir ekrana uzun süre bakmak birçok göz hastalığının oluşmasına sebep oluyor. Kullanılan cihazların pil ömürleri kısıtlı olduğu için şarj aletlerini yanında taşımak ve belli bir mekâna bağlı kalarak cihazı şarja takmak zorunda olmaları mobil öğrenmenin dezavantajlarından bir tanesidir. Bunun yanı sıra büyük sorunlardan biri haline gelen bir diğer dezavantaj ise internetteki kesintiler ve hız problemi, aşırı yüklenme sonucu internette yaşanan kopmalar öğrenme sürecinde kesintiler olmasına ve sürecin uzamasına sebep oluyor. Mobil öğrenmenin saydığımız gibi birçok avantajı ve dezavantajı bulunmaktadır.

COVID-19 salgını sürecinde eğitim sistemi büyük zorluklarla karşılaşmıştır. Yaşanılan zorluklar eğitimin yeterliliği, öğrenen bireyin bilgiye ne derecede sahip olduğu gibi birçok soru işareti oluşturmuştur. Uzaktan eğitim ve mobil öğrenme sayesinde yaşanan salgın sürecinde eğitim sekteye uğramadan devam etmiştir. Günümüzde mobil araçların eğitimde

kullanılabilirliği arttırmakla birlikte gelişim sağlamaya da devam etmektedir. Mobil öğrenme ile öğrenmenin sadece sınıf ortamında olmadığı, yaşam boyu sürebilen ve mekân-zaman kısıtlaması olmayan bir süreç olduğu gözlemlenmiştir. Dolayısıyla mobil öğrenmenin hayatımıza girmesi hayat boyu öğrenmeye büyük oranda kolaylıklar sağlamıştır. Sonuç olarak mobil öğrenme sayesinde daha da yaygınlaşan hayat boyu öğrenme bireylerin kendini geliştirmesini ve toplumun gelişmesini sağlamıştır.

Araştırmanın Amacı

Bu çalışmada, alanyazın taraması yapılarak mobil öğrenme araçları ile bu öğrenme biçiminin eğitim-öğretim faaliyetlerindeki avantaj ve sınırlılıkları ele alınmıştır. Dolayısıyla çalışmada ‘mobil öğrenmenin tanımı’, ‘mobil öğrenme araçları’, ‘mobil öğrenmenin avantajları ve sınırlılıkları’ konularına değinilmiştir.

YÖNTEM

Çalışmada mobil öğrenmeye yönelik literatür taraması yapılarak ulusal ve uluslararası makale ve tezlerden ulaşılan verilerle bir derleme oluşturulmuştur. Literatür taraması, üzerinde çalışma yapılan konu ile ilgili daha önce yayınlanan çalışmaların araştırılması, ulaşılması, incelenmesi, analiz edilmesi, tasnif edilmesi, özetlenmesi ve sentez edilmesidir (Demirci, 2014). Çalışmada ulaşılan veriler doküman analizine uygun olarak incelenmiştir. Doküman incelemesi, araştırmacının kullanması gereken verilere başka yöntemlere gerek kalmadan ulaşabilmesini sağlar (Yıldırım & Şimşek, 2004). Araştırma yapılırken birçok farklı kaynak ve veri tabanı kullanılmıştır. Çalışma için Google Scholar, Dergipark, Yükseköğretim Kurulu Ulusal Tez Merkezi veri tabanlarında mobil öğrenme üzerine yapılan araştırmalar incelenmiştir. İlgili literatür taranıp, analiz edilmiş ve ulaşılan veriler alt başlıklar halinde kısaca sunulmuştur.

Mobil Öğrenme

Tarihimize baktığımızda yaşayan toplumların eğitimi önemseydiği, gelişimi için çeşitli çalışmalar yaptıkları görülmektedir. Eğitimin gelişimi ile teknolojinin gelişimi arasında doğru orantılı bir bağ olduğu söylenebilir. Teknoloji geliştikçe eğitimde de değişim ve gelişim yaşamaktadır. Örgün öğretim ortamlarında öğrenmeyi mekân ve zaman kısıtlamalarından kurtarma çabaları her zaman olmuştur (Özer, 2017). Özellikle son zamanlarda teknolojilerde yaşanan gelişmeler bu kısıtlılıkları ortadan kalkmasını sağlamıştır. Teknoloji ile hayatımıza giren bilgisayar ve internet sayesinde e-öğrenme kavramı ortaya çıkmıştır ve uzaktan eğitimde aktif olarak kullanılmaya başlanmıştır (Şener, 2016). Uzaktan eğitimde bilgisayar ve internetin sağladığı ve sunduğu kolaylıklar bu eğitimde kullanılan eski yöntemlerin yok olmasına veya azalmasına neden olmuştur (Gökdağ & Kayri, 2005). Bir noktadan sonra yer, zaman kısıtlaması olmayan bir öğrenme türüne ihtiyaç duyulmuştur. İhtiyaçlardan dolayı arayış içerisine girilmiş ve mobil öğrenme kavramı ortaya çıkmıştır.

Mobil teknolojilerde yaşanan gelişmeler zaman ve mekân fark etmeksizin bilgiye erişim imkânı sağlamıştır (Ergüney, 2017). Mobil öğrenme, uzaktan eğitim ile başlayıp e-öğrenme ile devam eden bir sürecin sonucunda ortaya çıkan bir öğrenme türüdür. Mobil öğrenme ile ilgili günümüze kadar birçok tanım yapılmasına rağmen mobil teknolojilerin hızlı gelişimi ve “mobil” kavramındaki belirsizlikten dolayı mobil öğrenme üzerine herkes tarafından kabul edilmiş genel bir tanım bulunmamaktadır (Kukulska-Hulme & Traxler, 2007). Ancak alanyazında mobil öğrenmenin ne olduğu ile ilgili tanımları incelendiğimizde, taşınabilir cihazlarla sağlanan her türlü öğrenme mobil öğrenme olarak belirtilmiştir (Traxler, 2005). Diğer taraftan Trifonova (2003), mobil araçlar ve mobil ortamlarda sağlanan öğrenmeler olarak tanımlamıştır. Kukulska-Hulme ve Traxler (2005)’a göre mobil öğrenme, öğrenen bireyin mekân kısıtlaması olmaksızın istediği ortamda eğitim alması ve öğrenenin hareketli olmasıdır. Wagner (2008)’e göre ise mobil öğrenme, okulda bilgisayar başında veya sırasında oturarak öğrenen öğrencilerin sınırlılıklarını kaldırarak, ihtiyaç duyduğu anda ortam ve zaman

fark etmeksizin bulunduğu ortamı öğrenme ortamı olarak kişileştirerek öğrenmesidir. Crompton (2013), kısaca mobil öğrenmeyi elektronik cihazlarla sosyal etkileşim içinde çok yönlü öğrenmenin gerçekleşmesi şeklinde tanımlamıştır. Bu kapsamda mobil öğrenme genel anlamıyla öğrenenlerin zaman ve mekândan bağımsız mobil teknolojiler aracılığıyla öğrenme etkinliklerini kolaylaştıran, yaygınlaştıran, eğitim ve öğretimin etkililiğini arttıran ve rahat öğrenme ortamları sunan öğrenme türü (Elçiçek & Bahçeci, 2014) olarak ifade edebiliriz.

Mobil öğrenme, uzaktan eğitimde kullanılan bir öğrenme türü olarak düşünülse de geleneksel öğrenmelerde de kullanılmaktadır. Bireyler tabletler, bilgisayarlar, akıllı telefonlar gibi taşınabilir araçlar ile eğitsel içeriklere ulaşabilmektedirler (Öz, 2013; Akt: Sönmez, 2019). Uzaktan eğitimde mobil öğrenme sayesinde bilgiye ulaşabiliyor ve öğrenme gerçekleşiyor, geleneksel yöntemde ise okulda öğrenilenlerin tekrarını yapabiliyor. Ağca ve Bağcı (2013)'e göre, mobil öğrenme, mobil cihazlar ile uygulama ve dijital öğrenme ortamlarını birleştirdiği için gelecekte kullanılacak eğitim süreçlerine büyük katkısı olması bekleniyor.

Mobil Öğrenme Araçları

Son yıllarda bilgi ve iletişim teknolojilerinde yaşanan gelişmeler bu teknolojilerin eğitimde yaygın olarak kullanılmasına neden olmuştur. Bu nedenle teknolojik araçların öğrenme alanlarında kullanımı her geçen gün artmaktadır (Sönmez, 2019). Günümüzde mobil cihazlar yeni teknoloji ile daha da gelişerek birçok özelliği bünyesinde barındıran araçlar haline gelmiştir (Bozkurt, 2015).

Mobil araçlarda çok fazla çeşitlilik görülmektedir, ancak hangi araçların eğitimde kullanılabileceği tartışmaya açık bir konudur (Şener, 2016). Trifonova ve Ronchetti (2003)'ye göre öğrenmede kullanılabilecek araçlar; dikkat çekmeyecek biçimde minimal, her an kullanılabileceğimiz işlevsellikte ve öğrenme içeriğine ulaşabilecek donanıma sahip olan araçlar olmalıdır. Kazi (2005)' ye göre ise, öğrenme ortamında internet bağlantısı bulunan mobil araca ve öğrenme materyallerinin saklandığı web sunuculara ihtiyaç vardır. Bilgisayarlar, notebooklar, ultrabooklar, netbooklar, kişisel dijital asistanlar (PDA), akıllı telefonlar, cep telefonları, MP3 çalarlar, oyun konsolları, video oynatıcılar, sabit diskler, USB bellekler ve tablet bilgisayarlar mobil öğrenme araçları olarak kullanılmaktadır (Şener, 2016). Fakat günümüzde ağırlıklı olarak eğitimde dizüstü bilgisayarlar, tablet bilgisayarlar, akıllı telefonlar ve taşınabilir medya oynatıcıları kullanılmaktadır (Mutlu, Yenigün & Uslu, 2006). Bu cihazlar Wi-Fi, GSM operatörü ya da kablolu internet yoluyla dijital alanda kullanılmaktadır. Özellikle tablet bilgisayar ve akıllı telefonların birçok özelliği barındırması ve kolay taşınabilir olması bu cihazların yaygınlığını arttırmaktadır (Özer, 2017). Ancak Corbeil ve Valdes-Corbeil (2007), mobil araçlar içerisinden özellikleri bakımından en güçlü olanın dizüstü bilgisayar olduğunu belirtmektedir. Bulun, Gülnar ve Güran (2004)'a göre ise dizüstü bilgisayarlarda kablosuz erişim imkânı olsa bile ağırlıklarından dolayı tam olarak mobilite sağlayıp sağlamadığı tartışmaya açık bir konudur.

Mobil Öğrenmenin Güçlü Yönleri

Mobil cihazların kullanımı yaygınlaştıkça eğitim alanında sağladığı katkılar da genişleyerek devam etmiştir. Mobil öğrenmenin genel anlamda topluma, özel anlamda bireye sağladığı pek çok katkı bulunmaktadır. Mobil öğrenme, sınıf içi eğitim ortamında örgün öğrenme ile günlük hayatımızın bir parçası haline gelerek öğrenmeyi desteklemektedir. Diğer taraftan örgün öğrenme yerine öğrenmeyi her zaman her yerde gerçekleştirerek bilgi, toplum, eğitim ve teknoloji arasındaki ilişkiyi canlandırmıştır (Bektaş, 2019).

Öğrenme ortamlarında mobil teknolojilerin kullanılmasıyla öğrenen bireysel olarak bilgiye erişerek ve bilgiyi kullanarak yaşam boyu öğrenebilmektedir. Bunun sayesinde rahat bir öğrenme ortamı sağlanarak, zaman konusunda da kazanç sağlanabilir (Oran & Karadeniz, 2017). Mobil cihazların boyutlarının küçük ve taşınabilir olması, hızlı iletişim sağlaması, öğrenmede esneklik sağlaması ve zaman ilerledikçe daha ucuz olması yönüyle diğer cihazlardan daha hızlı gelişmektedir (Suki & Suki, 2007). Bu cihazlar kablosuz bağlantı

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teknolojisine sahiplerdir. Bu nedenle bilgiye her zaman ve her yerde ulaşmanın yanı sıra etkileşimde hızlı olmaktadır (Georgiev, Georgieva & Smrikarov, 2004). Houser, Thornton & Kluge (2002), “taşınabilirlik, bağlantılık ve düşük bütçe” gibi özellikleri sayesinde mobil cihazların eğitimde kullanılan değerli araçlar haline geldiğini belirtmişlerdir.

Alanyazında mobil öğrenmenin avantajlarını şu şekilde sıralanmışlardır (Bektaş, 2019; Corbeil & Valdes, 2007)):

- ✓ Belli bir yerde bulunma zorunluluğu olmaması öğrenen için avantajdır.
- ✓ Öğrenme sürecini öğrenen istediği zaman başlatıp bitirebilir.
- ✓ Senkron (eş-zamanlı) ve asenkron (eş-zamansız) iletişimiyle güçlü bir işbirliği sağlar.
- ✓ İki taraf arasındaki iletişim engelini en aza indirir.
- ✓ Öğrenenlerin öğrenme ihtiyaçlarını bireyselleştirilmiş öğrenme ile karşılar.
- ✓ Teknolojiye ilgisi olan bireyler için çoklu ortam imkânı sağlaması ilgilerini çekiyor.

Diğer tarafta Brown ve Mbatı (2015) de mobil öğrenmenin sağladığı pedagojik rahatlıkları şu şekilde sıralamışlardır (Bektaş, 2019):

- ✓ SMS teknolojisinin motive edici yönü, mobil cihazlarla ölçme ve değerlendirme yapılabilmesi,
- ✓ Mobil platformda görsel ve işitsel yöne hitap eden cihazların ve uygulamaların ağırlıkta olması,
- ✓ Kişiselleşmiş, konum-tabanlı ve etkileşimli öğrenme uygulamalarının oranının fazla olması,
- ✓ Öğrenmenin konum, etkinlik, zaman, yön ve çevre olarak belli bir yerde gerçekleşmesi,
- ✓ Formal ve informal öğrenmelerin bir arada olması,
- ✓ Kişiyeye özel öğrenme ortamı ve bireysel öğrenme olması,
- ✓ Bireylerin istediği paylaşımları yapma imkânlarının olması.

Boyes (2011) mobil öğrenmenin eğitsel olarak çok değerli özellikleri olduğunu ifade etmiş ve bu özellikleri şu şekilde sıralamıştır (Bektaş, 2019):

- ✓ Belli bir zaman dilimi ve belli bir mekân sınırlılığı olmaması,
- ✓ Öğrenme sürecindeki bütün detayları öğrenenin belirliyor olması,
- ✓ Zaman boşluklarını değerlendirebilmemize imkân sağlaması,
- ✓ Öğrenme stillerinin çoğunda kullanılabilmesi,
- ✓ Sosyal öğrenmenin yaygınlaşması,
- ✓ Öğrenen tarafın düşüncelerini anında dile getirmesi,
- ✓ Verilere kısa sürede ulaşılması,
- ✓ Karar verme sürecini iyileştirme,
- ✓ Öğrenme ortamında yanlışları düzeltmek için öğrenene anında dönüt sağlaması,
- ✓ Öğrenene özgüven kazandırması,
- ✓ İçselleştirmesi kolay olan bilgileri sunma,
- ✓ Kişi kısıtlaması olmaması,
- ✓ Doğru bir planlama ile yüz yüze eğitime hazırlaması,
- ✓ Genel bir kitleye hitap ettiği için bütün platformlarda kullanılabilmesi,
- ✓ İnternet bağlantısı olmadan da verilerin kaydedilmesi,
- ✓ Düşük maliyete sahip olması,
- ✓ Öğrenen ile öğretene arasında iletişimin direkt sağlanıyor olması,
- ✓ Öğrenme sürecinde bütün aşamaları takip edebilmesi.

Mobil öğrenmenin güçlü yönlerine bakıldığında öğrencilerin mobil cihazlar ile öğrenmesi, öğrenci başarısını pozitif yönde etkilemesi, eğitim açısından mobil öğrenmenin önemli bir

etken olduğu düşünülmektedir. Bu alana yönelmesi ve yatırım yapılması gelecek açısından önemli sonuçlar doğurabilir (Bektaş, 2019; Gay vd., 2001).

Mobil Öğrenmenin Zayıf Yönleri

Mobil öğrenmenin pek çok güçlü yönü olduğu gibi zayıf yönleri de bulunmaktadır. Wagner (2005)'e göre mobil öğrenmenin en zayıf yönü donanımsal engelleridir. Kantaroğlu ve Akbıyık (2017)'a göre ise mobil öğrenme araçlarının veri iletimi ve depolama konusunda sınırlarının olması ve mobil teknolojinin hızlı gelişiminden doğan maliyet yüksekliliği mobil öğrenmenin zayıf yönlerindedir. Dağhan vd. (2017) ise farklı bir açıdan bakarak mobil cihaz çeşitliliğinin çok olmasını dezavantaj olarak görmüşlerdir. Öğrenenlerin ellerinde cihaz çeşitliliğinin fazla olmasından dolayı herkesin aynı öğrenme deneyimine sahip olmasını dezavantaj olarak değerlendirmişlerdir. Mobil öğrenmenin kullanılmaya başlandığı yıllarda ekran boyutu, internet bağlantısı ve çözünürlük sorun oluyorken günümüzde bu sorunlar yaşanmamaktadır (Oberge & Daniels, 2013). Bazı araştırmacılar (Clough vd., 2009; Corbeil & Valdes, 2007) ise mobil öğrenmenin olumsuz yönlerini şu şekilde sıralamışlardır (Bektaş, 2019):

- ☒ Öğrenme araçlarının ekran boyutlarının küçüklüğü,
- ☒ Ağ bağlantı ücreti gibi maliyetler,
- ☒ Metin giriş problemleri,
- ☒ Veri kapasitesi ve depolama sınırlılığı,
- ☒ Mobil cihazların iletişim sistemi standartlarının oluşturulmaması,
- ☒ Alışılan e-öğrenmenin mobil öğrenmeye uyarlanma zorluğu,
- ☒ Teknolojinin gelişmesiyle mobil teknolojilerde maliyet artışı,
- ☒ Uzun zaman kullanılması gereken cihazların pil ömründen dolayı uzun süreli öğrenmelerde kullanılamaması,
- ☒ Ağ bağlantılarında yaşanan sorunlar,
- ☒ Kullanılan araçların veri güvenliği konusunda yaşanan sıkıntılar,
- ☒ Öğrenenin kontrolünde sıkıntılar yaşanması,
- ☒ Teknoloji kullanımı iyi olmayan öğrencilerin yaşadığı psikolojik kaygılar,
- ☒ Teknolojinin gelişimi ile yeni öğrenme araçlarına ve platformlara içerik aktarımında yaşanan sorunlar,
- ☒ Her araç için içeriğin farklı hazırlanması, belli bir iletişim sisteminin olmaması,
- ☒ Kablosuz veri paylaşımında teknolojinin yetersiz kalması.

Ancak mobil öğrenmenin zayıf yönlerinin birçoğunun zaman içerisinde teknolojinin gelişimi ile ortadan kalkacağı düşünülmektedir.

SONUÇ VE TARTIŞMA

Bu çalışma, her geçen gün yaygınlaşan mobil öğrenme kavramının ne olduğunu, hangi alanlarda kullanıldığını, mobil öğrenme araçlarını ve bu öğrenme biçiminin güçlü ve zayıf yönlerini açıklamak üzere hazırlanmıştır. Günümüzde bilgiye kısa sürede ulaşmanın ve kullanabilmenin öneminin arttığı görülmektedir. Bilgiye ulaşmanın en hızlı yollarından bir tanesi de mobil öğrenme olduğu için bu öğrenmenin kullanım alanı her geçen gün genişlemektedir. Mobil öğrenmenin imkânlarından faydalanmak için kullanılacak birçok mobil öğrenme araçları bulunmaktadır. Bu araçlar sayesinde zaman ve mekân kısıtlaması olmadan öğrenme sağlanmaktadır. Mobil öğrenmenin birçok avantajı olmasının yanı sıra dezavantajları da bulunmaktadır. Çalışmanın içerisinde bu konularla ilgili detaylı bilgilere ulaşılabilir. Birçok araştırmacı mobil öğrenme üzerine çalışmalar yapmış ve sonuçlara ulaşmıştır. Yapılan çalışmaların sonuçları incelendiğinde; zaman ve mekândan bağımsız öğrenme için kullandığımız mobil teknolojilerin kullanıldığı alanlar zaman içerisinde hızlı bir

şekilde genişlediği görülmektedir (Bektaş, 2019). Bu teknolojiler eğitim-öğretim etkinliklerine aktarılmalı, öğrenci - öğretmen - yöneticilere bu konuda bilgiler verilmeli ve mobil öğrenme farkındalığı oluşturulmalıdır. Mevcut eğitim sistemi yüz yüze yapmaya yoğunlaşsa da mobil öğrenme ve uzaktan eğitimin kullanımı ve kalitesi arttıkça toplum olarak daha eğitilmiş bir seviyeye gelineceği söylenebilir (Ateş, 2011). Özer (2017) ise yaptığı çalışmada, yabancı dil öğretiminde mobil öğrenmenin kullanılmasının öğrencilerin mobil öğrenme araçlarının kabul düzeylerini arttırdığını saptamıştır. Bunun yanı sıra Sönmez (2019), mobil öğrenmenin öğrenenlerin akademik başarıları üzerinde ciddi etkileri olduğunu tespit etmiştir. Diğer taraftan Bozkurt (2015), mobil araç ve uygulamaların, öğrenenleri desteklemek ve kullanılan ağlar aracılığıyla öğrenme içeriğine erişim sağlamak için hizmetler sunduğunu ifade etmiştir. Bu sayede öğrenme süreci, öğrenme sürecinde kullanılan kaynaklar, öğrenme fırsatlarının sağlanması ve deneyimlerin kazanılması kesintisiz olarak devam edebilir.

KAYNAKÇA

- Ağca, R. K., & Bağcı, H. (2013). Eğitimde mobil araçların kullanımına bağlı öğrenci görüşleri. *Eğitim ve Öğretim Araştırmaları Dergisi*, 2(4), 295-302.
- Ateş, V. (2011). Mobil teknolojilerin eğitim sürecine katkılarının incelenmesi ve sayısal tasarım dersine yönelik m-öğrenme uygulaması. Yüksek Lisans Tezi, Gazi Üniversitesi, Türkiye.
- Bektaş, M. (2019). Ortaöğretim öğrencilerinin mobil uygulamaları eğitsel amaçlı kullanma durumlarının incelenmesi: Sakarya Kaynarca örneği. Yüksek Lisans Tezi, Sakarya Üniversitesi, Türkiye.
- Boyes, M. (2011). 24 Benefits of m-learning. *E-learning Network Insides*.
- Bozkurt, A. (2015). Mobil öğrenme: Her zaman her yerde kesintisiz öğrenme deneyimi, *Anadolu Üniversitesi Açıköğretim Uygulamaları ve Araştırmaları Dergisi*, 2(1), 65-81.
- Brown, T. H., & Mbatı, L. S. (2015). Mobile learning: Moving past the Myths and embracing the opportunities. *International Review of Research in Open and Distributed Learning*, 16(2), 115-135. <https://doi.org/10.19173/irrodl.v16i2.2071>.
- Bulun, M., Gülnar, B., & Güran, M. S. (2004). Eğitimde mobil teknolojiler. *The Turkish Online Journal of Educational Technology*, 3(2), 165-169.
- Clough, G., Jones, A., McAndrew, P., & Scanlon, E. (2009). Informal learning in online communities of mobile devices enthusiasts. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education and training* (pp. 100–112). Athabasca: Athabasca University Press.
- Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Globalizing professional development: The evaluation of a collaborative computer-mediated professional development program. *Issues in Information Systems*, 8(2), 76-82. https://doi.org/10.48009/2_iis_2007_76-82.
- Crompton, H. (2013). A historical overview of mobile learning: Toward learner-centered education. In Z. Berge and L. Muilenburg (Eds.). *Handbook of Mobile Learning*, pp 3-14.
- Dağhan, G., Kibar, P. N., Çetin, N. M., Telli, E., & Akkoyunlu, B. (2017). Bilişim teknolojileri öğretmen adaylarının bakış açısından 21. yüzyıl öğrenen ve öğretmen özellikleri. *Eğitim Teknolojisi Kuram ve Uygulama*, 7(2), 215-235.
- Demirci, A. (2014). Literatür taraması. Y. Arı & İ. Kaya. (Ed.), *Coğrafya araştırma yöntemleri*, 73-108, Balıkesir: Coğrafyacılar Derneği.
- Elçiçek, M., & Bahçeci, F. (2014). Meslek yüksekokulu öğrencilerinin mobil öğrenmeye yönelik tutumlarının incelenmesi. 8. Bilgisayar ve Öğretim Teknolojileri Sempozyumu Bildirileri, 18-20 Eylül 2014, Trakya Üniversitesi, Edirne, Türkiye.
- Ergüney, M. (2017). Uzaktan eğitimde mobil öğrenme teknolojilerinin rolü. *ulakbilge*, 5(13), 1009-1021. <https://doi.org/10.7816/ulakbilge-05-13-02>.

- Gay, G., Stefanone, M., Grace-Martin, M., & Hembrooke, H. (2001). The effects of wireless computing in collaborative learning environments. *International Journal of Human-Computer Interaction*, 13(2): 257-276.
- Georgiev, T., Georgieva, E., & Smrikarov, A. (2004). M-learning-a new stage of e-learning. *International Conference on Computer Systems and Technologies-CompSysTec*, 4(28), 1-4.
- Gökdağ, İ., & Kayri, M. (2005). E-öğrenme ve Türkiye açısından sorunlar, çözüm önerileri. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, 2(2), 31-33.
- Gunasekaran, A., McNeil, R. D., & Shaul, D. (2002). E-learning: Research and applications. *Industrial and Commercial Training*, 34(2), 44-53. <https://doi.org/10.1108/00197850210417528>.
- Houser, C., Thornton, P., & Kluge, D. (2002). Mobile learning: Cell phones and PDAs for education. In *International Conference on Computers in Education*, 1149-1150. <https://doi.org/10.1109/CIE.2002.1186176>.
- Kantaroglu, T., & Akbiyik, A. (2017). İşletme fakültesi ve eğitim fakültesi öğrencilerinin mobil öğrenmeye yönelik tutumlarının karşılaştırılması. 1. *Journal of Business*, 5(2), 25-50.
- Kazi, S. A. (2005). Vocatest: an intelligent tutoring systems for vocabulary using mlearning approach. Paper to be presented at the redesigning pedagogy: research, policy, practice conference, 30 May-1 June 2005, Singapore.
- Kinshuk (2003). Adaptive mobile learning technologies. Department of Information Systems: Massey University, New Zealand.
- Korucu, A. T., Usta, E., & Coklar, A. N. (2019). Eğitim fakültesi öğrencileri ile turizm fakültesi öğrencilerinin mobil öğrenmeye yönelik tutumları. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science]*, 12(1), 1-15. <http://dx.doi.org/10.30831/akukeg.512541>.
- Kukulska-Hulme, A., & Traxler, J. (2007). Designing for mobile and wireless learning. In H. Beetham and R. Sharpe (Eds.) *Rethinking pedagogy for a digital age* (pp. 180-192). Routledge.
- Mutlu, M. E., Yenigün, H. U., & Uslu, N. (2006). Açıköğretimde mobil öğrenme: Açıköğretim e-öğrenme hizmetlerinden mobil bilişim aygıtlarıyla yararlanma olanaklarının değerlendirilmesi. *Akademik Bilişim*, 9-11 Şubat 2006, Pamukkale Üniversitesi, Denizli, Türkiye.
- Oberg, A., & Daniels, P. (2013). Analysis of the effect a student-centred mobile learning instructional method has on language acquisition. *Computer Assisted Language Learning*, 26(2), 177-196. <https://doi.org/10.1080/09588221.2011.649484>.
- Oran, M., & Karadeniz, Ş. (2007). İnternet tabanlı uzaktan eğitimde mobil öğrenmenin rolü. *Akademik Bilişim'07 - 9. Akademik Bilişim Konferansı Bildirileri*, 167-170.
- Öz, H. (2013). Mobil öğrenme, mobil dil öğrenme. II. Ulusal Yabancı Dil Eğitimi Çalıştayı. Samsun 19 Mayıs Üniversitesi Eğitim Fakültesi İngiliz Dili Eğitimi Anabilim Dalı, 8 - 9 Kasım, Samsun, Türkiye.
- Özer, Ö. (2017). Mobil destekli öğrenme çevresinin yabancı dil öğrencilerinin akademik başarılarına, mobil öğrenme araçlarını kabul düzeylerine ve bilişsel yüke etkisi. *Yüksek Lisans Tezi*, Mersin Üniversitesi, Türkiye.
- Sharples, M., Taylor, J., & Vavoula, G. (2016). A theory of learning for the mobile age. In C. Haythornthwaite, R. Andrews, J. Fransman & E.M. Meyers (eds.) *The SAGE handbook of e-learning research*, 2nd edition. SAGE, pp. 63-81.
- Siemens, G. (2002). Instructional design in elearning. <http://www.elearnspace.org/Articles/InstructionalDesign.htm> (18.12.2021).
- Sönmez, N. (2019). Mobil öğrenmenin akademik başarıya etkisi. *Yüksek Lisans Tezi*, Adıyaman Üniversitesi, Türkiye.

- Suki, N. M., & Suki, N. M. (2007). Mobile phone usage for m-learning: Comparing heavy and light mobile phone users. *Campus-Wide Information Systems* 24(5), 355-365. <https://doi.org/10.1108/10650740710835779>.
- Şener, A. (2016). Ortaöğretim öğrencilerinin mobil cihaz kullanım alışkanlıkları ve mobil öğrenme araçlarını kullanma öz-yeterlik inançlarının incelenmesi, İzmir Karabağlar örneği. Yüksek Lisans Tezi, Ege Üniversitesi, Türkiye.
- Traxler, J. (2005). Mobile learning: It's here, but what is it. *Interactions*, 9(1), 1-12.
- Trifonova, A., & Ronchetti, M. (2004). A general architecture for m-learning. *Journal of Digital Content*, 2(1), 31-36.
- Trifonova, A. (2003). Mobile learning: Review of the literature. Technical Report DIT-03-009. Informatica e-Telecomunicazioni, University of Trento, Italy.
- Wagner, E. D. (2005). Enabling mobile learning. *Educause Review*, 40(3), 41-42. Retrieved January 10, 2022 from <https://www.learntechlib.org/p/99141/>.
- Wagner, E. D. (2008). Realizing the promises of mobile learning. *Journal of Computing in Higher Education*, 20, 4-14. <https://doi.org/10.1007/s12528-008-9008-x>.
- Yıldırım, A., & Şimşek, H. (2004). Sosyal bilimlerde nicel araştırma yöntemleri. Seçkin Yayınevi, Ankara.

INVESTIGATION OF SPORTS INJURY PREVENTION AWARENESS OF
INDIVIDUALS INTERESTED IN COMBAT SPORTS

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Abstract

It is accepted and recommended by the World Health Organization that physical activity and exercise have health benefits for individuals of all ages. On the other hand, physical activity and exercise practices can bring with it some negative effects, including injuries, as well as the musculoskeletal system. In this context, in our study, it was aimed to examine the awareness of individuals interested in combat sports from sports injuries.

This study was carried out in accordance with the descriptive survey model. The population of the research consisted of individuals who were active in the field of combat sports in Diyarbakır and continued to these halls. Simple random sampling method from random sampling methods was used to determine the sample, and 276 volunteers who were actively engaged in combat sports made up the sample. In the research, Personal Data Collection Form and Sports Injury Prevention Awareness Scale were used as data collection tools.

Total of 276 people participated in the study, 152 (55,1%) men and 124 (44,9%) women. The mean age of the participants was found to be 26,52. There was no statistically significant difference between the sub-dimensions of the scale used according to the gender of the participants and the total score averages. A statistically significant difference was found between education status, environmental factor and equipment sub-dimension ($p<0,05$). There was no statistically significant difference between the other sub-dimensions and the total score averages of the scale.

In this study, in which the awareness of individuals who are interested in combat sports about prevention from sports injuries is examined, the high scores obtained from the scale, regardless of gender and educational status, show that the participants who are interested in this sports have a high level of prevention from sports injuries.

Key words: Combat Sports, Sports Injury, Injury Prevention.

CONSENT OF THE GOVERNING: RESEARCH ETHICS IN AUTOCRACIES

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Abstract

This paper examines trends in research and practices with particular reference to the study of politics in autocratic states. Political scientists and others in related disciplines seek to understand the dynamics of political systems. They are not usually guided by practitioners' imperatives, as may be the case in some more applied social sciences. However, their research findings may inform policymakers and others who are. It may be an ethically positive inclination to study policy or political practice areas that contribute to fairness and justice globally or locally. Still, the core value of political science research is impartial insight rather than applied outcomes. Further, political scientists may focus on contexts that are rhetorically democratic but are, in reality, authoritarian. Such regimes are disproportionately present in developing countries that may subscribe to philosophies other than liberal democracy and in which the local elite's interests may constrain academic freedom. The predominant codes of research ethics were initially developed for biomedical and applied research contexts. Their appropriateness in guiding political science and related subject research warrants examining. This paper will discuss the adherence to and practicality of institutional ethical guidelines by political scientists in non-liberal democratic contexts, mainly Central Asia, where recent unrest has accentuated the ethical research issues. The topic is particularly relevant as "fewer than a fifth of the world's people now live in fully Free countries", and analytical understanding is crucial to democratic development.

Keywords: politics, research ethics, authoritarian regimes.

**ÇEŞİTLİ BRANŞLARDAN PROFESYONEL SPORCULARIN FAİR PLAY
KAVRAMINA YÖNELİK METAFORİK ALGILARI**

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Özet

Bu çalışmanın amacı çeşitli branşlardan profesyonel sporcuların Fair Play kavramına yönelik metaforik algılarının belirlenmesidir.

Bu araştırmada nitel araştırma yöntemlerinden ölçüt örnekleme yöntemi tercih edilmiştir. Aktif olarak herhangi bir spor branşını yapıyor olmak araştırmaya dahil olma ölçütü olarak belirlenmiştir. Veriler araştırmacılar tarafından hazırlanan anket formu aracılığıyla toplanmıştır. Anket formunda katılımcıların sosyo-demografik bilgilerini öğrenmeye yönelik sorulara ek olarak Fair Play kavramına ilişkin algılarını belirlemek amacıyla “Fair Play...benzer çünkü...” cümlesini tamamlamaları istenmiştir. Çalışma grubunda farklı branşlarda olan ve gönüllü olarak araştırmaya katılmak isteyen toplam 80 sporcu yer almıştır. Herhangi bir metafor içermeyen 7 sporcunun cevapları analize dahil edilmemiştir. Bu nedenle toplam 73 sporcudan elde edilen veriler analiz edilmiştir. Araştırmaya toplam 17 farklı branştan sporcu katılmıştır. Analizde Microsoft Excel ve SPSS 25.0 programları kullanılmış ve veriler, içerik analizi, tanımlayıcı istatistikler ve frekans analizi yöntemleriyle analiz edilmiştir. Araştırmanın güvenilirliğini arttırmak için ve yanlılığını azaltmak için tüm veriler araştırmacılar tarafından tek tek incelenmiş ve anlam açısından fikir birliği oluşana kadar tartışılmıştır. Ayrıca uzman görüşü alınmış ve oluşturulan kategoriler uzman görüşlerine göre gözden geçirilmiştir.

Yapılan analizler sonucunda 43 metafor oluşmuştur. En çok kullanılan metaforlar adalet (9), saygı (8) ve iyilik (4) metaforlarıdır. Bu metaforlar 7 kategori altında birleştirilerek incelenmiştir. Bu kategoriler “ahlak, doğa, iyi niyet, nesne, önem arz eden unsur, yayılan değer ve diğer”dir. Araştırma sonuçları genel olarak değerlendirildiğinde neredeyse tüm katılımcıların Fair Play kavramı hakkında pozitif yönlü ve Fair Play kavramının neden önemli olduğuna dair ifadeler kullandığı görülmüştür.

Anahtar Kelimeler: Fair Play, Metafor, Spor

METAPHORICAL PERCEPTIONS OF PROFESSIONAL ATHLETES FROM VARIOUS BRANCHES TOWARDS THE CONCEPT OF FAIR PLAY

Summary

Fair Play is not only expressed as honest game, honest behavior, but also being honorable. Ethical behavior means applying the rules with honesty and respect in all matters. Fair Play, on the other hand, is to put the superior human spirit in life by suppressing personal interests and ambitions above all these. After the International Olympic Committee (IOC) recognized the International Fair Play Council (CIFP) and accepted it as an organization in 1981, Fair Play was put on the agenda by the National Olympic Committees affiliated to the IOC.

The aim of this study is to determine the metaphorical perceptions of professional athletes from various branches towards the concept of Fair Play.

In this study, criterion sampling method has been preferred as one of the qualitative research methods. Being actively engaged in any sport branch has been determined as a criterion for inclusion in the study. The data have been collected through a questionnaire form prepared by the researchers. In addition to the questions aimed at learning the socio-demographic information of the participants in the questionnaire form, they have been asked to complete the sentence “Fair Play is similar to ... because ...” in order to determine their perception of the concept of Fair Play. A total of 80 athletes who are in different branches and want to participate in the study voluntarily have taken part in the study group. The answers of 7 athletes without any metaphor have not been included in the analysis. Therefore, the data obtained from a total of 73 athletes have been analyzed. Athletes who are from totally 17 different branches have been participated in the study. In the analysis, Microsoft Excel and SPSS 25.0 programs have been used and the data have been analyzed using content analysis, descriptive statistics and frequency analysis methods. In order to increase the reliability of the research and to reduce its bias, all the data have been examined one by one by the researchers and discussed until a consensus has been built in terms of meaning. Moreover, expert opinions have been obtained and the created categories have been reviewed according to expert opinions. As a result of the analyzes, 43 metaphors have been formed. The most commonly used metaphors are the metaphors of justice (9), respect (8) and kindness (4). These metaphors have been examined by combining them under 7 categories. These categories are “morality, nature, goodwill, object, element of importance, radiating value and others”. When the research results were evaluated in general, it was seen that almost all the participants used statements about the concept of Fair Play in a positive way and why the concept of Fair Play is important.

Key Words: Fair Play, Metaphor, Sport.

GİRİŞ

Eski Yunancadan dilimize “ethos” kökünden gelen etik kelimesi, “ahlaki, ahlakla ilgili” anlamını taşımaktadır. Bu sözcüğün daha güncel anlamına baktığımızda, insanların davranışlarına bakarak iyi veya kötü olarak değerlendirilmesidir. Etik, aynı zamanda felsefenin bir dalı olarak karşımıza çıkmaktadır. Kısacası etik olarak değerlendirilen

davranışlar, yaşantılar sırasında adaletli olanı yapabilme ve değeri belirleme biçimi olarak açıklanmıştır (Tuncel, 2014).

Spor açısından bakıldığında ise spordaki etik, spor alanlarında tarafların sorumluluklarını; tarafsız bir biçimde, kişiler arasında gösterilen saygı çerçevesinde, dürüst, adil kısaca evrensel değerleri göz önünde bulundurarak yerine getirmeleri, çalışmalarını da yine bu gibi değerlere dayandırarak yapmalarını kapsamaktadır. Sportif alanındaki etiğin amacı; evrensel etik ilkelerin kişilere benimsetilerek turnuvalar, çalışmalar gibi sporun olduğu bütün ortamlarda bu ilkeleri davranışlarında sergilenmesini sağlamaktır. Evrensel kabul gören değerlerle dürüst, adil ve saygılı yaklaşma davranışlarına da “Fair Play” diyebiliriz. Fair Play, İngiltere’den tüm dillere geçmiş “kurallara uymak” anlamına gelen bir kavramdır. Kısacası, “sportif erdem” anlamına gelmektedir (Çon ve ark., 2020). Ülkemizde ise genellikle “sportmenlik” terimiyle özdeş görülmektedir. Sportmenlik kavramı ise; maç içerisinde kendini kontrol edebilmek, sabırlı olmak, rakibe saygı duymak, cesaret ile birlikte kibarlık, asalet gibi özellikleri bir arada gösterebilmek ve tüm bu durumların da kişilerin değerleri haline gelmesini sağlayan bir kavram olarak değerlendirilmiştir (Pepe ve ark. 2019). Sportmenliği yaymak amacıyla 1926 yılında Uluslararası Sportmenlik Birliği, ISC olarak kısaltması kullanılan bir birlik kurulmuştur. Bu birlik sportmenliği yaymak amacıyla; kurallara uymak, takım arkadaşlarıyla uyumlu olmak, sporcu olarak hep formda kalmak, öfkeyi kontrol etmek, turnuvada şiddetten kaçınmak, kazandığında övünmemek, yenildiğinde yıkılmamak, sağlıklı bir beden için psikolojik açıdan sağlam olmak şeklinde 8 ilke belirlemiştir.

Bu sekiz ilke ile bakıldığında ve turnuva ortamına uyarlandığında; dürüst bir şekilde, oyunu kurallarına uygun oynama, rakibine saygı gösterme, yanlış verilen kararlardan yarar sağlamama, rakibini tahrik edici biçimde sevinmeme, sevinme halinde bile sevincini abartmama, yenilgi olsa bile rakibini takdir edebilme gibi davranışları benimseme anlamına gelmektedir (Pepe ve ark. 2019).

Tüm bu anlatımlar doğrultusunda bakıldığında sportmenlik, etik ve fair play gibi kavramların spor ortamlarında erdemli davranışı ifade ettiği görülür. Özellikle spor ortamlarında fair play kavramlarına ilişkin çalışmalar, sporculara fair play davranışa ilişkin ödüller dahi verilir. Tüm bu yaklaşımların temelinde de aslında fair play davranışlarının spor ortamlarında benimsenmesi söz konusudur.

Yapılan tüm bu çabaların ne kadar sonuç verdiği konularında bilimsel çalışmalar yapılması da alana önemli katkı sunacağı düşüncesi ile öncelikle sporcuların fair play hakkında bilinç altında ne düşündüklerinin öğrenilmesi istenmiştir. Bu açıdan bilinç altı düşünceleri ortaya çıkaran metafor yöntemi kullanılarak farklı branşlardan profesyonel sporcuların fair play kavramına yönelik metaforik algıları belirlenmek istenmiştir. Bu ana amaç doğrultusunda aşağıdaki sorulara yanıt aranmıştır.

- Farklı branşlarda profesyonel olarak spor yapan bireylerin “fair play” kavramına ilişkin metaforları nelerdir?
- Profesyonel sporcuların “fair play” e ilişkin metaforlarında ortaya çıkan temalar nelerdir?

MATERYAL ve METOD

Çalışma Grubu

Bu araştırma nitel yöntemle hazırlanmış ve ölçüt örnekleme yöntemi kullanılmıştır. Araştırmanın ölçütü ise; profesyonel olarak herhangi bir spor branşını yapmış ya da yapıyor olmaktır. Çalışma grubunda farklı branşlardan araştırmaya gönüllü katılmak isteyen toplam 80 sporcu yer almıştır. Ancak katılımcıların doldurdıkları anketler incelendiğinde 7

sporunun doldurduğu formlar boş olması nedeniyle cevapları analize dahil edilmediğinden toplam 73 sporcudan elde edilen veriler dikkate alınmıştır.

Verilerin Toplanması ve Veri Toplama Araçları

Araştırmacılar tarafından sporculara çalışma hakkında bilgi verilmiş, bilgilendirme sonrası araştırmaya gönüllü katılmak isteyenlere anket formları dağıtılmış ve doldurmaları için 15 dakika süre tanınmış, anket doldurma işlemi sonrası yine araştırmacılar tarafından toplanmıştır. Anket formu katılımcıların sosyo-demografik özelliklerini belirleyen sorular ile sporcuların Fair Play kavramına yönelik algılarını belirlemek amacıyla “Fair Play benzer, çünkü.....” şeklinde boşluk doldurma işlemi gerektiren açık uçlu bir soru hazırlanmıştır.

Verilerin Analizi

İçerik analizi yöntemi Microsoft Excel ve SPSS 25.0 paket programları kullanılarak veriler analiz edilmiştir. Daha sonra katılımcıların Fair Play kavramına ilişkin yanıtlar incelenmiş ve birbirine yakın olan cevaplar gruplandırılmıştır. Bu işlem neticesinde cevaplar; “ahlak”, “diğer”, “doğa”, “iyi niyet”, “nesne”, “önem arz eden unsur” ve “yayılan değer” şeklinde toplam 7 kategori altında toplanmıştır.

Araştırmanın Güvenirliğine ve Geçerliğine İlişkin Önlemler

Araştırmacılar tarafından incelenen veriler fikir birliği içinde kategorize edilmiştir. Sonrasında uzman görüşü alınarak kategoriler gözden geçirilmiştir. Literatürde bu tür araştırma sonuçlarının güvenilirliği için (Güvenirlik=Görüş birliği / [Görüş birliği+Görüş ayrılığı) x100) uyum yüzdesinin %70’in üzerinde olması gerektiği belirtilmiştir (Miles ve Huberman, 2019). Bu araştırma için yapılan hesaplama sonrasında uyum yüzdesi %85 olarak tespit edilmiştir.

Yine bu tür araştırmalarda geçerlik açısından olguyu olduğu şekliyle ve objektif bir şekilde elde etmesi olarak ifade edildiğinden (Yıldırım ve Şimşek, 2018) bu çalışmada da geçerliği sağlamak için araştırmanın aşamaları tek tek ve ayrıntılı olarak açıklanmıştır.

BULGULAR

Çalışma grubunu 40’ı kadın (%54,8), 33’ü erkek (%45,2) katılımcı oluşturmuştur. Katılımcıların yaş ortalaması 27,74±7,90, spor geçmişleri ortalaması ise 11,55±7,26’ dır. Araştırmaya toplam 12 farklı branştan sporcu katılmıştır. Bu sporculardan 35’i (%47,9) milli sporcudur. Bu bölümde araştırmaya katılan sporcuların “Fair Play” kavramına yönelik olarak oluşturdukları metaforlar ve bu metaforlara ait kategoriler ile örnek cümleler tablolar halinde verilerle yorumlanmıştır.

Tablo 1. Sporcuların Fair Play Kavramına Yönelik Oluşturduğu Metaforlar

Metafor	n	Metafor	n	Metafor	n
Adalet	9	Ahlak	1	Görgü	1
Saygı	8	Anne	1	Gurur	1
İyilik	4	Ayna	1	Güç	1
Kardeşlik	3	Balık	1	Gül	1
Barış	3	Cesaret	1	Güneş	1
Dürüstlük	3	Çerçeve	1	İç Güzellik	1
İnsan	3	Deniz	1	İzafiyet Teorisi	1
Mutluluk	2	Doğa	1	Mecburiyet	1
Ağaç	2	Elmas	1	Nehir	1
Çiçek	2	Empati	1	Onur	1
Çocuksuluk	2	Erdem	1	Oyun	1
Kıyafet	1	Etik	1	Sevgi	1
Ders Verme	1	Dostluk	1	İyi Davranış	1
Şömine	1	Yardımlaşma	1		
Vicdan	1	Yarış	1		
				TOPLAM: 73	

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Sporcuların Fair Play kavramına yönelik geliştirdiği metaforlar incelendiğinde toplamda 43 farklı metafor oluşturdularını görülmüştür. Bu metaforlardan en çok kullanılanları adalet (9), saygı (8) ve iyilik (4) metaforlarıdır.

Tablo 2. Anlamları Açısından Metafor Kategorileri, Frekansları ve Yüzdeleri

Kategori Adı	Metaforlar	Frekans	Yüzde
Ahlak	Adalet, ahlak, dürüstlük, empati, erdem, etik, görgü, iyi davranış, onur, saygı, sevgi	28	%38,4
Doğa	Ağaç, balık, çiçek, deniz, doğa, gül, güneş, nehir	10	%13,7
Yayılan Değer	Ders verme, gurur, iyilik, mutluluk, yardımlaşma	9	%12,3
İyi Niyet	Çocuksuluk, dostluk, iç güzellik, kardeşlik, vicdan	8	%11,0
Diğer	Cesaret, çerçeve, güç, izafiyet teorisi, mecburiyet, oyun, yarış	7	%9,6
Önem Arz Eden Unsur	Anne, barış, insan	7	%9,6
Nesne	Ayna, elmas, kıyafet, şömine	4	%5,5
Toplam: 7	Toplam: 43	Toplam: 73	Toplam: %100

Tablo 2 incelendiğinde katılımcıların en çok tekrar ettiği metaforlar ahlak kategorisi altında toplanan metaforlar olduğu görülmüştür. Daha sonra sırasıyla doğa ve yayılan değer kategorisi altında incelenen metaforlar üretildiği görülmüştür.

Tablo 3. Metafor Kategorileri ve Örnek Cümleler

Kategori	Örnek Cümleler
Ahlak	Fair Play ahlaklı davranışa benzer çünkü uygulandığı branşa seviye getirir.
	Fair Play bir çeşit adalete benzer çünkü insani ve vicdani boyutta doğru olamı yapmaktır.
	Fair Play iyi davranışa benzer çünkü sporcunun aslında taşıması gereken bir özelliktir.
Doğa	Fair Play doğaya benzer çünkü oyunu güzelleştirir.
	Fair Play zeytin dalına benzer çünkü dünyayı o kurtaracaktır.
	Fair Play bir güneşe benzer çünkü sıcakık ısıtır, aydınlatır ve beraberinde güzellikler getirir.
Yayılan Değer	Fair Play iyiliğe benzer çünkü yaptıkça çoğalır.
	Fair Play gülmeye benzer çünkü sen güldükçe onlarda güler.
	Fair Play yardımlaşmaya benzer çünkü bulaşıcıdır ve kişisel hakların fark edilmesini sağlar.
İyi Niyet	Fair Play iç güzelliğine benzer çünkü her insanda olmaz.
	Fair Play kardeşliğe benzer çünkü kardeşlik her zaman kazanır.
	Fair Play dostluğa benzer çünkü anlayış, iyilik ve doğruluğu temsil eder.
Diğer	Fair Play çerçeveye benzer çünkü her yerden bakıldığın da güzel durmak zorunda.
	Fair Play izafiyet teorisine benzer çünkü ne kadar erdemli bir oyun sergilersen zaman o kadar hızlı geçer ve oyunundan keyif alırsın.
	Fair Play oyuna benzer çünkü mücadeleyi ve adil olmayı öğretir.
Önem Arz Eden Unsur	Fair Play anneye benzer çünkü Fair Play'siz müsabaka eksik bir aile gibidir.
	Fair Play insanlığa benzer çünkü her şeyin ötesinde sporcu bir insandır ve değerleri vardır.
	Fair Play dünya barışına benzer çünkü olması gerektir.
Nesne	Fair Play kişinin en güzel giyindiği kıyafete benzer çünkü nasıl giyinirsen öyle hisseder ve öyle davranırın.
	Fair Play aynaya benzer çünkü sen nasıl davranırsan o da aynı şekilde davranır.
	Fair Play elmasa çünkü herkes kazanmak için kendini kaybeder.

Tablo 3'te her bir kategoriye ait üçer metafor seçilmiş ve orijinallliği değiştirilmeden verilmiştir.

TARTIŞMA VE SONUÇ

Araştırma sonucunda katılımcıların fair play kavramı hakkında birbirinden farklı 73 metafor oluşturduğu görülmüştür. Bu metaforlar anlam açısından incelenip gruplanmış ve böylece 7 farklı kategori oluşturulmuştur.

Ahlak kategorisinde katılımcıların fair play hakkında 11 farklı metafor ürettiği görülmüştür. Bu metaforlar “adalet, ahlak, dürüstlük, empati, erdem, etik, görgü, iyi davranış, onur, saygı, sevgi” şeklindedir. Bu kategorideki toplam 28 metafor toplam metaforların %38,4’ünü oluşturmuştur. Bu kategoride oluşturulan metaforların insan davranışının temelinde olması gereken özellikler olduğu dikkat çekicidir. Tel (2014), Türk toplum yaşantısında görülen birçok davranışın temelinde ahlaki değerlerin yattığını, bu değerlerin birçoğunun da günümüzde spor ortamında fair play olarak değerlendirildiğini belirtmektedir. Mavi ve Tuncel (2012), çalışmalarında sporcuların sporda hoşgörü denilince akıllarına en çok fair play kavramının geldiğini tespit etmişlerdir.

Doğa kategorisinde katılımcıların 8 farklı metafor oluşturduğu görülmüştür. Bu metaforlar “Ağaç, balık, çiçek, deniz, doğa, gül, güneş ve nehirdir”. Bu kategorideki 10 metafor toplam metaforların %13,7’si bu kategoridedir. Bu kategorideki metaforlar fair play kavramını doğada var olan güzellikler ile benzeştiren metaforlardır. Bir katılımcı “Fair Play zeytin dalına benzer çünkü dünyayı o kurtaracaktır” şeklindeki ifadesiyle fair playin ne kadar önemli olduğunu ifade etmiştir.

Yayılan değer kategorisinde katılımcıların “ders verme, gurur, iyilik, mutluluk, yardımlaşma” olmak üzere 5 farklı metafor oluşturduğu tespit edilmiştir. Toplam metaforların %12,3’ü bu kategori altında değerlendirilmiştir. Bu kategoride değerlendirilen metaforlar fair play kavramının yapıldıkça çoğaldığını ifade eden cümlelerden oluşturulmuştur. Örneğin katılımcılardan birinin söylediği “Fair Play iyiliğe benzer çünkü yaptıkça çoğalır” şeklindeki ifade bu bilgiyi destekler niteliktedir.

İyi niyet kategorisinde katılımcıların 5 farklı metafor oluşturduğu tespit edilmiştir. Bunlar “çocuksuluk, dostluk, iç güzellik, kardeşlik, vicdan” şeklindedir. Bu kategori altında değerlendirilen metaforlar toplam metaforların %11,0’ini oluşturmaktadır. Bu kategorideki metaforlar fair play kavramını bireylerin iyi niyetli oluşlarıyla açıklamaktadır. İnan ve arkadaşları (2019), fair play hakkında üretilen metaforları “bir değer olarak”, “sosyal etkileşim olarak” ve “bir hak olarak” kategorileri altında inceledikleri çalışmalarında en çok ileri sürülen metaforları “dostluk”, “kural”, “erdem” ve “saygı” olarak belirlemiştir. Bir katılımcının “Fair Play dostluğa benzer çünkü anlayış, iyilik ve doğruluğu temsil eder” şeklindeki ifadesi de fair playin ne anlama geldiğini belirtir niteliktedir.

Diğer kategorisindeki katılımcılar 7 farklı metafor oluşturmuşlardır. Bu metaforlar “Cesaret, çerçeve, güç, izafiyet teorisi, mecburiyet, oyun ve yarışır”. Metaforların %9,6’sı bu kategoridedir. Katılımcıların başka hiçbir kategoriyle bağdaştırılamayan ifadeleri bu kategoride değerlendirilmiştir. O nedenle bu kategoride birbirinden bağımsız olabilecek metaforlar bulunmaktadır. Örneğin bir katılımcı “Fair Play izafiyet teorisine benzer çünkü ne kadar erdemli bir oyun sergilersen zaman o kadar hızlı geçer ve oyunundan keyif alırsın” şeklindeki ifadesiyle fair playi izafiyet teorisine benzetmiştir.

Önem arz eden unsur kategorisindeki katılımcılar 7 kez tekrarlanan 3 farklı metafor üretmişlerdir. “Anne, barış, insan” şeklinde belirlenen metaforlar toplam metaforların %9,6’sını oluşturmaktadır. Katılımcıların bu kategorideki ifadeleri fair play kavramının onlar için ne kadar önemli olduğunu anlamamıza da yardımcı olmaktadır.

Nesne kategorisinde katılımcıların 4 farklı metafor oluşturduğu görülmüştür. Bu kategori altında değerlendirilen metaforlar “Ayna, elmas, kıyafet ve şöminedir”. Metaforların %5,5’i bu kategori altında değerlendirilmiştir. Katılımcıların fair play kavramını herhangi bir nesneye benzettikleri ifadeler bu kategori altında toplanmıştır.

Sonuç olarak katılımcıların fair play kavramına yönelik olarak pozitif yönlü ve fair play kavramının neden önemli olduğuna dair ifadeler kullandıkları görülmüştür. Bu sonuç fair play'in önemini kavramak açısından yol gösterici olduğu düşünülmüştür. Benzer bir şekilde Şebin ve arkadaşları (2010) tarafından spor yapan üniversite öğrencileriyle yapılan çalışma sonucunda katılımcıların cinsiyet farketmeksizin fair play kavramına yönelik olumlu görüşlere sahip olduğu sonucuna ulaşılmıştır.

Metaforların, insanların günlük yaşantılarında kullanılan kavramları nasıl anlamlandırdıklarını anlamaya yardımcı oldukları (Saban, 2010) yönündeki açıklamalar göz önüne alındığında; spor ortamlarında şiddetin önlenmesi açısından değerlendirilebileceği, ayrıca sporcuların çocuk ve gençler açısından önemli rol modeller oldukları düşünüldüğünde profesyonel sporcuların fair play kavramını nasıl anlamlandırdıklarının ortaya çıkarılması ve sonrasında bu tespitler baz alınarak spor ortamlarında fair play kavramının yaygınlaştırılmasında kullanılması açısından önemli görülmüştür. Ayrıca sonraki çalışmaların daha fazla katılımcıyla gerçekleştirilmesinin doğru tespitlere ulaşmada önemli olduğu düşünülmüştür.

KAYNAKÇA

- Çon, M., Okudan, B., Bol, E. & Karakullukçu, Ö. F. (2020). Türkiye'de Fair Play'in Toplumla Benimsetilmesi ve Geliştirilmesi. İçinde, Scientific Developments for Health and Life Sciences (Ed: Mehmet Dalkılıç). Ankara: Gece Kitaplığı.
- İnan, M., Dervent, F. ve Karadağ, B. (2019). Spor Paydaşlarının Fair Play Kavramına İlişkin Metaforik Algıları. *Hacettepe Spor Bilimleri Dergisi*, 30 (2), 85-95.
- Mavi, S. & Tuncel, S. D. (2012). Sporcuların Sporda Hoşgörü Kavramına İlişkin Algıları. *Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi*, 10 (4), 125-129.
- Miles, M. B. & Huberman, A. M. (2019). Nitel Veri Analizi. Çeviri Editörleri: Sadegül Akbaba Altun & Ali Ersoy. 3. Baskı. Ankara: Pegem Akademi Yayıncılık.
- Pepe, K., Kara, A., Özkurt, R. & Dalaman, O. (2019). Aktif Spor Yapan Amatör Sporcuların Spor Ortamında Fair Play (Sportmen) Davranışlarının İncelenmesi. *Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 5 (2), 497-506.
- Saban A. (2010). Prospective Teachers' Metaphorical Conceptualizations of Learner. *Teaching and Teacher Education*, 26(2), 290-305.
- Şebin, K., Tozoğlu, E., Yılmaz, S., Bostancı, Ö. & Demirel, N. (2010). Spor Yapan Üniversite Öğrencilerinin Fair Play'e İlişkin Görüşleri. *Atatürk Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi*, 9 (2).
- Tel, M. (2014). Türk Toplum Yaşantısında Fair Play. *International Journal of Science Culture and Sport*, Special Issue 1, 694-704.
- Tuncel, S. D. (2014). Spor Etiği. İçinde: *Meslek Etiği Kavramları*, (Ed. Atak, S., Kenan G. S.). Adalet Yayınevi, 473-98.
- Yıldırım, A. & Şimşek, H. (2018). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri*. 11. Baskı. Ankara: Seçkin Yayıncılık.

İLKÖĞRETİMDE ÇALIŞAN BEDEN EĞİTİMİ ÖĞRETMENLERİNİN OLUMSUZ DAVRANIŞLARLA BAŞ ETME YÖNTEMLERİ

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Özet

Öğretim etkinliğini bozan psikolojik, fiziksel veya maddi olarak rahatsızlık ve zarar veren her türlü davranış istenmeyen öğrenci davranışıdır. Okullarda çocuk ve gençlerin formal eğitimde çok fazla dersler yüklendiği ifade edilir. Bu yüklenme her ders saatinin 40 dakika ve teneffüslerin 10 dakika olması göz önüne alındığında ve oturarak işlenen dersler sonrasında sadece 10 dakika teneffüsün olması, beden eğitimi ve spor derslerine olan ilgi ve ihtiyacı da arttırmaktadır. Beden eğitimi derslerinin de kural çerçevesinde işleniyor olması öğrencilerin bu derslerde de istenmeyen davranışlar göstermesine neden olabilmektedir.

Bu açıdan olan ilköğretim okullarında oyun sürecindeki öğrencilerle çalışan Beden Eğitimi öğretmenlerinin sınıfta karşılaştıkları istenmeyen öğrenci davranışları ile baş etme yöntemlerinin incelenmesidir. Öğretmenlerin kullandığı olumsuz davranışlarla baş etme yöntemleri kullanma sürecinde öğretmenlerin öğrencilere yönelik hangi davranışları sıklıkla kullandığını ortaya koymaktır. Bu amaçla Kocaeli ili Milli Eğitim Müdürlüğüne bağlı bulunan merkez ve ilçe okullarında görev yapan 30 beden eğitimi öğretmenine Alkan (2007) tarafından geliştirilen İstenmeyen Davranışlarla Baş Etme Yöntemleri Ölçeği ile birlikte sosyo-demografik özelliklerin belirlenmesi için hazırlanan kişisel bilgi formu kullanılmıştır. Elde edilen veriler SPSS 25.0 Paket programında analiz edilmiştir.

Araştırmanın sonucunda, Öğretmenlerin istenmeyen davranışlara karşı en çok kullandıkları yöntemler; öğrenciyi dersten çıkarma, sorduğu sorulara cevap vermeme, öğrenciyi tahtada bekletme, fiziksel ceza verme, sınıfta başarılı olan öğrenci ile kıyaslama, söz hakkı vermeme, öğrenciyi teneffüse çıkarmama öğrenciye fazla ödev verme, sınıfta yokmuş gibi davranma, davranışın yanlış olduğunu anlatmadır. Öğretmenlerin istenmeyen davranışlara karşı en az kullandıkları yöntemler; öğrenciyi sevdiği şeylerden ve eğlenceli etkinliklerden mahrum bırakma, görmezden gelme, derste değişiklik yapma, dokunarak uyarma, ceza alınacak davranışları önceden belirleme, rehberlik servisi ile görüşme, okul idaresi ile görüşme, aile ile görüşme, yerini değiştirme, öğrenci ile ders dışında konuşmadır.

Anahtar Kelimeler: Beden eğitimi Öğretmeni, istenmeyen davranış, baş etme, olumsuz davranış

**METHODS OF PHYSICAL EDUCATION TEACHERS WORKING IN PRIMARY
EDUCATION IN ORDER TO COPE WITH NEGATIVE BEHAVIORS OF
STUDENTS**

Abstract

Any kind of behavior that causes discomfort and harm psychologically, physically or financially that disrupts the effectiveness of teaching is undesirable student behavior. It is stated that a lot of lessons are loaded in formal education for young people in schools. This load which is 40-minute class hour and 10 minutes of recess, and only 10 minutes of recess after sitting classes also increases the interest and need for physical education and sports classes. The fact that physical education lessons are also processed within the framework of the rule may cause students to show undesirable behavior in these lessons.

The purpose of this study is to investigate the methods of coping with unwanted student behaviors encountered in the classroom by physical education teachers working with students in the game process in primary schools. Moreover, It reveals how often teachers use certain behaviors towards students in the process of using methods to deal with negative behaviors used by teachers. For this purpose, a personal information form prepared for 30 physical education teachers working in central and district schools affiliated to the Directorate of National Education of Kocaeli Province was used to determine socio-demographic characteristics together with the Scale of Methods of Coping with Unwanted Behaviors developed by Alkan (2007). The data obtained have been analyzed in the SPSS 25.0 Package program.

As a result of the research, the most commonly used methods of teachers against unwanted behavior are throwing the student out of the classroom, not answering the questions asked by the student, keeping the student waiting on the board, physical punishment, comparing the student with the successful student, not giving the student right to speak, not allowing the student have a break, giving the student much more homework than the others, acting as if the student was not in the classroom and telling the student that the behavior of him/her is wrong. The methods that teachers use the least against unwanted behavior are depriving the student of the things he likes and fun activities, ignoring, making changes in the lesson, warning by touching, determining the behavior that will be punished in advance, meeting with the guidance service, meeting with the school administration, meeting with the family, changing the location, talking with the student outside the lesson.

Key Words: Physical Education Teacher, unwanted behavior, coping, negative behavior

1.GİRİŞ

Davranış, insanlarca sergilenen olumlu ya da olumsuz, bedensel, zihinsel veya duygusal bütün eylemler olarak tanımlanabilir. Olumsuz davranış, yaşanan ortam ya da duruma uygun olmayan davranışların birey tarafından bilinçli olarak ortaya konulması olarak tanımlanmıştır (Balay ve Sağlam, 2008). Öğrencilerde; derste söz almadan konuşmak, derse hazırlıksız gelmek, nezaket kurallarına uymamak ve başarısızlıkları konusunda sürekli mazeret üretmek şeklinde görülen bireysel olumsuz davranışlar, arkadaşlarını öğretmene şikâyet etme gibi arkadaşları ile ilgili olanlar ve öğretmenle sağlıklı iletişim kuramama gibi davranışlar ise

öğretmenle ilgili olanlar şeklinde üç tip olumsuz davranışlar görüldüğü belirtilmiştir (Celep, 2002).

Öğrencilerin bireysel, arkadaşlarla ilgili ve öğretmene yönelik olumsuz davranışlarının yanında; çatışma, çalışmalarla ilgilenmeme ve çalışmalarını sonlandırma, yönergelere uymama, dikkatsizlik, derste yerinde oturmama, sınıf içi çalışmalarını bölme, söz almadan konuşma, yalan söyleme, argo konuşma, iletişim kurmama, öğretmenden onay alma ihtiyacının yoğun olması, bağırarak konuşma, öfke kontrolünün olmaması, yaşına uygun olmayan davranışlar, grup çalışmalarına katılmama veya vazgeçme, paylaşmayı bilmeme, işbirliği yapmama sorumluluklardan kaçınma, ödev yapmama dağınıklık, okul araç-gereçlerine zarar verme, bazen de çalma davranışı şeklinde ortaya çıktığı belirtilmiştir (Karadağ ve Öney, 2006).

Öğrencilerin olumsuz davranışlarına yönelik açıklamalarda bulunulsa da diğer bir açıdan bakıldığında eğitim programının özellikleri, konular için öğrencinin ilgisine uymayan, seviye ve duruma uygun olmayan araç-gereçlerle eğitim yapılmasının öğrencilerde dikkat dağılması, isteksizlik gibi olumsuz davranışlara yol açacağı belirtilmiştir (Balay ve Sağlam, 2008). Eğitimin hedef aldığı toplum veya birey üzerinde istenilen yönde davranış değişikliği sağlaması gerektiğinden söz edilmiştir (Hayva, 2010). Bir eğitim programının başarılı bir şekilde yürütülebilmesi için de eğitimcilerin etkili bir şekilde sınıfı yönetmeleri gerektiği ve bu etkili sınıf yönetiminin de olumsuz davranışların ortaya çıkmasını önleyeceği hatta olumsuz davranış ortaya çıkmış dahi olsa bu olumsuz davranışların giderilmesinde etkili bir sınıf yönetimine sahip olunmasından söz edilmiştir (Uysal ve ark. 2010). Bu etkili sınıf yönetiminin de beraberinde disiplini de getirmektedir. Disiplin ise, çocukta istenilen davranışı geliştirme ve kendi öz kontrolünü geliştirme becerisini kazandırabilmek olarak tanımlanmıştır (Yavuzer, 2000).

Bu noktada öğrencilerin sınıf içerisinde gösterdikleri davranışların da sınıf yönetimini etkileyen değişkenler arasında yer aldığı bu açıklamalardan görülebilmektedir. Tüm bu literatür açıklamalarına bakıldığında eğitim sistemimizde oturarak sınıf içerisinde yapılan eğitimlerin yoğun olması, öğrencilerin ilgilerine uymayan öğrenme konuları ve öğretim araç gereçleri ile sınıf yönetiminin uygun yöntemlerle yapılması önemli görülmüştür. Eğitim programlarında oturarak yapılan derslerin yanında çocukların hareket ihtiyacına yanıt veren resim, müzik ve beden eğitimi ve spor dersleri de çocuklar açısından diğer derslere göre öğretim teknikleri ve öğrenilenlerin aktatılması açısından ilgi çeken malzemeleri olan derslerdir. Öğretim tekniği olarak çocukların ihtiyaç ve ilgilerine uygun materyallerle öğretim yapan beden eğitimi dersini yürüten öğretmenlerin de okullarda özellikle yaş grubu küçük sınıflar tarafından disiplin sağlayıcı kişiler olarak görüldüğü (Özdamar, 2017). Bilgisi göz önüne alındığında; derslerinde olumsuz davranış gösteren öğrencilere beden eğitimi ve spor öğretmenlerinin bu olumsuz davranışlara yönelik yaklaşımlarının nasıl olduğu merak edilmiştir. Bu açıdan ilköğretimde çalışan beden eğitimi öğretmenlerinin olumsuz davranışlarla baş etme yöntemleri nelerdir? ana probleminden hareketle aşağıdaki sorulara yanıt aranmıştır.

-Beden Eğitimi öğretmenlerinin sınıf içi olumsuz davranışlarla baş etme yöntemleri sosyo-demografik değişkenlere göre anlamlı bir farklılık göstermekte midir?

-Beden Eğitimi öğretmenlerinin sınıf içi olumsuz davranışlarla baş etme yöntemleri meslekte geçirilen yıla göre anlamlı bir farklılık göstermekte midir?

Araştırma Grubu

Bu araştırma ile ilköğretimde çalışan Beden Eğitimi öğretmenlerinin derslerinde karşılaştıkları istenmeyen davranışlarla baş etme yöntemlerini belirlemektir. Araştırmanın çalışma gurubunu Kocaeli İl Milli Eğitimi Müdürlüğüne bağlı merkez ve ilçe ilköğretim okullarında görev yapan toplam 30 Beden Eğitimi öğretmeni oluşturmuştur.

Veri Toplama Araçları

Bu araştırmada veri toplama aracı olarak yüksek lisans tezinde kullanmış olan bir anket formu yazarlarından izin alınarak kullanılmıştır (Alkan, 2007). Araştırma için gerekli, izinler alındıktan sonra Kocaeli İli İzmit İlçesinde bulunan okullara gidilerek araştırma hakkında bilgilendirme yapılmış. Bilgilendirme sonrası araştırmaya gönüllü katılmak isteyen beden eğitimi öğretmenlerine anketler dağıtılmış ve 15 dakika doldurma işlemi sonrasında toplanmıştır. Uygulanan anket formu iki bölümden oluşmaktadır;

Birinci bölümde araştırmanın amacı doğrultusunda sosyo demografik bilgilere yer verilmiştir. Bu bölümde öğretmenlerin cinsiyeti, mezun olduğu okulun türü, kaç yıldır görevde olduğu, branşı, sosyo-ekonomik düzeyi, medeni durumu gibi bilgiler yer almaktadır.

İkinci bölümde 26 maddeden oluşan istenmeyen davranışlarla baş etme yöntemleri yer almaktadır. İstenmeyen öğrenci davranışları ile baş etmede kullanılan yöntemleri saptamak için öğretmen görüşlerinden yararlanılmıştır. Bu amaçla ilköğretim okullarında görev yapan öğretmenlere istenmeyen öğrenci davranışları ile karşılaştıklarında başvurabilecekleri olası yolların neler olabileceğini, şiddetin tanımını ve şiddet içeren davranışları yazmaları istenmiştir. Elde edilen bilgilerden yararlanılarak öğretmenlerin istenmeyen davranışlarla baş etme yöntemlerini saptamak amacıyla “hemen hemen hiç kullanmıyorum”, “nadiren kullanıyorum”, “bazen kullanıyorum”, “sık sık kullanıyorum”, “her zaman kullanıyorum” ifadelerinden oluşan 5’li likert tipi bir ölçek uygulanmıştır.

Verilerin Analizi

İstatistiksel analiz aşamasında şu işlemler gerçekleştirilmiştir:

- Beden Eğitimi öğretmenlerinin kişisel özelliklerini betimleyici frekans ve yüzde dağılımları çıkartılmıştır.
- Beden Eğitimi öğretmenlerinin İstenmeyen Davranışlarla Baş Etme Ölçeği’nden elde ettikleri puanların belirlenmesinde ortalama ve standart sapma puan değerleri kullanılmıştır.
- Elde edilen veriler bilgisayarda SPSS 25.0 paket programında analiz edilmiş, manidarlığı $p < 0,05$ düzeyinde sınıanmıştır.
- Yapılan normallik sınıamasına göre, verilerin normal dağılım gösterdiği belirlenmiş ve ikili küme karşılaştırmaları için bağımsız grup-t testi, üç veya daha fazla küme karşılaştırmaları için tekyönlü varyans analizi (ANOVA) kullanılmıştır.

BULGULAR

Bu bölümde örnekleme, problem durumuna ve alt problemlere ilişkin yapılan İstatistiksel analiz sonuçlarına yer verilmiştir.

Tablo 1. Çalışmaya katılan Beden Eğitimi öğretmenlerinin sosyo-demografik özelliklerinin frekans ve yüzdelik değerleri

Parametreler		N	%
Cinsiyet	Kadın	9	30.00
	Erkek	21	70.00
Medeni durum	Evli	19	63.3
	Bekar	11	36.7
Çocuğunuz var mı?	Evet	17	56.7
	Hayır	13	43.3
Sahip olunan çocuk sayısı	Yok	13	43.3
	1	4	13.3
	2	10	33.3
	3	13	10.0
Mezun olduğunuz fakülte	Beden Eğitimi ve Spor	17	56.7
	Eğitim Fakültesi	6	20.0
	Diğer	7	23.3
Kaç yıldır Beden Eğitimi öğretmenliği yapıyorsunuz?	1-5	11	36.7
	6-10	5	16.7
	11-15	6	20.0
	16-20	5	16.7
	21 ve üzeri	3	10.0
Toplam		30	100,0

Örnekleme oluşturan bireylerin cinsiyetlerine, medeni durumlarına, mezun olunan okullara, kıdemlerine göre dağılımları tablo 1 de incelenmiştir. Buna göre örnekleme oluşturan bireylerin %30'u kadın (9 kişi) ve %70'i erkek (21 kişi), %63.3'ü evli (19 kişi) ve %36.7'si bekar (11 kişi), %56,7'si Beden Eğitimi ve Spor Yüksekokulu (17 kişi), %20'si Eğitim Fakültesi (6 kişi), %23,3'ü diğer (7 kişi) olduğu görülmüştür. Sahip olunan çocuk değişkenine göre %43.3'ünün çocuğu bulunmazken (13 kişi), 13.3'ünün 1 çocuğu (4 kişi), 33.3'ünün 2 çocuğu (10 kişi), %10'unun 3 çocuğu (13 kişi), kaç yıldır Beden Eğitimi öğretmenliği yaptınız sorusuna ise 1-5 yıl arası olanlar 11 kişi (%36,7), 6- 10 yıl olanlar 5 kişi (%16,7), 11-15 yıl arası olanlar 6 kişi (%20), 16-20 olanlar 5 kişi (%16,7), 20 yıl ve üzeri olanlar 3 kişi (%10) olmak üzere 30 kişiden oluştuğu belirlenmiştir.

Tablo 2. Beden Eğitimi öğretmenlerinin Sosyo-Demografik Özelliklerine İlişkin T-Testi ve ANOVA Analizleri

Parametreler		N	Ort. ±SS	P değeri
Cinsiyet	Kadın	9	49,22±15,14	,004*
	Erkek	21	65,57±12,27	
Medeni durum	Evli	19	58,78±12,98	,377
	Bekar	11	63,90±18,21	
Çocuğunuz var mı?	Evet	17	62,41±11,63	,476
	Hayır	13	58,38±18,81	
Sahip olunan çocuk sayısı	Yok	13	58,38±18,81	,469
	1	4	71,50±6,35	
	2	10	58,38±18,81	
	3	13	63,00±3,60	
Mezun olduğunuz fakülte	Beden Eğitimi ve Spor O.	17	59,23±17,55	,565
	Eğitim Fakültesi	6	66,66±6,80	
	Diğer	7	59,00±13,54	
Kaç yıldır Beden Eğitimi öğretmenliği yapıyorsunuz	1-5	11	57,09±20,30	,430
	6-10	5	58,00±11,23	
	11-15	6	65,50±6,47	
	16-20	5	69,80±6,30	
	21 ve üzeri	3	53,33±17,67	

Tablo 2’de yer alan olumsuz davranışlarla baş etmede kullanılan yöntem puanları cinsiyete göre incelendiğinde kadın 49,22±15,14, erkek 65,57±12,27 olduğu görülmüştür, olumsuz davranışlarla baş etmede kullanılan yöntem puanlarının analizi sonucuna baktığımızda bulunan bu farkın anlamlı olduğu (P ,004) görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanları, medeni duruma göre incelendiğinde evli (58,78±12,98), bekâr 63,90±18,21 olduğu görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanlarının analizi sonucuna baktığımızda bulunan bu farkın anlamlı olmadığı (P ,377) görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanları çocuk sahibi olup olmama durumuna göre incelendiğinde evet (62,41±11,63), hayır (58,38±18,81) olduğu görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanlarının analizi sonucuna baktığımızda bulunan bu farkın anlamlı olmadığı (P ,476) görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanları çocuk sahibi olup olmama ve sahip olunan çocuk sayısına göre incelendiğinde yok (58,38±18,81), 1 çocuk (71,50±6,35), 2 çocuk (58,38±18,81), 3 çocuk (63,00±3,60) olduğu görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanlarının analizi sonucuna baktığımızda bulunan bu farkın anlamsız olduğu görülmüştür (P ,469). Olumsuz davranışlarla baş etmede kullanılan yöntem puanları mezun olunan okul ya da fakülteye göre incelendiğinde Beden Eğitimi ve Spor Yüksekokulu (59,23±17,55), Eğitim Fakültesi (66,66±6,80), diğer (59,00±13,54) olduğu görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanlarının analizi sonucuna baktığımızda bulunan bu farkın anlamlı olmadığı (P,565) görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanları meslek yılına göre incelendiğinde 1-5 yıl (57,09±20,30), 6-10 yıl (58,00±11,23), 11-15 yıl (65,50±6,47), 16-20 yıl (69,80±6,30), 21 yıl ve üzeri (53,33±17,67) olduğu görülmüştür. Olumsuz davranışlarla baş etmede kullanılan yöntem puanlarının analizi sonucuna baktığımızda bulunan bu farkın anlamlı olmadığı (P ,430) görülmüştür.

TARTIŞMA

Bu çalışmada, Kocaeli İl Milli Eğitim Müdürlüğü'ne bağlı ilköğretim okullarında görev yapan Beden Eğitimi öğretmenlerinin, istenmeyen davranışlarla baş etme düzeylerini belirleyerek bu duruma; cinsiyet, yaş, medeni durum, çocuk sayısı, çalışma yılı, mezun olduğu bölüme göre farklılık gösterip göstermediği incelenmiş, elde edilen bulgular araştırma amaç ve yöntemine bağlı kalınarak literatür verileri ışığında tartışılarak yorumlanmıştır.

Beden Eğitimi öğretmenlerinin olumsuz davranışlarla baş etme düzeyleri cinsiyet değişkeni açısından incelendiğinde anlamlı farklılığa rastlandığı görülmüştür. Yapılan literatür incelemeleri sonucunda cinsiyet açısından anlamlı farklılıklar bulunan çalışmalara (Balay ve Sağlam, 2008; Özer ve ark. 2014) rastlanırken, anlamlı farklılığın bulunmadığı çalışmalar da (Korkmaz ve ark., 2009) görülmüştür. Bu çalışma literatürle örtüşmüştür. Ortalamalara göz atıldığında erkek öğretmenlerin olumsuz davranışlarla baş etme becerilerinin daha yüksek olduğu görülmüştür. Bunun sebebinin ise daha çocuk yaşta izlenen animasyonlarda bile kadını hassas gösterirken erkeğin liderlik ve güç temsili olarak gösterilmesinin (Zor ve Bulut, 2020) öğrencilerin erkek beden eğitimi öğretmenlerini daha sert ve otoriter görmelerinin etkisi olup olmadığının detaylı araştırılması gereken dikkat çekici bir durum olarak değerlendirilmiştir.

Beden Eğitimi öğretmenlerinin olumsuz davranışlarla baş etme düzeyleri Medeni hal değişkeni bakımından incelendiğinde anlamlı farklılığa rastlanmamıştır. Literatür incelendiğinde bu değişken açısından herhangi bir bulguya rastlanmamıştır. Fakat ortalamalar değerlendirildiğinde bekar öğretmenlerin olumsuz davranışlarla baş etme becerilerinin daha yüksek olduğu görülmüştür.

Beden Eğitimi öğretmenlerinin olumsuz davranışlarla baş etme düzeyleri çocuğu olup olmama durumu değişkeni bakımından incelendiğinde anlamlı farklılığa rastlanmamıştır. Literatür incelendiğinde bu değişken açısından herhangi bir bulguya rastlanmamıştır. Ancak ortalamalar değerlendirildiğinde çocuğu olan öğretmenlerin olumsuz öğrenci davranışlarıyla baş etme becerilerinin daha yüksek olduğu görülmüştür.

Beden Eğitimi öğretmenlerinin olumsuz davranışlarla baş etme düzeyleri Mezun olunan fakülte bakımından incelendiğinde anlamlı farklılığa rastlanmamıştır. Literatür incelendiğinde bu değişken açısından herhangi bir bulgu görülmemiştir. Ortalamalar açısından değerlendirildiğinde ise Eğitim Fakültesi ve Beden Eğitimi ve Spor Yüksekokulu mezunu olan öğretmenlerin olumsuz öğrenci davranışlarla baş etme becerilerinin daha yüksek olduğu görülmüştür.

Beden Eğitimi öğretmenlerinin olumsuz davranışlarla baş etme düzeylerinde Meslekte geçirilen yıl bakımından anlamlı farklılığa rastlanmamıştır. Literatür incelendiğinde anlamlı farklılığa rastlanmamış çalışmaların olduğu (Balay ve Sağlam, 2008) görülmüştür. Bu çalışma literatürle örtüşmüştür. Ayrıca ortalamalara göre incelendiğinde olumsuz davranışlarla baş etme bakımından en düşük ortalamanın meslekte çalışma yılı düşük olan öğretmenlerde olduğu görülmüştür. Literatürde aynı sonuçlara rastlanan çalışmaların yoğunlukta olduğu (Charles, 1992; Türnüklü ve Yıldız, 2002; Pala, 2005) görülmüştür. Bu durum literatürle örtüşmüştür. Ortalamalar incelendiğinde ise mesleki tecrübeleri az olan öğretmenlerin olumsuz öğrenci davranışlarıyla baş etme becerilerinin daha düşük olduğu görülmüştür. Bunun meslek yaşamına yeni başlayan öğretmenlerin, istenmeyen davranışlarla baş etme sürecinde tecrübe bakımından eksik kalmalarının yaklaşımlarını etkilediği (Aydın, 1998) bilgisıyla değerlendirildiğinde; sınıf ortamındaki olumsuzluklar karşısında deneyimi olmayan

öğretmenlerin ne yapacaklarına ilişkin deneyimlerinin az olması sonucunda da literatür bilgisi desteklediğini göstermiştir.

Sonuç olarak, okul yaşamında davranışı gösteren birey sadece kendisini değil okuldaki diğer bireylerin de yaşamını etkileyeceği düşünülerek, okulda ve sınıfta istenmeyen davranışlarla baş etmek önemli görülmektedir. Bu açıdan istenmeyen davranışlar ve bu davranışlarla sağlıklı bir şekilde baş etme yöntemlerinin geliştirilebilmesi için detaylı planlanmış deneysel çalışmaların yapılması, yeni yapılacak çalışmalarda ise daha geniş örneklem grubuna ulaşılması, farklı branş öğretmenleriyle karşılaştırmalar ve farklı illerdeki Beden Eğitimi öğretmenleriyle karşılaştırmalar yapılması gerektiği düşünülmüştür.

KAYNAKLAR

Alkan, H.B. (2007). İlköğretim Öğretmenlerinin İstenmeyen Davranışlarla Baş Etme Yöntemleri ve Okulda Şiddet. *Yayımlanmamış Yüksek lisans Tezi. Niğde Üniversitesi Sosyal Bilimler Enstitüsü.*

Aydın, A. (1998). Sınıf yönetimi. *Ankara: Anı Yayıncılık.*

Balay, R., & Sağlam, M. (2008). Sınıf İçi Olumsuz Davranışlara İlişkin Öğretmen Görüşleri. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi, 5(2), 1-24.*

Celep, C. (2002). Sınıf Yönetimi ve Disiplini. 2. Baskı, Ankara: Anı Yayıncılık.

Charles, C.M. (1992). Building Classroom Discipline: From Models to Practice. (4. Baskı) London: Longman.

Hayva, Z. (2010). Öğretmenlerin Sınıf Yönetimi Becerilerinin İlköğretim 4. ve 5. Sınıf Öğrencilerinin Olumsuz Davranış Göstermelerindeki Rolünün İncelenmesi. (Master's thesis, Sosyal Bilimler Enstitüsü).

Karadağ, E., Öney, A. (2006). İlköğretim Birinci Kademe Öğrencilerinin Sınıf-İçi Olumsuz Davranışlarının Değerlendirilmesi. *Hasan Ali Yücel Eğitim Fakültesi Dergisi, Sayı 1, 119-134.*

Korkmaz, N.H., Korkmaz, F., & Özkaya, G. (2009). İlköğretim Okullarındaki Beden Eğitimi Öğretmenlerinin İstenmeyen Davranışlarla Baş Etme Stratejilerinin İncelenmesi (Bursa İli Örneği). *İlköğretim Online, 8(1), 119-128.*

Özdamar, G. (2017). Beden Eğitimi Öğretmenlerinin Mesleki Değer Yönelimleri ve Öğrencileri Tarafından Algılanan Disiplin Sağlama Stratejilerinin İncelenmesi. (Master's thesis, Eğitim Bilimleri Enstitüsü).

Özer, B., Bozkurt, N., & Tuncay, A. (2014). İstenmeyen Öğrenci Davranışları ve Öğretmenlerin Kullandıkları Başa Çıkma Stratejileri. *Turkish Journal of Educational Studies, 1(2).*

Pala, A. (2005). Sınıfta İstenmeyen Öğrenci Davranışlarını Önlemeye Dönük Disiplin Modelleri. *Manas Üniversitesi Sosyal Bilimler Dergisi, 7(13), 171-179.*

Türnüklü, A., Yıldız, V. (2002). Öğretmenlerin Öğrencilerin İstenmeyen Davranışları ile Basa Çıkma Stratejileri I. *Çağdaş Eğitim Dergisi, sayı 284: 22-27.*

Uysal, H., Altun, S.A., & Akgün, E. (2010). Okulöncesi Öğretmenlerinin Çocukların İstenmeyen Davranışları Karşısında Uyguladıkları Stratejiler. *İlköğretim Online*, 9(3), 971-979.

Yavuzer, H. (2000). Okul Çağı Çocuğu, İstanbul: Remzi Kitabevi.

Zor, İ., & Bulut, S. (2020). Toplumsal Cinsiyet Kavramına Animasyon Filmleriyle Bakmak: Buz Devri, Shrek ve Winx Club: Kayıp Krallığın Sırrı Örnekleri. *Gümüşhane Üniversitesi Sosyal Bilimler Enstitüsü Elektronik Dergisi*, 11(1), 58-69.

THE NEW ACTOR OF TRANSMEDIA STORYTELLING IN MARKETING
COMMUNICATION: METAVERSE

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Abstract

It is seen that the tools used in marketing communication have reached a different dimension with the introduction of the internet into our lives. Web 2.0 allowed users/viewers to move from a passive role to an active role. In addition, thanks to web 2.0, user-generated content (UGC) is produced and shared with other individuals easily and quickly. These developments have helped the emergence of transmedia storytelling, which is based on the "participatory culture" that enables the audience to be participants at the same time and the "convergence culture" that provides the transition (migration) between the media. Transmedia storytelling tells different parts of the main story on various platforms. In this structure, the audience can be included in the story with their content and have the opportunity to experience the story. It is thought that the developments in the internet and social media tools and, finally, the emergence of the metaverse concept will accelerate the emergence of web 3.0, which is characterized as a decentralized version of the internet that is interconnected with blockchains. Metaverse, which is predicted to be an essential phenomenon for the future, supports the creation of 3D virtual environments through augmented reality devices. Individuals in this universe will play a crucial role in constructing and developing the metaverse world with the help of "avatars" that they will create as both users and creators. In addition, thanks to the avatars, they will be able to come together with the heroes of the relevant story in a virtual environment and experience the story. At this point, it is thought that Web 3.0 and metaverse can be a new blockchain-based instrument that can be used in transmedia storytelling. In this framework, the study focuses on the metaverse concept, which can be used as a new actor in transmedia storytelling, and comments and inferences are made about the structure and areas of use of this instrument in the future.

Keywords: Marketing Communication, Transmedia Storytelling, Metaverse, NFT.

INTRODUCTION

New developments in the media impact marketing communication and shape people's worldviews. One of the changes in media is the "transmedia storytelling," which is still in its early stages, and "the metaverse," which has only lately emerged and is growing in popularity. Henry Jenkins and has a 20-year history, it is still seen as a developing area. Transmedia storytelling is based on the "participatory culture" that enables the audience to become participants and the "convergence culture" with the development of communication tools that make the transition across media easier. These features of transmedia storytelling facilitate the transition of the characters to be created between the media and enable different performances by creating new stories. The metaverse, which has only just gained popularity but is expected to become a significant phenomenon in the not-too-distant future, provides an opportunity to broaden the concept of the real world. Furthermore, individuals in the metaverse will be able

to play a critical role in the creation and evolution of the metaverse environment thanks to "avatars" that they will create as users and creators. Viewers in the metaverse universe will be able to become active users and creators thanks to their avatars and NFTs (non-fungible tokens), which are digital assets of the virtual world. Thus, this virtual universe, which will be created based on blockchain, will appear as a new medium in marketing and communication, as well as in many areas such as entertainment, art, sports, and commerce. It is seen that many banks have opened bank branches in the metaverse, as well as many world-famous brands have opened stores in this world. Furthermore, it is expected that e-commerce sites or retailers opening stores in the metaverse will significantly affect this virtual world's marketing tools and marketing trends. Although the concept of the metaverse is being talked about and gaining importance day by day, it is seen that the discussions in the academic literature and especially in the field of marketing are pretty limited. This study makes conclusions and suggestions about how the metaverse universe will contribute to transmedia storytelling, an essential instrument in marketing communication, and how the metaverse universe can be used in the future to close this gap in the literature and practice.

1) MARKETING COMMUNICATION AND TRANSMEDIA STORYTELLING

The primary goal of marketing communication is to promote related goods, services, or ideas to the target audience. Personal selling, sales increasing promotions, advertising, and public relations operations are some of the basic tactics utilized in marketing communication. Furthermore, advancements in transportation and communication have aided the internet, and direct marketing channels have become vital marketing communication tools. The expansion in media tools, the demassification of consumer markets, and the development of the internet are the major societal areas affected by technological innovation (Kitchen and Burgmann, 2010). Businesses endeavor to determine the wants and needs of consumers and try to satisfy them during this period when the modern marketing technique is dominating. At the same time, they perform all of this as part of an integrated marketing effort (Varinli, 2012). At this point, brands are attempting to surround consumers with a variety of tools, both online and offline, by coordinating their campaigns. Instead of contacting the consumer through a single channel, this approach aims to reach the consumer through numerous channels connected to one another, using several media channels of messaging.

In terms of conveying messages to consumers in a coordinated manner across several channels, "transmedia storytelling" is one of the essential concepts used, particularly in the worlds of film and entertainment. Henry Jenkins, a media theorist, is one of the essential characters in creating and developing transmedia storytelling, which has been used in the last two decades. Jenkins (2010) explains transmedia storytelling as "*transmedia storytelling represents a process where integral elements of a fiction get dispersed systematically across multiple delivery channels for the purpose of creating a unified and coordinated entertainment experience. Ideally, each medium makes its own unique contribution to the unfolding of the story*". According to the Producers Guild of America (PGA); "*A transmedia narrative project or franchise must consist of three (or more) narrative storylines existing within the same fictional universe on any of the following platforms: Film, Television, Short Film, Broadband, Publishing, Comics, Animation, Mobile, Special Venues, DVD/Blu-ray/CD-ROM, Narrative Commercial and Marketing rollouts, and other technologies that may or may not currently exist. These narrative extensions are NOT the same as repurposing material from one platform to be cut or repurposed to different platforms*" (Kinke, 2010). When these definitions and the scope of transmedia storytelling are reviewed, it is clear that transmedia storytelling should have three basic elements. "Multiple media platforms, content expansions, and audience interaction" are among these aspects (Gambarato and Tárca, 2017).

The story is not delivered exactly during the distribution of the story across several media platforms in transmedia storytelling, but changes are made in different parts of the story.

Scolari (2013) cites the television series *Lost* as an example of the story's dissemination on media platforms. The producers of this series developed the story on different platforms by creating characters that do not appear in television episodes. One of these new characters became the main character in the video game *Lost: Via Domus*, and a diary was published on the website for another character.

At this point, the story's content is expanded in different media by fulfilling the content expansion function. At the time of the successful construction of the fictional narrative universe, there were a variety of tactics that could be used. There are four ways for developing the fictional universe, according to Scolari (2009). These strategies can be explained as follows:

- a) Creating micro-stories that will enable the transition between media:** These micro-stories ensure that the time between the film series and the macro-story (the central story universe) is enriched and developed. For example, comics, internet clips, video games, and "mobisodes" (one- to three-minute screenings) made for mobile phones can be used.
- b) Creating parallel stories:** In this strategy, another story emerges at the same time as the macro story. Parallel stories can also develop over time and become a spin-off.
- c) Creating peripheral stories:** It refers to creating stories that can be described as satellites of micro-stories. These peripheral stories have a weak link with the macro story, but these peripheral stories can evolve over time and turn into a spin-off.
- d) Creation of user-generated content platform:** In this strategy, the content created by users who come together for a specific purpose is mentioned. Websites that connect content to each other, namely wikis, and platforms such as blogs, fan pages, and Youtube channels created by users can be shown as examples.

Another critical feature is audience engagement, which states that the audience moves away from passive consumers and becomes an active prosumer. At this point, the audience gets involved in the tale by doing things like experiencing the story, creating material about it, and sharing it on social media. At the point of the story's development, the content platforms created by the users also serve the audience engagement element.

There are seven key concepts that form the foundation of transmedia storytelling and hint at transmedia storytelling definitions and story universe expansion. These principles can be explained as follows (Pratten, 2015; Davis, 2013):

- 1) Spreadability vs. Drillability:** Spreadability refers to the incentive and convenience that fans can share content via social media. Drillability refers to how fans can "dig deeper" into the story world to find hidden gems.
- 2) Continuity vs. Multiplicity:** Continuity refers to the storyworld's constancy throughout multiple embodiments. This means that as fans explore more content, they will not encounter any inconsistencies or conflicts. Multiplicity refers to "Alternative retellings" or parallel universes in which the same stories are recounted in a different setting.
- 3) Immersion vs. Extractability:** Immersion refers to the ability to completely engulf a fan in a fictional story world, such as in a theme park or a real-world event. Extractability, on the other hand, refers to how fans adopt some of the characters' features in this fictional novel and use them in their own lives.
- 4) Worldbuilding:** Worldbuilding refers to the extensions of the story on different platforms that do not tell a story by itself and will not directly contribute to the story's content in the future but will still expand the understanding of the story created.
- 5) Seriality:** Seriality is the division of a long story into chapters/parts and distributing those chapters/parts across different media. Rather than splitting the story into sections and

presenting them in a single area, these parts are presented to the fans in different environments.

6) Subjectivity: Subjectivity refers to the perspectives of different characters in the created story. In transmedia storytelling, the hero's story is not told from a single point of view. Instead, parts of the story in different media are told from the perspectives of the second or other supporting characters, giving fans new thoughts and experiences.

7) Performance: Performance refers to the fans' contribution to the world in the story. In this way, the videos produced by the fans or the performances they have shown by taking part in the related content can be included in the story.

It's helpful to define two critical notions in the establishment and evolution of transmedia storytelling. "convergence culture" is one of these concepts, while "participatory culture" is another.

Convergence Culture

Convergence is defined as *"the flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behavior of media audiences"* (Nanou et al., 2018). On the other hand, Convergence culture describes *"a world where every story, image, sound, brand, and relationship displays itself across the broadest possible range of media platforms"* (Jenkins and Deuze, 2008). According to Henry Jenkins, who coined the term "convergence culture," there are many media environments, and the contents can quickly spread to these media environments.

Convergence, rather than a uniform and direct link, refers to systematic series of processes between media. In the old media system, many media owners were homogenizing the culture by using the media's dominance over the means of production and distribution. However, thanks to social media networks, consumers of this culture have transitioned to the position of content producer and distributor. In this emerging new media ecology, a culture of convergence evolves with the convergence of the contents and the channels (Youtube, Twitter, Facebook, Instagram, and so on) that contain these contents.

Participatory Culture

"Participatory culture" is another essential term in transmedia storytelling. According to Jenkins, participatory culture is defined as *"a culture in which fans and other consumers are actively invited to participate in the creation and dissemination of new content."* Participatory culture includes the ideas of media producers and consumers as participants interacting with each other (Freire, 2020: 4). In addition, participatory culture refers to a structure in which an individual moves away from being a passive consumer of traditional media production and instead becomes an active creator and sharer of new content and taking on a more productive and social role (Roxo, 2020: 67). Instead of the old unilateral system, the media and its users create a participatory culture that encourages mutual dialogue and sharing. In this way, all stories in the transmedia story universe allow the participation of fans from production to consumption, bringing the media closer together. For this reason, for the story to evolve and succeed, it is vital to understand the dynamics of the participatory culture and the convergence culture and how to structure them effectively.

2) METAVERSE

The term "metaverse" is derived from the words "meta" and "universe," and it refers to a hypothetical environment connected to the real world. "Metaverse" was first used in 1992 in a fictional story called *Snow Crash*, written by Neal Stephenson. The metaverse is defined by Stephenson in this novel as a vast virtual environment that is parallel to the physical world and in which users communicate through digital avatars (Lee et al., 2021). Users escape to this fictitious world known as the metaverse to have a good time. This book is characterized

as an endless entertainment place and virtual reality, making predictions about how the internet could evolve. In 2021, Facebook renamed itself "Meta" and launched the "metaverse" vision using an augmented reality theme, and this concept reached a different dimension and awareness. As a result, the concept of "the metaverse," a term used in science fiction movies, is currently being studied as a new infrastructure application. Marc Zuckerberg explains the metaverse as "*you can think about the metaverse as an embodied internet, where instead of just viewing content — you are in it*" (Muldoon, 2021). Furthermore, the metaverse is regarded as a digital world where daily living and commercial activities can be carried out (Ko et al., 2021).

Web 3.0 ushers in a new online environment dominated by decentralized users. The metaverse universe offers concepts like augmented reality, blockchain technology, and artificial intelligence, and it can lead to recent advances in the post-covid 19 internet era. Although numerous social media platforms and applications (Facebook, WhatsApp, Instagram) are employed in these sectors, metaverse offers a separate universe backed by an augmented reality beyond social media. Virtual reality applications, in particular, will be able to serve as a link between the physical world and the metaverse universe. The metaverse is generally portrayed as a digital space where users, brands, and other stakeholders can communicate and entertain themselves (Nicolle, 2021). Furthermore, the metaverse offers a new society in which cultural interactions such as professional life, private life, real estate, education, shopping, games, and sports can be experienced, in addition to entertainment content. For example, the Ethereum blockchain-based Decentraland platform uses virtual reality to host festivals, meetings, and creative events. "The metaverse has the potential to become a multitrillion-dollar part of the world economy in the decades to come," says Epic Games CEO Tim Sweeney. Therefore, the next three years will be critical for all companies targeting the metaverse like Roblox, Facebook, Microsoft, Epic (Kim, 2021).

It is seen that some of the brands in the real world are preparing for the metaverse. RTFKT Studios, a startup that will create virtual sneakers for the metaverse, has been acquired by the Nike firm (news.nike.com). The Samsung company has created a virtual store in the metaverse universe by moving the Samsung 837 store in New York, which it calls the experience center. In this virtual store, Samsung not only sells games, product launch events, live performances, and NFT awards, but it also sells blockchain-based services where specific digital assets like wearable technology can be traded (www.samsung.com). In the metaverse, JPMorgan, the largest bank in the United States, launched a virtual bank called Onyx lounge (Zacks, 2022); in Turkey, Aktif Bank purchased metaverse space; and several advertising firms began serving in the metaverse (Önder, 2022).

NFTs (non-fungible tokens) are among the essential digital assets in the metaverse universe. Non-fungible digital assets (NFTs) are digital assets that reflect real-world artifacts like music, games, and artwork. NFTs are frequently traded online alongside cryptocurrencies and are encoded using software similar to those used by cryptocurrencies (Conti and Schmidt, 2022).

3) THE FUTURE OF METAVERSE AND NFT IN TRANSMEDIA STORYTELLING

Metaverse's declared goal is to enable thematically integrated immersive experiences. Metaverse not only creates immersive virtual worlds but also allows for seamless transitions between physical and virtual experiences (Seidel et al., 2022). In the long run, metaverse can provide businesses with new communication options regarding brand awareness and new and realistic customer experiences from target audiences (Dan, 2021). When assessed within the context of marketing communication, transmedia storytelling is one of these new communication opportunities. Therefore, evaluations of the linkages between the core principles and components of transmedia storytelling and the structure and properties of the metaverse universe are provided at this phase of the study.

Spreadability/drillability is one of the characteristics of transmedia storytelling. The metaverse universe generates a new virtual environment connected to the real world. As a result, it's expected that the metaverse universe will allow for the dissemination of the story and further in-depth investigation in other universes with various dimensions. *Continuity/multiplicity* is another transmedia storytelling principle. The main story of transmedia storytelling will be carried to the metaverse universe and continued on a new and different platform. As a result, both continuity and multiplicity principles will be successfully implemented and developed. For example, singer Emily Lazar has begun to employ NFTs to connect the story across numerous environments while maintaining a consistent narrative. With the help of comic books, music videos, and now NFT, the author creates an iconic and fanciful character (Martin, 2021). In transmedia storytelling, games play a crucial role in continuity and multiplicity. The requirements of continuity and multiplicity are met by creating games that can be played on computers and smartphones and in which the key characters of the story are located, encircling the audience on all sides. Thanks to the games, viewers/fans can see and experience the story from many perspectives. The metaverse universe appears to be an excellent platform for gamifying storytelling. Instead of viewing the event as "simply a game," game creators could collaborate with other industries to create characters who reflect the audience's desires. NFTs are supported by community layers and include extensive gamification mechanisms. As a result, they've become a crucial component for multiple platforms in experiencing transmedia storytelling (Arnon, 2021).

Another principle of transmedia storytelling is *immersion/extractability*. The immersion principle will be aided by the story's transfer to the metaverse reality and the audience's ability to continue searching for new experiences here. NFTs are regarded to be a useful tool when it comes to the principle of extractability. As a result, NFTs can provide substantial opportunities for brands looking to expand and reach new consumers as a new marketing channel. NFTs add a new dimension to fan experience tools. NFTs also enables the creation of fan clubs for artists and corporations and serve as digital passports. In addition, NFTs can now be described as a franchise that will assist fans in purchasing and building collections as part of the relevant brand and story. *Worldbuilding* is another critical aspect of transmedia storytelling. New story universes will be built as extensions of the major stories and will host traditional narratives and serve as a crucial point in fields like the metaverse. Transitioning stories to a different universe (metaverse) brings up fresh possibilities for constructing a new world. Juan Hernandez, CEO of CurioNFT, states that "*NFTs can become powerful storytelling mediums and become elements of transmedia projects.*" As a result, NFTs are considered a component of the grand story universe (Hernandez, 2021).

In addition, the metaverse will have some of the main story's elements, such as short films of different characters, games, virtual meetings, etc. Such activities can help implement and grow *seriality* and *subjectivity* principles. Another principle of transmedia storytelling is *performance*. This approach ensures that the audience can participate in the story and experience it to the fullest extent possible. Individuals will be able to participate in the story using their avatars and interact with the characters in a virtual environment if the stories are moved to the metaverse universe. In this way, individuals will be able to interact with the characters they admire, even if they are in a virtual environment.

Participatory and convergence cultures are the two fundamental issues on which transmedia storytelling is built. The metaverse universe offers a suitable place for both of these fundamental issues. One of the most significant aspects of the metaverse, according to Tim Sweeney (Epic Games CEO), is content creation. Users and players, not only companies, are responsible for developing material in the metaverse (Kim, 2021). As a result, user-generated content is critical for both metaverse and transmedia, just as with transmedia storytelling. The metaverse's user-generated material has a lot in common with participatory culture, one of the most fundamental aspects of transmedia storytelling. Holloway-Attaway and Vipsjö (2020)

found that by merging transmedia storytelling and gamification strategies with Augmented Reality (AR), children's books and other media channels may be used more effectively. As a result, it can be observed that combining transmedia storytelling with augmented reality technology can be employed in education, allowing books (stories) to be better understood. Although the metaverse is often referred to as a virtual universe, it may also be thought of as a convergence. Convergence is intended to establish a physically permanent virtual place with a virtually improved physical reality, allowing users to experience both simultaneously (Collins, 2008). As a result of the metaverse, new online virtual worlds and the physical world can converge and be used simultaneously. As a result, the metaverse universe aids the birth of new online regions and the continued growth of convergence culture, which is an essential aspect of transmedia. In this regard, it is anticipated that the metaverse universe would aid the development of transmedia storytelling, expand communication tools by establishing a new virtual environment, and make media transitions faster and more immersive.

4) CONCLUSION AND DISCUSSION

The increased use of shared technologies across industries assists in developing a more connected world. The increased visibility and accessibility of such technologies and applications aid the transmedia industry in reaching a more accessible and cross-border position (Bradley, 2022). Transmedia storytelling is an innovative form of audience-targeted marketing communication. Viewers conduct research to find and learn about new episodes/portions of the story, and they want to see the characters on various platforms and from other perspectives. The metaverse universe as a second life is expected to be an intriguing new way to satisfy the audience's desire and curiosity. Individuals want to interact with and experience items in addition to consuming them. Consumers will be able to interact with and experience the products/films/brands that are the topic of transmedia storytelling through the metaverse. Time, space, actors, and works are the essential dimensions required for humans to experience something. The Metaverse universe provides the opportunity to experience these four dimensions. When the principles and components of transmedia storytelling are compared to the qualities of the metaverse universe, it is clear that they are compatible.

Narin (2021), in her content analysis study on metaverse articles, finds that metaverse is often appraised in terms of issues like education, culture, art, and games. Kuş (2022), in his study, revealed that individuals make sense of the concept of the metaverse, especially with cinema and literary works that have a science fiction perspective. In addition, the examinations revealed a limited number of studies on metaverse and marketing communication. This study mentions the relationship between metaverse, marketing communication, and transmedia storytelling. Thus, it is thought that the audience will have the opportunity to communicate better with the metaverse universe. At the same time, it is believed that this research will contribute significantly to the literature on metaverse and marketing communication.

According to Bradley (2022), interactive audience communities are becoming increasingly important in helping to speed up the transition between stories. It is expected that introducing tools like NFT to these communities will elevate the stories and that metaverse will take the lead among transmedia tools in the future. The metaverse universe is supposed to provide richer storytelling and stronger connections with the audience. Similarly, Valeonti et al. (2021) believe that introducing blockchain-based metaverses in films already in the transmedia universe will emerge as a form of payment that can be paid with digital assets such as NFT. Many brands and businesses are currently attempting to link their products to the metaverse and incorporate it into this industry. Likewise, diversifying one's portfolio is a goal for filmmakers. As audiences seek out stories on various media, storytellers seek new ways to tell stories. As a result, it is expected that transmedia storytelling would flourish even more within the metaverse universe.

REFERENCES

- Arnon, B. (2021). We haven't even begun to tap into the potential of NFTs. <https://cointelegraph.com/news/we-haven-t-even-begun-to-tap-into-the-potential-of-nfts> 02.02.2022
- Bradley, D. (2022). What Does The Future Hold For Transmedia Storytelling? Available at: <https://www.beyondgames.biz/18433/what-does-the-future-hold-for-transmedia-storytelling/> [04.02.2022]
- Collins, C. (2008). Looking to the future: Higher education in the Metaverse. *Educause Review*, 43(5), 51-63.
- Conti, R & Schmidt, J. (2022). What Is An NFT? Non-Fungible Tokens Explained. Available at: <https://www.forbes.com/advisor/investing/nft-non-fungible-token/> [25.03.2022]
- Dan, A. (2021). NFTs reshape brand marketing in the creator economy. Available at: <https://www.forbes.com/sites/avidan/2021/09/13/nfts-reshape-brand-marketing-in-the-creator-economy/?sh=3dea3900da2d> [04.02.2022]
- Davis, C. H. (2013). Audience value and transmedia products. *Media Innovations. A Multidisciplinary Study of Change*, 175-190.
- Freire, M. M. (2020). Transmedia storytelling: from convergence to transliteracy. *DELTA: Documentação de Estudos em Lingüística Teórica e Aplicada*, 36 (3).
- Gambarato, R. R., & Tárca, L. P. T. (2017). Transmedia Strategies in Journalism: An analytical model for the news coverage of planned events. *Journalism studies*, 18(11), 1381-1399.
- Hernandez, J (2021). Dynamic Spaces and Storytelling are the Next Phase in the Evolution of NFTs. Available at: <https://curionft.com/Blog-Dynamic-Spaces> [01.02.2022]
- Holloway-Attaway, L., & Vipsjö, L. (2020). Using augmented reality, gaming technologies, and transmedial storytelling to develop and co-design local cultural heritage experiences. In F. Liarokapis, A. Voulodimos, N. Doulamis & A. Doulamis (Eds.), *Visual Computing for Cultural Heritage*. Springer, (177-204), Cham: Springer.
- Jenkins, H. (2010). Transmedia storytelling and entertainment: an annotated syllabus, *Continuum*, 24(6), 943-958, Doi: 10.1080/10304312.2010.510599
- Jenkins, H., & Deuze, M. (2008). Editorial convergence culture. *Convergence* 14(1), 5-12.
- Kim, S. (2021). Metaverse Is a Multitrillion-Dollar Opportunity, Epic CEO Says. Available at: <https://www.bloomberg.com/news/articles/2021-11-17/metaverse-is-a-multitrillion-dollar-opportunity-epic-ceo-says> [01.02.2022]
- Kinke, N. (2010). Producers guild of america agrees on new credit: "transmedia producer". Available at: <http://www.deadline.com/2010/04/producers-guild-of-america-vote-on-creation-of-new-credittransmedia-producer/>. [06.02.2022]
- Kitchen, P. J., & Burgmann, I. (2010). Integrated marketing communication. *Wiley international encyclopedia of marketing*.
- Ko, S. Y., Chung, H. K., Kim, J. I., & Shin, Y. (2021). A study on the typology and advancement of cultural leisure-based metaverse. *KIPS Transactions on Software and Data Engineering*, 10(8), 331-338.
- Kuş, O. (2022). Metaverse: "Dijital büyük patlamada" fırsatlar ve endişelere yönelik algılar. *Intermedia International E-journal*, 8(15), 245-266.

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- Lee, L. H., Braud, T., Zhou, P., Wang, L., Xu, D., Lin, Z., ... & Hui, P. (2021). All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda. *Journal of Latex Class Files*, 14(8), 1-66.
- Martin, D. (2021). Interview: Transmedia Nft Artist/Musician – Emily Lazar. Available at: <https://trendandchaos.com/interview-emily-lazar/> [03.02.2022]
- Muldoon, J. (2021). Facebook Is Now Meta. And It Wants to Monetize Your Whole Existence. Available at: <https://jacobinmag.com/2021/10/mark-zuckerberg-meta-facebook-rebrand-metaverse> [03.02.2022]
- Nanou, V., Kaimara, P., & Papadopoulou, A. (2018, Haziran). Transmedia storytelling and creative writing: can media convergence change the way we creatively write?, *Digital Culture & AudioVisual Challenges* (DCAC-2018), Corfu, Yunanistan.
- Narin, N. G. (2021). A content analysis of the metaverse articles. *Journal of Metaverse*, 1(1), 17-24.
- Nicolle, L. (2021). Transmedia Trends 2021: Metaverse, NFT and Endless Entertainment. Available at: <https://nicollelamerichs.com/2021/12/17/transmedia-trend-report-2021/> [01.02.2022]
- Önder, N. (2022). Metaverse'e adım atan öncü markalar. Available at: <https://www.marketingturkiye.com.tr/haberler/metaversee-adim-atan-ocnu-markalar/> [25.03.2022]
- Pratten, R. (2015). *Getting started with transmedia storytelling: a practical guide for beginners*, Kaliforniya: CreateSpace.
- Roxo, F. (2020). Transmedia storytelling as a potential employer branding strategy. *U. Porto Journal of Engineering*, 6 (1), 66-77.
- Scolari, C. A. (2009). Transmedia storytelling: Implicit consumers, narrative worlds, and branding in contemporary media production. *International Journal of Communication*, 3, pp. 586-606.
- Scolari, C. A. (2013). Lostology: Transmedia storytelling and expansion/compression strategies. *Semiotica*, 2013(195), 45-68.
- Seidel, S., Yepes, G., Berente, N., & Nickerson, J. V. (2022, January). Designing the Metaverse. In Proceedings of the 55th Hawaii International Conference on System Sciences. <https://par.nsf.gov/biblio/10298099>
- Valeonti, F., Bikakis, A., Terras, M., Speed, C., Hudson-Smith, A., & Chalkias, K. (2021). Crypto collectibles, museum funding and OpenGLAM: challenges, opportunities and the potential of Non-Fungible Tokens (NFTs). *Applied Sciences*, 11(21), 9931.
- Varinli, İ. (2012). *Pazarlamada Yeni Yaklaşımlar*. Detay Yayıncılık: Ankara.
- Zacks (2022). JPMorgan (JPM) Enters Metaverse, Unveils Virtual Onyx Lounge. Available at: <https://www.nasdaq.com/articles/jpmorgan-jpm-enters-metaverse-unveils-virtual-onyx-lounge> [25.03.2022]

Internet Resources

<https://news.nike.com/news/nike-acquires-rtfkt> [01.02.2022]

<https://www.samsung.com/us/explore/metaverse-837x/> [08.02.2022]

**VORUKH VILLAGE CASE: UNMARKED BORDERS BETWEEN TAJIKISTAN
AND KYRGYZSTAN**

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Abstract

Territorial conflicts are among the most critical problems in modern diplomacy, which many states encounter. The emergence and fall of the USSR their unqualifiedness at the beginning of the twenty-first century are historical cradles of most Central Asian republics' current territorial problems. After the collapse of the formal USSR, many newly established countries have faced various political and diplomatic difficulties, including territorial disputes.

This study scrutinizes the trials of delimitation and demarcation of borders between Tajikistan and Kyrgyzstan, presenting the historical background and current position of the issue with the claims of both sides. A discussion of the proposed solutions follows it. The study concludes with an evaluation of the probability of the security threat in the region possessed by the dispute. Since 1991 The Tajik Vorukh exclave with a territory of 96,7 km² surrounded by Kyrgyzstan turned out to be a crisis; thus, it receives special attention in this study. Throughout their independence, the Tajik side has attempted to connect Vorukh to the rest of Tajikistan, whereas the Kyrgyz side has attempted to seize control. The failure to recognize the gravity of the problem has resulted in the significant catastrophe of 2021. A typical disagreement over a water reservoir developed into a small-scale war between the countries during April and May 2021. As a result, resolving this border conflict takes more outstanding care to avoid future calamities. Most proposed diplomatic solutions remained unappealing, first to the locals, then to both states. More than 470 kilometers (out of 976) of the border between the mentioned countries are still not demarked, while their delimitation is questionable.

The primary goal of this study is to investigate, arguing that the situation might escalate again with a probability of becoming the cause of regional destabilization. This study seeks answers to the following questions through qualitative descriptive case studies: What prevents two sides from resolving the border disputes? What makes the case of Vorukh significant? Can the border dispute between Tajikistan and Kyrgyzstan trigger destabilization in the region? The significance of this study is seen in understanding and improvement of interstate cooperation in the region.

Keywords: Central Asia, Tajikistan, Kyrgyzstan, border disputes, Vorukh village.

POLITICAL VIOLENCE IN CYPRUS

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Abstract

Cyprus, an island in the Eastern Mediterranean, has great geopolitical importance due to its geographical location. Because of this situation, it attracted the attention of many nations, the nations that wanted to rule the island fought a very fierce wars, and from time to time they tried to seize the political dominance on the island.

Looking at the history of Cyprus, it is seen that historians cannot reach a consensus on whether the first inhabitants of the island came from Europe or Asia. The island, which came under the rule of many civilizations from the Hittites to the Egyptians and Ancient Greeks, dates back to BC. It was taken by the Romans in 58 BC and remained under the Roman Empire for 350 years. Cyprus, which came under the rule of the Ottoman Empire in 1571 after the being ruled by the Templar Knights, Lusignans and Venetians. Ottoman Empire leased the island to the United Kingdom in 1878. That was the beginning of a violence that started between Turks and Greeks on the island. In the 1950s violence has reached its pinnacle and continued to exist as physical and political violence since then.

While violence has been showing itself in almost every field recently, politics has played a major role. Cyprus, which is one of the geographies where the most obvious examples of political violence has kept its place on the agenda. With the emergence of especially rich natural gas resources, natural wealth has been added to the strategic positioning of the island, and this has placed the island at the center of power struggles.

In this study, we will be discussing the violence and power struggle took place throughout history in the island and powers struggle of nations that wanted to rule the island; In the light of recent developments, the issue of political violence in Cyprus will be evaluated.

Key Words: Cyprus, violence, political violence, geopolitical location

EXAMINATION OF MENTAL SKILLS LEVELS IN PHYSICALLY DISABLED
ATHLETES

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Abstract

This research; This study was conducted to examine the mental skill levels of physically disabled athletes with different variables. The descriptive method, one of the quantitative research methods, was adopted as the research model. The research group was formed with the voluntary participation of a total of 157 athletes, 97 men and 60 women from Ankara, Antalya, Şırnak and Istanbul. “Mental Skills Scale” was used as data collection tool and “Personal Information Form” developed by the researcher to determine personal characteristics of athletes. SPSS 25.00 package statistics program was used in the analysis of the data. In the analysis of existing data; First of all, it was examined whether the data showed a normal distribution and as a result, it was deemed appropriate to perform parametric tests. As an analysis method in the research; Independent groups t-test, ANOVA test for multiple comparisons between different variables and correlation analysis were used. As a result of the research; While significant differences were detected in the gender, age, education level, branch and disability status of the physically disabled athletes, there were positive differences in mental skill levels and imagination skill, mental preparation, self-confidence, anxiety and anxiety management, concentration, relaxation/relaxation skill and motivation sub-dimensions. relationships have been identified.

Keywords: Sport, Physical Disability, Mental Skill.

TURNAROUND AS A BUSINESS STRATEGY TO REVERSE AN ECONOMIC CRISIS

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Abstract

The economic crisis which began in 2008, has led to recession many countries and firms. Turnover as a business strategy, belongs to the group of rescue/reversing business strategies and is used mainly by companies facing financial or other problems. To implement this strategy, it is necessary to understand the macroeconomic framework as well as the micro-environment of a specific industry.

The first important decision to be taken is whether a company should be reorganized or liquidated and if the decision is not that of the liquidation, top management should have to implement a turnaround strategy. In this paper we will focus on the case of Greece companies. This research is conducted into unprecedented conditions for the Greek economy, with a GDP of 237 billion in 2009 to 179 billion in 2014 and unemployment from 9% in 2009 to 27% in 2015 (Hellenic Statistical authority). To analyze the turnover strategy, we developed a survey to 152 Greek companies that represent more than 3% of the Greek GDP. The companies under study are in the commercial (trading) or industrial sector.

As a conclusion, the economic crisis really affected Greek companies to a great extent, in terms of their strategy and performance. It was realized that very quickly measures were taken by the managers with quite high efficiency. Greek managers got the knowledge of turnaround tactics and strategy, which must apply in a crisis. At the same time, not all of them has the same opinion about the order of the implementation of each one. Anyway, retrenchment strategy is a priority.

Keywords: turnaround strategy, economic crisis, companys survey, Greece.

INTRODUCTION

Turnaround is not something new in the business world. Probably, the first use of the term turnaround is made by Schendel, Patton, and Riggs (1976) and is defined as "a significant recovery of business performance after a significant decline" or "a transition from decline to an upward trend". Organizational turnaround processes are primarily concerned with business renewal. Turnaround management activities thus revolve around a review of management practices, activity-based costing, and SWOT analysis to determine the root causes of a company's failure (Thompson et al., 2014). Thain and Goldthorpe (1989) use the definition "*Reversing Performance from Decline and Failure to Recovery and success*" to define the meaning of the term turnaround (Charalabidis, 2011). Turnaround strategy means to turn a

losing company into a profitable one. This is to make the company more profitable again. The main purpose of implementing a turnaround is to change a negative company to a positive one. Without a suitable turnaround strategy to support it, a sick company will shut down in due course. It is a remedy for industrial instability. Turnaround is a restructuring procedure. After this, a decline company can be transformed into a profit-making one, by implementing a standardized method. It attempts to improve weaknesses to help companies that are sick, weak, and not profitable to recover.

This is a complete U-turn of the relevant planned strategic economic transition. Gopal (1991) provides a more detailed interpretation of the term: “the process by which companies reduce their losses and achieve increased profitability, the process of converting a *failed* organization into a successful one, a *poor* one into a satisfactory one, a *patient one* to a profitable company”. In this case, the focus is on profitability. Similarly, Bruton and Wan (1994) interpretation focuses on financial performance: “recovery is the reversal of the decline of an organization's financial performance”. Barker and Barr (2002) generally define the recovery effort as “an orchestrated and organized effort by the company's top management to respond to corporate performance problems”. Barker and Duhaime (1997), Gatti (2002), Chowdhury (2002), Sheppard and Chowdhury (2005), and Charalabidis (2011) state that a successful recovery takes place when a company is going through a performance decline that threatens its existence for a period of years but capable of reversing the decline in performance, ending the threat of survival, and achieving sustainable performance.

The causes of corporate decline are one of the most explored elements of a turnaround strategy (Pandit, 2000). More specifically, O'Neill (1986) and Pearce and Robbins (1993) refereed that causes of decline affect the solutions which finally adopted, and Scherrer (2003) argues that understanding the causes of decline is the first step to recovery. Large-scale empirical research, such as that of Robbins and Pearce (1992), shows that the choice of recovery strategy is influenced by the cause of decline or, more correctly, management's perception of the cause of decline.

If we focus in Greece, in mid-2010 and after the revelations that Greece's budget deficit closed for 2009 at levels above those that would make public debt sustainable, the Greek government was also unable to raise funds from the markets at fair interest rates for financing the fiscal deficit and refinancing the debt. This resulted in the immediate risk of bankruptcy and default of the Greek State.

The government strived to reestablish the country's validity in international markets to gain interest rate reductions resulted in initiatives to minimize public spending that ended in failure to restore the negative climate. Consequently, Greece sought assistance from the International Monetary Fund, the European Union, and the European Central Bank, which collaborated to establish a cooperative assistance framework for the country. The funding from the support mechanism was made under the conditions that Greece will take fiscal consolidation measures. This financing avoided the immediate risk of bankruptcy of Greece, which would have uncontrollable consequences for the entire system. The problems of the Greek economy were the high debt, the borrowing rates, the high unemployment, and the low competitiveness, which forced the state to increase the expenses for the maintenance of the economy.

Lack of investment and high market prices were also a problem. Unemployment has been on the rise since September 2008 and GDP has been declining, with a deficit of € 717m (-0.3%) within four months. Due to these unprecedented conditions for the Greek economy, with a GDP of 237 billion in 2009 to 179 billion in 2014 and unemployment from 9% in 2009 to 27% in 2015 (Hellenic Statistical authority) many companies faced a decline situation and straggled to survive.

In this research, the main goal is to find out what happened to companies in the commercial and industrial sector in Greece during the years 2010-2016 and the extent of the effects of the financial crisis on key factors such as their strategic plan, their turnover and their results and ROI. In addition, to understand the reasons why managers believe that their companies have

been affected by the measures they have taken, the tactics they have implemented and whether these tactics have brought successful results. Important for our research was to find out if the differences in tactics mentioned in the literature are easier to apply during a recession phase of the economy.

METHODOLOGY

Our sample consists of 152 participants in our research. Approximately 450 questionnaires were distributed, and 152 companies answered back, most of them by personal contact - interview. Companies in Greece (there are few exceptions) are registered in the GEMI (general commercial register) which is under the authority of Ministry of Development and Investment. GEMI is the Hellenic Register of Commercial Publicity, as defined in European directives on company law (Directive 2009/101 / EC) and the Electronic Database for Entrepreneurship in Greece, from which information for any company could be obtained from the Public Administration, third parties, banks, and other legal entities.

The criteria used to share the questionnaires were a) the company to be operating in Greece b) to belong in the commercial (trading) or industrial sector. Additionally, we tried to cover companies of all sizes, from all legal forms and from basic geographical areas. We had also in my mind to collect questionnaires from different business sectors such as electricity, water supply, detergents, metallurgy, dairy industry etc. Moreover, we wanted to collect questionnaires from companies which are listed in the stock exchange and the publication of their data is mandatory strictly, every six months.

We tested ten surveys to be sure that managers could understand the questions without any problem. The survey was submitted-conducted from September 2018 to November 2020. Finally, we used a sample of 152 Greek companies. An online questionnaire was sent by e-mail both to companies listed in ASE and to companies which were not listed in the stock exchange to cover both categories as mentioned before. In many cases we realized an interview to fill the questionnaire immediately because the response rate was very low due to limited time of the managers. Some of the respondents did not answer all the questions and that is why in some cases the sum of the answers is not 152.

We tried to cover all the categories regarding the small, medium, and large size. So, our sample is allocated to 35% small companies, 24% medium size companies and 41% large and very large companies; 49% belongs in the industrial sector and 51% in the trading sector. Additionally, we tried to cover geographically the entire Greek territory. In Greece most companies in terms of their headquarters are concentrated in the 2 major cities Athens and Thessaloniki. Nevertheless, we sent questionnaires and tried to reach companies from all over the territory. Finally, the questionnaires collected represent companies that are located 56% in Central Greece (where Athens also belongs), 39% in Northern Greece (where Thessaloniki also belongs) and only 5% in southern Greece. So, the data we gathered are from small, medium, and large companies in the commercial and industrial sector and we believe that our sample can give us reliable results if we consider that the total turnover of companies that responded is close to 3% of the country's total GDP.

RESULTS AND DISCUSSION

Having in mind the methodology we proposed before, in this epigraph we show the most relevant results.

Most of the participants were males (N=101, 67.3%) while N=49 (32.7%) were females. In terms of age, the majority ranged from 40 to 49 years of age (N=73, 48.3%), followed by the age group 50 to 59 (N=39, 25.8%). Regarding the educational level, the highest score is MSc sector (N=86, 56.6%) following University degree (N=55, 36.2%). Respect the sector,

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Trading represents 50.7% (N=77) and Industry 49.3% (N=75). About size, 51 (35.3%) are small, 34 (23.6%) are medium and 59 (41.1%) are large.

During the 2010 to 2016 economic crisis, the companies that participated showed that a 29.6% were extremely negatively affected (N=45) and 25.8% mostly negatively affected (N=35). We observe that 74.3% were negatively affected by the financial situation while only 15.1% were positively affected to some extent. Most of these companies had to take extraordinary measures to deal with the situation (N=107, 70.4%).

We also asked managers what was most affected during the financial crisis. More specific, we asked the effects on operations-indicators during the country's economic situation, indicating that the strategic plan of their company was mostly affected negatively by 30.5% (N=46), turnover was mostly affected negatively by 29.8% (N=45), the results of the company were affected extremely negatively by 26.5% (N=40), the ROI of their company was mostly affected negatively by 24.2% (N=36) and the ROA of their company was mostly affected negatively by 29% (N=40). Summarizing the negative answers (extremely negative, mostly negative, somewhat negative) for each individual factor (strategic plan, turnover, results, ROI ROA), the percentage in all exceeds 60%.

We also study about the tactics managers tried to implement to reverse the situation or to prevent to become in crisis. In this sense, 40.1% (N=61) of the participants affirm that their company did not increase the prices of their products/services, whereas only 6.6% (N=10) claimed that their company increased the prices with great ease (16.6%, N=25). However, the participants also claimed that their company neither reduced the prices of their products/services (19.1%, N=29). Most of the companies had to give discounts to their customers to be paid in advance/cash (24.3%, N=37) which was neither easy nor hard (22%, N=33). Most of the companies neither removed non profitable products/services (24%, N=16), nor non profitable distribution channels (32%, N=48). Moreover, the companies were not forced to proceed with personnel wages/salaries cuts (41.3%, N=62) nor were they forced to reduce headcounts (41.7%, N=63). 16% (N=24) of the companies negotiated and managed to reduce raw materials, services cost of their suppliers including electricity, etc., 10.7% (N=16) of the companies negotiated and managed to reduce/take discounts for their real estate rents. 11.6% (N=17) of the companies negotiated with banks or other debtors to reduce somehow the financial cost of the company and 81.6% (N=124) of the companies succeed in reducing operating costs. 25.8% (N=39) of the companies did not make any changes at their top management, 23.8% (N=35) of the companies did not implement any reductions with their promotion and marketing activities and 59.3% (N=89) did not implement a divest plan, for example a sale of fixed assets, a sale of subsidiaries, etc. Finally, the companies managed to succeed in increasing their cash flow liquidity (63.8%, N=97) and increase their turnover (59.9%, N=91).

Additionally, our findings showed that 60% managed to increase their turnover in contrast to the 40% that did not achieve a turnover increase. About 64% of the companies improved their liquidity situation and 92% did not remain at a loss while only 30% improved their ROI. After implementing turnaround tactics, most of the companies 81,6% managed to reduce their operating cost.

Most of the companies had implemented precautionary measures to avoid a future crisis due to country's general economic situation (80.4%, N=115). Furthermore, 83.6% (N=127) of the companies had taken extra measures to reverse the situation affected by the crisis or to avoid a crisis.

Following the theory and literature review and relying more on the turnaround model of Bibeault (1982), it is concluded the rational steps application sequence of some turnaround tactics:

1st situation analysis, 2nd reshuffling, changing top management, 3rd reform middle managers –improvement of communication strategy – actions to change corporate culture, 4th taking control – performing critical cash management, 5th start operating – cost reduction measures,

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6th selling assets and surplus inventories, 7th restructuring liabilities, 8th Revisiting business strategy and considering divestments, 9th Development – market and sales focus improving sales and marketing.

To understand what the managers of Greek companies know the design of a turnaround process, in our questionnaire we asked from them to indicate from 1 to 9 successively how they should be applied. In this sense, we received the following answers: 1st situation analysis 47.6% , 2nd reshuffling changing top management only 4,1% , 3rd reform middle managers – improvement of communication strategy – actions to change corporate culture 7.6% , 4th taking control – performing critical cash management 14.9% , 5th start operating – cost reduction measures 13.5%, 6th selling assets and surplus inventories 12.7% , 7th restructuring liabilities 8.1%, 8th Revisiting business strategy and considering divestments 14.9%, 9th Development – market and sales focus improving sales and marketing 18.9%. We see that regarding the first step most of the responders agree that must be the situation analysis. As for the second step which is 2nd only the 4 % agree on that instead and with approximately the same percentages the application of this measure is ranked after the third position. Obviously, it is quite difficult for the managers themselves to admit that there must be a change in management. The same is happening for the 4th tactic regarding middle management. Concerning the 5th step the 13.5% place it in the right order but the majority consider that it must be 2nd in the row. This is not so wrong following other models. Selling assets placed from most of our responders at the 7th and 8th place and it is rational because there is an emotional bonding with company assets, and everybody is trying to avoid it. In any case, of course to selling assets it is not a bad tactic and sometimes it is necessary to be implemented. Speaking for restructuring liabilities the majority place 3 to 6th in the row. For the business strategy the majority consider that it must be at 3rd place which is not right. Finally, regarding the development of the company focusing on marketing and sale the majority answered that it must be at the 1st and 2nd position against the 18.9% which place it in the right row.

CONCLUSIONS

In companies and organizations, by the term crisis we mean the reduction of its turnover, the reduction of its production, the low efficiency of indicators such as ROI and ROA which leads to redundancies, lack of liquidity, inability to meet its obligations, etc. The crisis often varies based on the causes of its occurrence and the general environment of economic activity. Such crises often threaten even the survival of companies and lead to the termination of their operations. Business crises are due to external and internal factors. With external factors we mean factors that may affect the operation of the business, but managers can not intervene for example GDP reduction, government intervention and government restrictions, high taxes, etc. Internal factors are those that come from the internal operation such as poor management, poor strategic decisions, and high operating costs.

In our research we did an empirical analysis of the crisis and turnaround tactics implemented to understand better turnaround tactics and causes of companies decline during the recession phase of the economic cycle. 152 Greek companies participated in our research whose total turnover represents 3% of the Greek PIB.

In summary, we see that the economic crisis really affected Greek companies to a great extent, both in terms of their strategy and in terms of their performance. It was realized that very quickly measures were taken by the managers with quite high efficiency, this resulted in stabilization and reduction of operating costs with a direct link to the successful results. If the strategic plan is implemented by the owner or the top management, it does not correlate with whether there are successful results in the implementation of a turnaround plan. Greek managers got the knowledge of turnaround tactics which must apply in a crisis but not every one of them has the same opinion about the order of the implementation of each one. With great certainty retrenchment phase is a priority for them.

The originality of this paper is based on the development of a comprehensive theoretical framework that examines the factors that influence strategic plan, turnover, and results of an organization during a recession phase of the economy. The contribution to knowledge is that it is a study to report valuable data from Greek organizations and how Greek executives pursue turnaround tactics and address which are those factors that influence their decisions and how these tactics affected on their results. Additionally, the study examines the role on successful turnaround based to whom formulated the strategic plan of the company and investigate the knowledge of the Greek managers on the tactics implemented during a turnaround plan.

REFERENCES

- Barker VL, Duhaime, IM 1997. Strategic change in the turnaround process: Theory and empirical evidence. *Strategic Management Journal*, 18(1): 13–38.
- Bruton GD, Wan CC 1994. Operating turnarounds and high technology firms. *The Journal of High Technology Management Research*, 5(2): 261–278.
- Charalabidis D 2011. Recovery Strategies to deal with corporate decline. Critical – theoretical review and empirical investigation within Athens Stock Exchange framework. Ph.D. *Thesis submitted to Accounting and Finance dept.*, University of Macedonia-Thessaloniki.
- Chowdhury SD 2002. Turnarounds: A Stage Theory Perspective. *Canadian Journal of Administrative Sciences / Revue Canadienne des Sciences de l'Administration*, 19(3): 249–266.
- Gatti C 2002. Leadership and Cultural Renewal in Corporate Turnarounds. *Symphonya. Emerging Issues in Management*, (2): 85-96. Available at: <http://dx.doi.org/10.4468/2002.2.09gatti>
- Gopal R 1991. Turning around sick companies—The Indian experience. *Long Range Planning*, 24(3): 79–83.
- O'Neill HM 1986. An analysis of the turnaround strategy in commercial banking. *Journal of Management Studies*, 23(2): 165–188.
- Pandit NR (2000). Some Recommendations for Improved Research on Corporate Turnaround. *Management*, 3(2): 31–56.
- Pearce JA, Robbins K 1993. Toward Improved Theory and Research on Business Turnaround. *Journal of Management*, 19(3): 613–636.
- Robbins K, Pearce JA 1992. Turnaround: Retrenchment and recovery. *Strategic Management Journal*, 13(4): 287–309.
- Schendel D, Patton GR, Riggs J 1976. Corporate Turnaround Strategies: A Study of Profit Decline and Recovery. *Journal of General Management*, 3(3): 3–11.
- Scherrer PS 2003. Management turnarounds: diagnosing business ailments. *Corporate Governance: The international journal of business in society*, 3(4): 52–62.
- Sheppard JP, Chowdhury SD 2005. Riding the Wrong Wave. *Long Range Planning*, 38(3): 239–260.
- Thain DH, Goldthorpe RL 1989. Turnaround management: causes of decline. *Business Quarterly*, 54(1): 55–62.
- Thompson AA, Peteraf M, Gamble J, Strickland A 2014. *Crafting and executing strategy: the quest for competitive advantage: concepts and cases*. New York: McGraw-Hill Education.

THE FUTURE OF THE METAVERSE IN MULTIDISCIPLINARY APPLICATIONS

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Abstract

The Metaverse is attracting a lot of publicity and investment from large and influential global organisations, most notably Facebook, who have now branded themselves as “Meta” in recognition of the strategic role the metaverse is destined to play in their corporate strategy. It is tempting to believe that the Metaverse is a new phenomenon set for rapid development and expansion, mirroring and building on the way Facebook put social media centre stage as a disruptive and successful global platform adopted by billions of people of all ages.

The origin of the word Metaverse stems from a novel called “Snow Crash” written in 1992 and it arguably came into practical reality only a decade later with the launch of Linden Lab’s virtual world “Second Life”. The applications developed within Second Life not only created bridges between the physical and virtual worlds but also between disciplines as arts and sciences collaborated to build a rich environment with substantial social and economic potential.

Today, almost 20 years after Second Life was born, at a time in human history when our physical world faces severe global environmental, health and social challenges, the Metaverse has once again emerged as a potential solution to some of these challenges. This presentation looks at the evolution of the Metaverse as a practical reality and explores how the current Metaverse development might build on the experiences of Second Life.

Keywords: Immersive Experiences, Second Life, Virtual Worlds, Metaverse, Digital Therapeutics

**IMPACT OF THE PANDEMIC ON EMPLOYEE MOTIVATION AND
PERFORMANCE IN THE IT INDUSTRY**

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Abstract

In today's globalized world, the pandemic has had a wide spread impact on economies, affecting several organizations owing to drop in business and trade. The disruptions in business activities have significantly impacted employment and employee morale. Organization had to adapt to WFH or home office (HO) arrangements to prevent work stoppage and disruptions in business. The job satisfaction and motivation of employees have invariably been an important issue when analyzing performance. In contrast with other industries, the IT business stands apart for its quick adaptation. Therefore, factors that build motivation, enhance engagement and drive performance is very critical in the knowledge industry. The objective of this study is to assess the elements that have an impact on motivation and performance of employees during the changed scenario. The research has implications for HR professional and leaders who wish to measure the effectiveness of their work-from-home policies on job satisfaction and performance. According to the review of literature collected from various sources, job satisfaction and recognition increase employee motivation along with favorable leadership styles being a central feature of organizational performance. Evaluating how an organization stimulates its employees is invaluable since employees are the direct link between organizations and its customers. Findings from the qualitative study demonstrate that motivation is a significant apparatus that plays a critical function of facilitating employees to keep up with ideal performance expectations, particularly during the pandemic. This study collaborates with other research finds in the importance of job satisfaction and motivation of IT professionals in the industry.

Keywords: Employee recognition, Work-environment, Productivity, Job satisfaction, Organization.

**ROLE OF CORPORATE TOWARDS ACHIEVING SUSTAINABILITY – A
CRITICAL REVIEW OF UNDERLYING FACTORS**

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India

Abstract

India is at the cusp of climate emergency. HSBC Global Research in its Climate Change Global Report of March 2018 (Paun et al., 2018) has ranked India (among 67 countries) as the most vulnerable country to climate change risks. The article is an attempt of making critical review of the studies done in the past on the role played by commercial institutions towards saving the planet. The authors also identified theories, built conceptual framework regarding the role of corporates to achieve sustainable development goals (SDGs) (United Nations, 2017) for a country. The article also provides insights into the practices of sustainability as adopted by the corporates and explores sustainability as a multi-dimensional construct. It also aims to highlight the underlying factors playing key role in driving corporate towards conscious capitalism, i.e., purpose and profit.

Key Words: Climate Risk, SDG, Sustainability, Conscious Capitalism

Introduction

In this paper, we are trying to review the literature to find out the prospective research gaps and the scope of research in the domain of role of corporate towards achieving sustainability. Throughout history humankind has created a multitude of different economic & social system – traditional system, feudalism, communism, capitalism – the list goes on (B Lab, n.d.). The systems are complex. They are created by people and can be changed by people. After all, humanity is interdependent with one another and with the planet. But the problem is that it is often forgotten and short-term gains are prioritized over long-term values. Profits over people and planet became the mantra leading to polarized economic prosperity.

We also showed agony towards the climate in search of the monetary gains. There has been an increase in ocean acidity by an alarming 26% since pre-industrial activities which is directly due to human activities (McGrath Triona, 2016). Report says that just 100 companies are responsible 71% of global emissions (Riley, 2017).

All these numbers indicate that our planet is at the brink of a collapse (Stoknes Espen, 2017). We have comfortably forgotten that “no body in the world can be successful in a world that fails”(University of Groningen, 2021).

Reacting to a piercing question asked by a businessman on the purpose of his visit in Davos, (Vasudev Sadhguru, 2022) Sadhguru replied “As a yogi, the only one thing I am interested in is human wellbeing. Whatever the nature of your business, it’s essentially about human wellbeing – and that’s my business too!”

Inclusiveness and interdependence are the two sides of the same coin when we refer to business and its purpose towards the planet. Many a times, the companies are confused with their probable role towards the 17 SDGs. The Story of the Hummingbird (Happy Earth

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People, 2019) , as told by 2004 Nobel Peace Prize Laureate Professor Wangari Maathai in “Dirt! The Movie” can work as a lighthouse to bring home the ideology of “I am doing what I can” (Yahgulanaas, 2012) indicating that every little contribution is of paramount value.

Literature Review

Many studies over the years have successfully highlighted the fact that active corporate engagement is essential for the world to achieve the changes in production and consumption patterns. According to a research by the Institute of Policy Studies, in 1999 the top 200 corporations’ combined sales exceeded the combined economies of all the world’s countries minus the top 10 (Steger, 2004).

In this journey of sustainability, there are four questions which need to be answered (Schoenmaker, 2017).

Parameters	The Big Questions	The Area of Concern
1. Why	Why does sustainability matter?	Sustainability challenges we are all facing.
2. What	What is sustainability?	Sustainable companies – transition of companies from unsustainable to sustainable production practices
3. How	How can investors and bankers finance sustainable companies?	Different routes adopted and the returns generated for the investors
4. How	How does a corporate stay sustainable in the corporate and financial world?	Sustainability moves required to be integrated into the core of the business.

Table 1 The Big Questions to be answered

The key aspect which drives the companies is to adhere to a transition – a transition from maximizing profit (F) only to maximizing integrated value (I) which combines Financial value (F), Social value (S) and Environmental Value (E) (Schoenmaker & Schramade, 2019).

So, a new concept $I = F + S + E$ originates.

This concept gives birth to the model of Triple Bottom Line (Mike Rosenberg, 2016) which firms started embracing in their endeavor to earn legitimacy in the eyes of environmentalists across the world. The pharma major Novo Nordisk also used the same triple bottom line business principle to progress with its commitment towards corporate sustainability (Epstein & Buhovac, 2014).

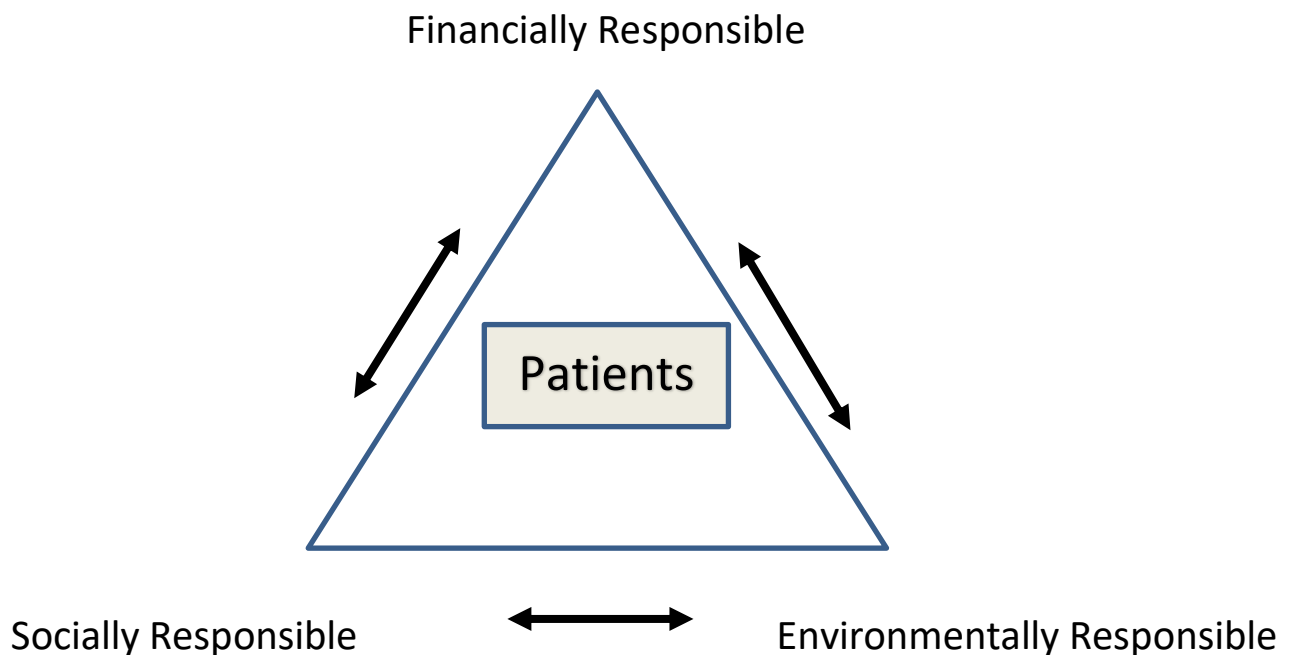


Figure 1 Novo Nordisk's Triple Bottom Line Business Principle
Source: Novo Nordisk (2012) Annual Report

In this model (shown in Figure 1), the firm aims to conduct its operation in a financially responsible (profitable for the long-term), socially responsible (patients first – at the center of the operations), and environmentally responsible (doing more with less resources) way. The aim is to ensure long-term profitability by minimizing any adverse impact from business activities. The firm also aims to maximize the positive footprint from its global operations via improved health of its clients (i.e., patients), creating employment opportunities, generating economic prosperity and building social equity.

Although this model has gained a lot of currency among the academicians as well as corporate honchos regarding the adaptation and the subsequent capability to measure the outcome, but it has been observed that during arduous economic periods, the issue of environmental sustainability takes a back seat (Michael Rosenberg, 2015). So, there remains quite an unexplored area of innovating capable business models which could continue germinate sustainable business goals during challenging time periods.

In a typical business case, there seem to be many potential barriers as well as promotional factors which might restrict a firm from exhausting all its wishes towards protecting the environment. The barriers may appear in the form mind-set of managers, knowledge gaps, regulatory barriers, investor behavior and so on while the latter may include public or market pressure, new business opportunities, top management leadership and the nurturing of a corporate culture (Steger, 2004).

There could strategic choices in front of the business managers regarding the trade-off between cost and benefits of compliance with regard to environmental sustainability (Mike Rosenberg, 2016).

An inverse U-shaped curve have been put forward to express the relationship between corporate economic and environmental & social performance (ESP) (Wagner et al., 2001). Figure1.2 depicts possible relationship between absolute economic performance and beyond-compliance ESP, that is, how economic performance is affected when companies voluntarily internalize external environmental and / or social effects (Steger, 2004).

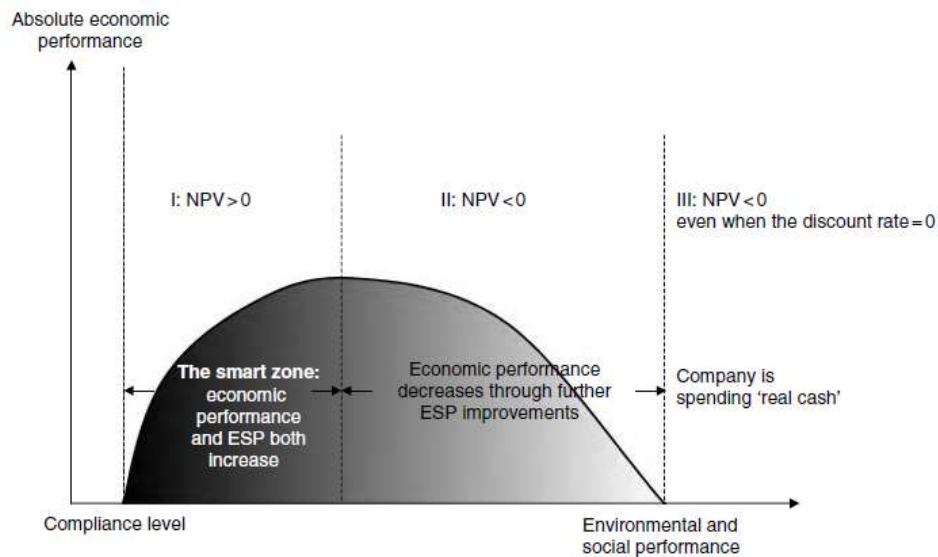


Figure 2 The Key Relationship

Source: The Business of Sustainability (2004)

The curve here defines three in-built phases of the impact of the ESP improvements on corporate economic performance in which corporate sustainability initiatives are compared against risk-weighted average cost of capital (famously known as, WACC). The smart zone (Zone I) depicts the projects which the firm would love to accept since $NPV > 0$, even it fails to improve ESP. the curve is steep at the beginning since any firm is expected to carry out those projects which generate higher returns (represented by high NPV). Zone II is demarcated as the zone of negative NPV and so, quite obviously, the curve flattens out. Zone III illustrates a situation where philanthropic level of ESP performance is observed. Even when the cost of capital is zero (which is not the case in Zone II), in Zone III expenditure on better ESP does not add any economic value and consequently affects economic performance in absolute terms.

.Whether the government can change the weather or not (Johnson Luke, 2013), it is definitely a proven fact that with the rise in industrial level, there is an adverse impact on the climate. Studies have been conducted to establish a direct correlation between per capita income and per capita emission of Carbon (Our World in Data, n.d.).

Hence, any country should balance its economic policies with environmental policies to achieve sustainable development. A fundamental change way in the way thinking by the State and market forces about the environment, society & development is sine qua non (Raj, 2022).

Conclusion

The climate activists have collectively (Mckibben Bill, 2012; Winston Andrew, 2012) laid out three fundamental climate numbers in his incredible essay in Rolling Stone magazine: to stay below (1) 2°C of warming (the limit the world's scientists have said might help us avoid the worst of climate change), we can only burn (2) 565 more gigatons (a billion tons) of carbon dioxide, which will force a battle with the fossil fuel industry since it has (3) 2,795 gigatons in reserve. Since this problem is a manmade one, it can be solved by man (Hrh The Prince Of Wales, 2022)

The studies done in the past are not exhaustive with limited exposure to certain specific sectors and / or geographies. Moreover, there are certain areas which need special attention with respect to the financial aspect of the environmental move. So, new research work can be carried out by using the above cited models to gauge the impact of work towards sustainability since businesses have started realizing that reducing environmental impact is

now a business imperative (*Reducing Environmental Impact Is Now A Business Imperative*, n.d.).

References

- B Lab. (n.d.). *Leaders build communities, not just profits*. Retrieved April 2, 2022, from <https://www.bcorporation.net/en-us/>
- Epstein, M., & Buhovac, A. (2014). *Making Sustainability Work*.
- Happy Earth People. (2019). *Be like the hummingbird. - Happy earth people*. <https://happyearthpeople.com/2019/10/21/belikesthehummingbird/>
- HRH THE PRINCE OF WALES. (2022, January 21). Exclusive: Prince Charles Says “Our Children Are Judging Us” On Climate Change. *Newsweek*, 26–33. <https://www.newsweek.com/2022/01/21/exclusive-prince-charles-says-our-children-are-judging-us-climate-change-1661370.html>
- Johnson Luke. (2013, February 13). Marco Rubio On Climate Change: “The Government Can’t Change The Weather.” *Huffington Post*. https://www.huffpost.com/entry/marco-rubio-climate-change_n_2679810
- McGrath Triona. (2016, February). *How pollution is changing the ocean’s chemistry*. TEDxFulbrightDublin.
- Mckibben Bill. (2012, July 19). Global Warming’s Terrifying New Math. *Rolling Stone*. <https://www.rollingstone.com/politics/politics-news/global-warmings-terrifying-new-math-188550/>
- Our World in Data. (n.d.). *CO2 emissions per capita Vs GDP Per Capita 2018*. Retrieved April 4, 2022, from <https://ourworldindata.org/grapher/co2-emissions-vs-gdp>
- Paun, A., Acton, L., & Chan Wai-Shin. (2018). Climate Change Global March 2018 -- Fragile Planet. *HSBC Global Research*.
- Raj, K. (2022, April 2). *Balance economic & environment policies : The Tribune India*. The Tribune. <https://www.tribuneindia.com/news/comment/balance-economic-environment-policies-382739>
- Reducing Environmental Impact Is Now A Business Imperative*. (n.d.). Retrieved April 6, 2022, from <https://www.forbes.com/sites/deloitte/2020/01/22/reducing-environmental-impact-is-now-a-business-imperative/?sh=287b007f6cc6>
- Riley, T. (2017, July 10). Just 100 companies responsible for 71% of global emissions, study says. *The Guardian*. <https://www.theguardian.com/sustainable-business/2017/jul/10/100-fossil-fuel-companies-investors-responsible-71-global-emissions-cdp-study-climate-change>
- Rosenberg, Michael. (2015). *Strategy and Sustainability A Hard-Nosed and Clear-Eyed Approach Sustainability for Business to Environmental*. Palgrave Macmillan.
- Rosenberg, Mike. (2016). Strategy, Business Ethics and Corporate Social Responsibility: A Strategic Approach to Sustainability. *IESE Insight*, 29, 54–61. <https://doi.org/10.15581/002.art-2850>
- Schoenmaker, D., & Schramade, W. (2019). *Principles of Sustainable Finance* (First). OXFORD University Press.
- SCHOENMAKER, P. D. (2017). *INVESTING FOR THE COMMON GOOD : a sustainable finance framework*. BRUEGEL.
- Steger, U. (2004). *The Business of Sustainability Building Industry Cases for Corporate Sustainability* (St. Ulrich (Ed.)). Palgrave Macmillan.
- Stoknes Espen. (2017, September). *How to transform apocalypse fatigue into action on global warming*. TEDGlobal, NYC. https://www.ted.com/talks/per_espen_stoknes_how_to_transform_apocalypse_fatigue_in_to_action_on_global_warming
- United Nations. (2017). *Sustainable Development Goals: Improve Life All Around The Globe*.

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UN. <https://www.youtube.com/watch?v=kGcrYkHwE80>

University of Groningen. (2021, January 22). *The Responsible CEO - Feike Sijbesma*. Sensus. <https://www.youtube.com/watch?v=AJVnVmEs2sI>

Vasudev Sadhguru. (2022, March 20). A conscious planet, its time has come. *The Times of India*. <https://timesofindia.indiatimes.com/blogs/toi-edit-page/a-conscious-planet-its-time-has-come/>

Wagner, M., Schaltegger, S., & Wehrmeyer, W. (2001). The Relationship between the Environmental and Economic Performance of Firms. *Greener Management International*, 94–111.

Winston Andrew. (2012, November 13). The Triumph (and Challenge) of Climate Math. *Harvard Business Review*.

Yahgulanaas, M. (2012). *FLIGHT OF THE HUMMINGBIRD (A Parable for the Environment)*. Greystone Books.

**ENERGY SECTOR ANALYSIS IN NIGERIA (1999-2020): A PARADIGM SHIFT
FOR GLOBAL COMPETITIVENESS**

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Abstract

Energy sector development especially in the oil and gas sub-sector drives the Nigerian economy as it accounts for its major source of foreign earnings and also supports the provision of goods and services within the commercial and non-commercial sectors of the country. Based on the above, this study analyses the trends of contributions of various productive activities in the energy sector to economic prosperity in Nigeria, and also develops and justifies the prospects in the sector for the country based on the prevailing circumstance globally. In order to achieve this, the study sourced data from internationally recognized databases which include World Bank, international energy agency (IEA) on the values (GDP) and production of crude oil, natural gas, coal, hydro sub-energy sector which were analysed using stationary test, followed by co-integration and error correction model (ECM) to investigate the relationship between the non-stationary variables. The findings of the study indicate a decreasing marginal contribution of oil and gas, coal and hydro energy sources to economic prosperity in Nigeria despite their positive significance. The study therefore recommends for a shift towards renewable energy components such biomass, primary solid biofuels, industrial waste and solar energy as they show increasing marginal contributions to global economic prosperity in addition to their safety and environmental sustainability.

Keywords: Crude oil; natural gas; coal; hydro-power; gross domestic product

INTRODUCTION

The energy sector is among the very critical factors for economic development across the globe (Adewuyi, Shigenobu, Senjyu, Lotfy & Howlader 2019). Productive activities in energy sector and energy commodities promote economic growth by speedily increasing productivity and generating enormous revenue as well as gross domestic products (GDP) of nations (James, Ndem, Ujong & Ihuoma 2021). The target of a productive energy sector is to provide energy related commodities to supply the commercial and non-commercial sectors of the economy. Hence, the energy sector remains the bedrock of sustainable economic prosperity (Ogbonna, Idenyi & Nick (2016). Therefore, the crucial roles of energy supply in the

globalization and market liberalization of the global economy cannot be underestimated as it underpinned all the needed economic development.

Nigeria as one of the major players in the energy sector in the world and has great potentials in renewable and non-renewable energy. It is blessed with abundant energy resources such as crude oil, natural gas, hydro, solar, coal, geothermal, lignite, wind, wood fuel, biomass and tide (Olagunju, Onuoha, Saibu, Eneanya & Akintunde 2021). Out of these so many, only crude oil and natural gas, and to some extent, hydro and coal are been used in the real production of energy (James *et al.*, 2021). One of the contributions of the energy sector to the Nigerian economy is in its ability to source both external and internal revenues for the country. In addition, the country possesses various forms of energy in both renewables and non-renewables with comparative market advantage and competitiveness ((Olagunju, *et al.*, 2021). In this regard therefore, the country has the capacity to generate enormous revenue both internally and externally from the sector in order to contribute to its economic progress. More often than not, in assessing this contribution of the sector to the economic prosperity of the nations, economic variables measurements are used in which the GDP becomes the most essential.

Problem Statements

Energy sector development especially in the oil and gas sub-sector drives the Nigerian economy as it accounts for its major source of foreign earnings and also supports the provision of goods and services within the country despite the availability of other sources of energy in the country. The recent development in the non-renewable energy (i.e crude oil, natural gas and coal) with respect to its environmental challenges such as pollution and degradation; lack of sustainability and general safety, nations around the world are considering a shift from over reliance on the non-renewables as major source of energy supply (Alao & Awodele 2018). This situation may result to dwindling global demand for commodities of oil and gas extraction thereby reducing the foreign earnings accruable from the market (Okorie & Manu 2016). For countries like Nigeria therefore, there is need to explore other means of foreign earnings, still in the energy sector such as in the areas of renewable energy (hydro-power), to grow its economy.

Renewable energy offers a better global energy supply with its environmental friendliness and its economic viability (Justin, Odo, Oluka & Salami 2022). Despite, the involvement and diversification into the renewable energies supply for commercial and non-commercial productive activities in Nigeria, there have not significant increase in its foreign earnings capacity. It is against this backdrop that there is need to economically evaluate the value trends of the commodities in energy sector (coal, crude oil, natural gas and hydro) and the prospects in the renewable energy in Nigeria.

Objectives of the Study

Based on the above, this study analyses the trends of contributions of various productive activities in the energy sector to economic prosperity in Nigeria, and also develops and justifies the prospects in the sector for the country based on the prevailing circumstance globally. However, the specific objectives of this study include:

- i. to determine the relationship between productive activities in coal energy sub-sector on the gross domestic product of Nigeria
- ii. to determine the relationship between productive activities in crude oil energy sub-sector on the gross domestic product of Nigeria
- iii. to determine the relationship between productive activities in natural gas energy sub-sector on the gross domestic product of Nigeria

- iv. to determine the relationship between productive activities in hydro energy sub-sector on the gross domestic product of Nigeria

Hypotheses of the Study

In this study, the statements of hypotheses to be tested are stated in null forms as below:

- H₀₁: Productive activities in coal energy sub-sector has no significant relationship with gross domestic product of Nigeria
- H₀₂: Productive activities in crude oil energy sub-sector has no significant relationship with gross domestic product of Nigeria
- H₀₃: Productive activities in natural gas energy sub-sector has no significant relationship with gross domestic product of Nigeria
- H₀₄: Productive activities in hydro energy sub-sector has no significant relationship with gross domestic product of Nigeria

LITERATURE REVIEW

Justin *et al.*, (2022) conducts a review of available capacity of renewable energy in Nigeria, the extent of its utilization in country in comparison to some selected countries in Africa. The study also seeks to explore the factors against the utilization and development of renewable energies and ways of enhancing its status. Many peer-reviewed journal articles and grey literature were gathered from which the most suitable ones were selected for review. It was found that the country is enormously endowed with various forms of renewable energy sources but the level of utilization abysmally low due to factors such as non-implementation of policies in renewable energy where they exist, financial issues and inadequate research in the area.

From a different dimension, James *et al.*, (2021) investigate the effects of deficit in electric power on economic growth (RGDP) with focus on agricultural and industrial sectors in Nigeria. The study used time-series data between 1981 and 2017 inclusive and the autoregressive distributed lag (ARDL) model which revealed that a unit deficit in electric power decreases economic growth in triple folds. The study therefore submits that government needs to construct energy banks or farms to muster losses and store the electricity before onward transmission to the final consumers. Similarly, Khobai, Mugano and Le Roux (2017) investigate the basic causal relationship that exists between electric supply and economic growth in South Africa between 1985 and 2014. The study used ARDL bound tests and vector error correction model (VECM) as model for estimation. The study's findings indicate that there is a significant long-term relationship among the variables (electricity price, trade openness, employment and capital) and that bi-directional causality occurs between electricity supply and economic growth.

Ogbonna, Idenyi and Nick (2016) on the other hand examine the impact of power generations capacity (gross capital formation and unemployment) on economic growth (real gross domestic product) in Nigeria between 1980 and 2015. The study employed co-integration, VEC mechanism and grange causality as models of estimation technique. The study indicated that there is a very stable long-term relationship between the GDP and the explanatory variables in the model. It was concluded that power generating capacity in the country has no statistical association with economic growth. Contrary to the study of Ogbonna, Idenyi and

Nick (2016), Okorie and Manu (2016) evaluate the same causal relationship between the electricity consumption in Nigeria and economic growth from 1980 to 2014. The study utilized Johansen co-integration and vector auto-regression (VAR-based) techniques and showed that a long term relationship exists. It was also revealed that electricity consumption possesses similar trajectory with economic growth in the long run.

Furthermore, Gokten and Karatepe (2016) using similar approach with Okorie and Manu (2016) evaluate the relationship that exists between electricity consumption and economic growth between 1950 and 2010 and show that there is a unidirectional causal relationship between them. On the contrary, Nazlioglu, Kayhan and Adiguzel (2014) showed that electricity consumption and economic growth are co-integrated in the long-run and also indicated that there is bidirectional causality in both the short and long run between electricity consumption and economic growth. In dissimilar study, Muhammad (2015) investigates the impact of shortage of electricity on sectoral (agriculture, industrial, and service) GDP in Pakistan. The findings reveal that electricity shortage is inversely proportional to the agricultural sector output, and that industrial sector output is adversely affected by electricity shortage and electricity load-shedding.

From the extant literature in the energy sector, most of the reviewed studies concentrated on the effect or causal relationship between energies consumption and economic growth. The trends in the consumptions of the various forms of energy were not considered in order to set a pace for future energy services that would be required. In addition, none of the studies looked at renewable sources of energy and the prospects in both short and long-runs. It is upon this premises that this study identified the gap in literatures it tend to cover by looking at the trends and contributions of various forms of energies to economic growth in Nigeria and the opportunities available in the renewable energies.

METHODOLOGY

This study used experimental and ex-post facto research designs. The initial design gives room for collections of relevant information from sources such as articles, journals, publications and books among others (Shrestha & Bhatta 2018). However, the later design allows for the use of secondary sources and records which completely eliminate the needs for enrichment of the data. The study sourced data from internationally recognized databases which include World Bank international energy agency (IEA) on the values (%GDP) and production of crude oil, natural gas, coal, hydro sub-energy sector from 1999 to 2020 which were analysed using stationary test, followed by co-integration and vector error correction model (VECM) to investigate the relationship between the non-stationary variables.

In presenting the model specification, the relationship that exists between the dependent variable (economic growth (EG)) and independent variable (energy sector (ES)) is as below:

$$EG = f(ES) \dots\dots\dots 1$$

The econometric representations are as below:

$$GDP = \alpha_0 + \alpha_1Coal + \alpha_2Crudeoil + \alpha_3Naturalgas + \alpha_4Hydro + \mu \dots\dots\dots 2$$

In carrying out the analysis, the Natural log values are used because of the size of the volumes of the data as presented in the function below:

$$LogGDP = \alpha_0 + \alpha_1LogCoal + \alpha_2LogCrudeoil + \alpha_3LogNaturalgas + \alpha_4LogHydro + \mu \dots\dots 3$$

Where: α_0 = intercept between *GDP* and *ES*; $\alpha_1, \alpha_2, \alpha_3$ and α_4 = slope of *Coal, Crudeoil, Naturalgas* and *Hydro*, μ = error term of the equation.

Table 1: Variable measurement

Variables	Measurement	Sources	Apriori expectation
GDP	GDP at current price	World Bank indicator (2021)	Dep. variable
Coal	Natural Log of Bituminous coal production	IEA database,(2021)	$\alpha_1 = +ve$
Crudeoil	Natural Log of Crude oil production	IEA database,(2021)	$\alpha_2 = +ve$
Naturalgas	Natural Log of Natural gas production	IEA database,(2021)	$\alpha_3 = +ve$
Hydro	Natural Log of Hydro-power production	IEA database,(2021)	$\alpha_4 = +ve$

Source: Researcher’s compilation (2022)

DATA ANALYSIS

The data analysis of the study is presented under the headings such as trend analysis, correlation analysis, unit root test of stationarity, co-integration test and vector error correction model.

Trend Analysis

The trend analysis in this study reveals the trend of energy production in Nigeria as shown in figure 1. Coal as form of energy production shows positive trajectory as there is a steading rising production from 2006 which is similar to production of natural gas as it is assumed that production is determined by the level of consumption and demands for the products. Contrarily, the trend of hydro-power production was galloping over the period under review while crude oil production has been nose-diving since 2011 and reaches its lowest ebb in 2020. This analysis clearly indicates that; the demand for Nigerian crude oil is on the decrease, the demand for natural gas and bituminous coal is on steady increase.

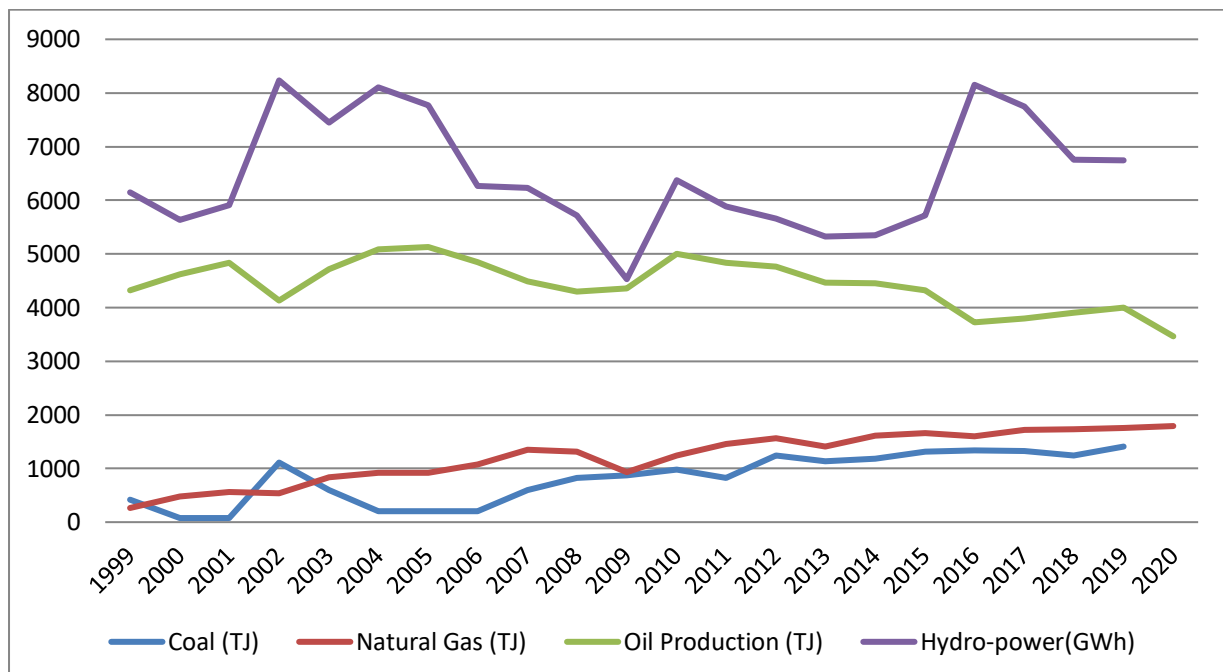


Figure 1: Trend analysis of energy sector production in Nigeria

Source: IEA, (2021)

Correlation Analysis

Correlation analysis in this study is presented to establish the relationship between GDP and the energy commodities variables (coal, crude oil, natural gas and hydro-power) by using

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Pearson correlation matrix of 2-tailed test at 0.05 level of significance (*). The table 3 reveals the analysis which indicates that GDP has positive and significant relationship with coal and crude oil productions but negative and insignificant relationship with Natural gas and hydro-power sub-sectors. However, this does not indicate what the relationship will be in the long-runs but instead what it was during the period under review.

Table 3: Correlation Analysis

Variables	<i>GDP</i>	<i>Coal</i>	<i>Crudeoil</i>	<i>Naturalgas</i>	<i>Hydro</i>
GDP	1.000				
Coal	0.802*	1.000			
Crudeoil	0.916*	0.780*	1.000		
Naturalgas	-0.373	-0.704*	-0.467	1.000	
Hydro	-0.302	0.018	-0.033	-0.157	1.000

Source: Researcher’s computation (2022)

Unit Root Test of Stationarity

The unit root results is carried out using augmented dickey-fuller (ADF) as shown in table 4 which revealed that all the variables considered are all stationary after the first difference except for coal that was stationary at level. This indicates that: test statistics at first difference is indeed greater than the value at 5% level of significance, thus, the variables are integrated of order I(1) and I(0). Therefore, co-integration tests cannot be used to determine for long term association among the variables in the model developed for this study. This is so because coal is stationary at 5% level and the co-integration tests as highlighted table 4 requires all variables to be stationary at first difference.

Table 4: Unit Root Test of Stationarity (ADF)

Variables	At Level	Prob.	At First Difference	Prob.	Order of Integration
GDP	0.17827	0.8171	-5.45161	0.0000	I (1)
Coal	-4.514671	0.0004	-	-	I (0)
Crudeoil	-2.671681	0.1726	-8.561713	0.0000	I (1)
Naturalgas	-2.562812	0.1005	-4.561571	0.0001	I (1)
Hydro	-0.871631	0.7163	-5.516813	0.0000	I (1)
Critical Values 5% level	-2.945842		-2.948404		

Source: Researcher’s computation (2022)

Co-integration Test Analysis

From the analysis above, it has been established that the variables are integrated of order I(1) and I(0). Therefore, to ascertain whether or not there is long term relationship among the variables in the model, the study used the auto-regressive distributed lag (ARDL) bounds test approach for the co-integration as shown in table 5. Based on the table, the null hypothesis of no long run relationship among the variables is rejected which implies that there is a long-run relationship among the variables. This is so because the estimated f-stat of 7.19271 calculated at N=4 (number of independent variables) exceeds the upper critical bound at 5% level of significance (i.e $f > 2$).

Table 5: Co-integration Test Analysis (ARDL)

Test statistics	Values	N
f-value	7.19271*	4
Critical value bounds		
Significance value	I(0) bound	I(1) bound
5%	2.41	3.98

*** Indicates f-stat is above upper bound value at 5% level of significance**

Source: Researcher’s (2022)

Error Correction Model

In the final analysis, the lagged coefficient of GDP of the error correction model as shown in table 6 is the error correction term. The coefficient of model which is (-0.3191682) showed a weak path of adjustment which implies that only (31.9%) of short-run disequilibrium in GDP is corrected in the long run. Similarly, the R-squared and adjusted R-squared result revealed that 88.62% of the variation in GDP is explained by energy sector production (i.e coal, crude oil, natural gas and hydro-power) in Nigeria. The Durbin-Watson stat value of 2.06 verifies that no serial correlations in the model.

Table 6: Error Correction Model Analysis

Variables	Coefficient	Std. Error	t statistics	Probability
D(coal)	6.891891	3.617281	1.23313	0.28171
D(Crudeoil)	-0.152891	0.056191	-0.67193	0.56184
D(Naturalgas)	-0.067163	0.009818	-0.56183	0.61791
D(Hydro)	-0.027691	0.007812	-0.47163	0.09371
LNGDP	-0.319168	0.076991	2.342444	0.046172*
R-squared	0.91732	Mean dependent var	15.70895	R-squared
Adjusted R-squared	0.88624	S.D. dependent var	0.634359	Adjusted R-squared
S.E. of regression	0.07458	Akaike info criterion	-2.493768	S.E. of regression
Sum Squared Resid	0.06061	Schwarz criterion	-1.632143	Sum Squared Resid
Log likelihood	65.7812	Hannan-Quinn criter.	-2.203857	Log likelihood
F statistics	289.819	Durbin-Watson stat	2.063976	F statistics
Prob (F statistics)	0.0000			Prob (F statistics)

*indicate significance at 5%

Source: Researcher's (2022)

Test of Hypotheses

The hypotheses are tested using correlation analysis as shown in table 3 above.

Hypotheses One

This statistics ($r = 0.802$; $p = 0.000$) indicates that the null hypothesis which states that “Productive activities in coal energy sub-sector have no significant relationship with gross domestic product of Nigeria” should be rejected. This is an indication that productive activities in the coal energy sub-sector have very strong positive relationship (80.2%) with the GDP.

Hypotheses Two

This statistics ($r = 0.916$; $p = 0.000$) indicates that the null hypothesis which states that “Productive activities in crude oil energy sub-sector have no significant relationship with gross domestic product of Nigeria” should be rejected. This is an indication that productive activities in the crude oil energy sub-sector have very strong positive relationship (91.6%) with the GDP.

Hypotheses Three

This statistics ($r = -0.373$; $p = 0.088$) indicates that the null hypothesis which states that “Productive activities in natural gas energy sub-sector have no significant relationship with gross domestic product of Nigeria” is accepted. There is an indication that productive activities in the natural gas energy sub-sector have weak negative relationship (-37.3%) with the GDP.

Hypotheses Four

This statistics ($r = -0.302$; $p = 0.172$) indicates that the null hypothesis which states that “Productive activities in hydro energy sub-sector have no significant relationship with gross domestic product of Nigeria” is accepted. There is an indication that productive activities in the hydro energy sub-sector have weak negative relationship (-30.2%) with the GDP.

FINDINGS AND DISCUSSION

The finding of this study clearly indicates that the energy sector has relationship with economic growth in Nigeria. Productive activities in the various commodity markets in the sector play roles on the gross domestic product of the country in various ways. Firstly, this study shows that productive activities in the coal energy sub-sector have effect on the GDP which agrees with the finding of (Rehman and Deyuan 2018) which also positive relationship. Secondly, according to this study, productive activities in the crude oil energy sub-sector have very strong positive relationship with GDP and this finding is supported by (Alao & Awodele 2018; Ogbonna, Idenyi & Nick 2016). Thirdly, it is revealed that productive activities in the natural gas energy sub-sector have inverse effect on the GDP which negates the position of (Olagunji, *et al.*, 2021; Alao & Awodele 2018). Lastly, this study posits that productive activities in the hydro energy sub-sector have weak and inverse effect on GDP.

Furthermore, Nigeria has being an active global player in the non-renewable energy markets such as crude oil, natural and bituminous coal and has not being a significant player in the renewable energy as data only data only exist for hydro-power energy (IEA, 2021; Akorede, *et al.*, 2017; Akuru & Okoro, 2014). Nigeria basic involvement in the non-renewable energy may not be sustainable environmentally and economically going by the global demand/production as shown in figure1 and 2. However, the economic prosperity in the energy sector moving forward is with the renewables such as solar energy, biomass, fossils, industrial wastes, wind and geothermal (Justin, *et al.*, 2022; Adewuyi, *et al.*, 2019; Aliyu, Modu & Tan, 2017).

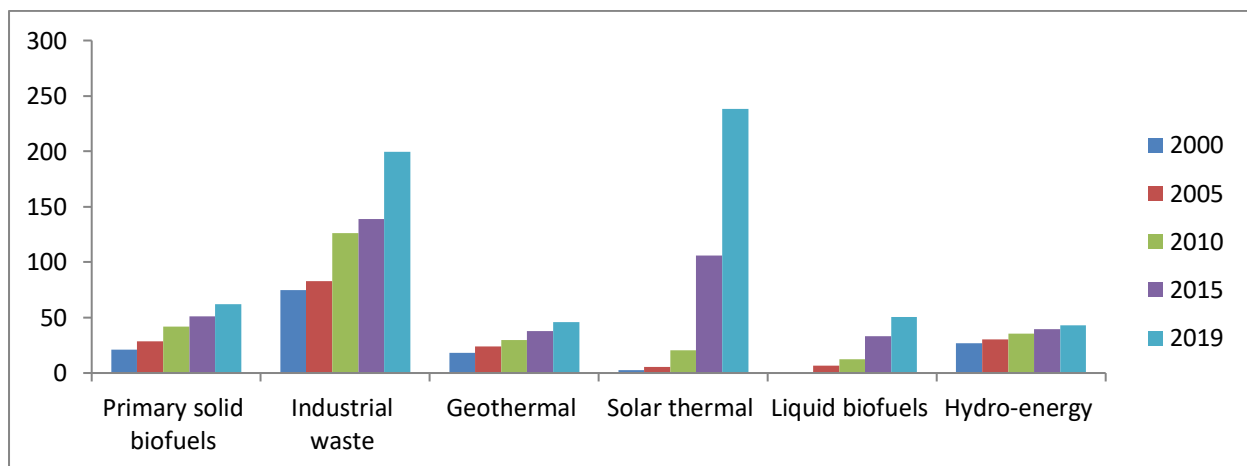


Figure 2: World Renewable Energy Production

Source: IEA, (2021)

The figure 2 indicates that there is global increasingly significant production/demand in renewable energy sources such as from solar thermal and industrial wastes and, steady increase in primary solid and liquid biofuels while there is no appreciable changes with respect to hydro energy from 2000 – 2019.

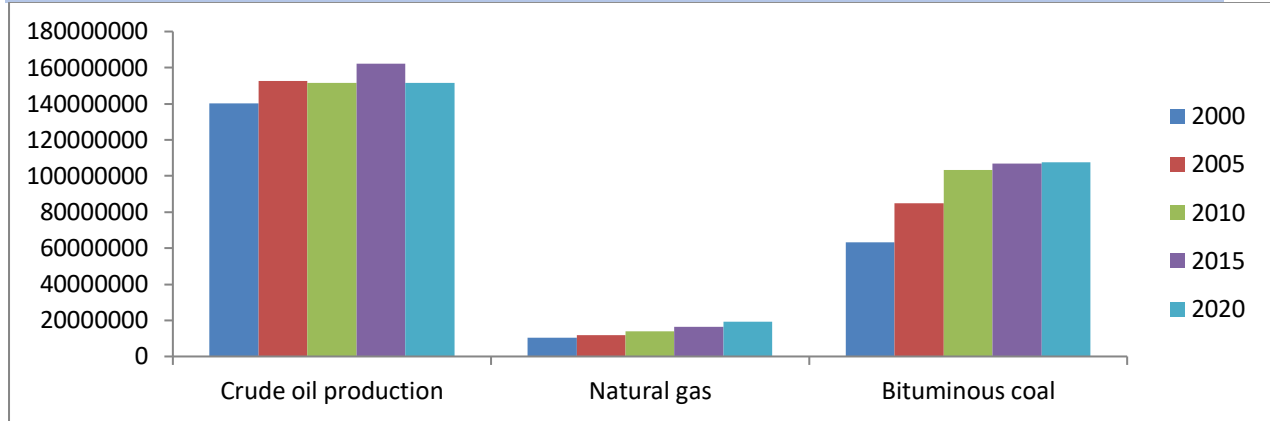


Figure 2: World Renewable Energy Production

Source: IEA, (2021)

Contrary to the above, the figure 3 indicates a global decreasing significance in production/demand in non-renewable energy sources especially the crude oil after its greatest demand in 2015. Also, bituminous coal did not show any appreciable changes in its demand/production as the case maybe.

CONCLUSION

The findings of the study indicates a decreasing marginal contributions of non-renewable energy sources from crude oil, coal and hydro energy sources to economic prosperity in Nigeria despite their positive significance. However, the Natural gas still shows some relative significant potential for the future. Nigeria has not exploit the potentials it has in renewable energies as alternative for economic prosperity and energy supply for commercial and non-commercial productive activities in the country. Nigeria has a massive solar and wind energy potential unutilized as it is positioned geographically close to the line of equator and can establish a full-scale solar powered energy-driven economy. Also, the abundant human and material resources offer it ability to thrive in energy sources from industrial and commercial, biomass, fossils wastes which could be generated from agricultural, industrial and even domestic activities.

The study therefore recommends for a shift towards renewable energy components as it shows increasing marginal contributions to economic prosperity not just in Nigeria but globally in addition to its safety and environmental sustainability. This can be achieved by taken advantage of the abundant wind and solar energy resources that nature endowed it with. Also, the country should use proceeds from the no longer favoured crude oil and coal production to establish and manage other sources of energy such as industrial waste conversion industries, solar, thermal and wind power generation plants.

References

- Abdulhameed, B. O., Benyoh, E. K., & Jong, W. R. (2019), Validating the techno-economic and environmental sustainability of solar PV technology in Nigeria using RETScreen Experts to assess its viability, *Elsevier Journal on Sustainable Energy Technologies and Assessments*, 36(1), 1-11.
- Adewuyi, O. B., Shigenobu, R., Senjyu, T., Lotfy, M. E., & Howlader, A. M. (2019) Multi objective mix generation planning considering utility-scale solar PV system and voltage stability: Nigerian case study, *Electrical Power System, Electric Power Systems Research*, 168, 269 - 282.

- Akorede, M. F., Ibrahim, O., Amuda, S. A., Otuoze, A. O., & Olufeagba, B. J. (2017), Current Status and Outlook of Renewable Energy Development in Nigeria, *Nigerian Journal of Technology (NIJOTECH)*, 36(1), 196 – 212.
- Akuru , U. B., & Okoro, O. I. (2014) Renewable energy investment in Nigeria: A review of the Renewable Energy Master Plan. *Journal of Energy in Southern Africa*, 25 (3): 67–73.
- Alao, O., & Awodele, K. (2018) An overview of the Nigerian power sector, the challenges of its national grid and off-grid development as a proposed solution. *2018 IEEE PES/IAS PowerAfrica*, accessed on February 18th, 2022 from <http://dx.doi.org/10.1109/PowerAfrica.2018.8521154>
- Aliyu, A. K., Modu, B., & Tan, C. W. (2017). A Review of Renewable Energy Development in Africa: A focus in South Africa, Egypt and Nigeria *Renewable and Sustainable Energy Reviews*, 81(2), 2502-2518.
- James, T., Ndem, B., Ujong, O. & Ihuoma, M. (2021) Electric power deficit and economic growth in Nigeria: A sectoral analysis, *International Journal of Energy Economics and Policy*, 11(6); 508-516.
- Justin U, Odo, K., Oluka, L. & Salami, K. (2022) A Systematic Review on the Renewable Energy Development, Policies and Challenges in Nigeria with an International Perspective and Public Opinions, *International Journal of Renewable Energy Development* 11(1): 287-308.
- Khobai, H., Mugano, G. & Le Roux, P. (2017), Exploring the nexus of electricity supply and economic growth in South Africa. *Economic Research Southern Africa (ERSA) Working Paper*, 656, 1-25.
- Nazlioglu, S., Kayhan, S., & Adiguzel, U. (2014), Electricity consumption and economic growth in Turkey: Cointegration, linear and nonlinear granger causality. *Energy Sources, Part B: Economics, Planning, and Policy*, 9(4), 315-324.
- Ogbonna, O.S., Idenyi, O.S. & Nick, A. (2016), Power generation capacity and economic growth in Nigeria: A causality approach, *European Journal of Business and Management*, 8(32), 74-90.
- Okorie, D.I. & Manu, S.A. (2016), Electricity consumption and economic growth: The Nigerian Case, *International Journal of Current Research*, 8(12), 44008-44017.
- Olagunju, O. O., Onuoha, B. Saibu, O., Eneanya, N. & Akintunde, A. (2021), Appraisal of Nigeria's energy planning: prospects for sustainable development, available and accessed on February 16th, 2022 from available at: <https://ssrn.com/abstract=3693269>.
- Rehman, A. & Deyuan, Z. (2018), Investigating the linkage between economic growth, electricity access, energy use, and population growth in Pakistan, *Applied Sciences*, 8(12), 24-42.
- Renewable Energy World Report (2017), *Matching Nigeria's energy supply to demand in the era of climate change*. Available from: <https://www.renewableenergy-world.com/2017/05/30/matchingnigeria>.
- Shrestha, M.B. & Bhatta, G.R. (2018), Selecting appropriate methodological framework for time series data analysis, *The Journal of Finance and Data Science*, 4(1), 71-89.

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Appendices: Database

Year	GDP (N'000)	Coal (TJ)	Natural Gas (TJ)	Oil Production (TJ)	Hydro-power (GWh)
1999	59372613485.66	413	264110	4318977	6148
2000	69448756932.58	77	473470	4625284	5628
2001	74030364472.05	77	566200	4829725	5909
2002	95385819320.57	1109	539600	4134800	8234
2003	104911947834.12	593	837147	4712369	7448
2004	136385979322.44	206	914643	5080849	8108
2005	176134087150.34	206	920011	5128328	7768
2006	236103982431.64	206	1074961	4852208	6263
2007	275625684968.62	593	1345046	4482681	6227
2008	339476215683.59	826	1311689	4291428	5721
2009	295008767295.04	877	927544	4356198	4529
2010	361456622215.72	980	1236539	5002054	6374
2011	404993594133.58	826	1456954	4835712	5883
2012	455501524575.50	1238	1565634	4760559	5659
2013	508692961937.49	1135	1412306	4468655	5326
2014	546676374567.72	1187	1611963	4457770	5346
2015	486803295097.89	1316	1660131	4317763	5721
2016	404650006428.61	1342	1603600	3722107	8151
2017	375746469538.67	1322	1713800	3790254	7747
2018	397190484464.31	1245	1736600	3898636	6758
2019	448120428858.77	1409	1754840	4000197	6745
2020	432293776262.40		1791168	3463506	

Sources: World Bank Indicator, (2021): International Energy Agency (2021)

Global Renewable Energy Production

Renewable Energy	2000	2005	2010	2015	2019
Primary solid biofuels (TJ)	208994	284689	421571	509929	623856
Industrial waste (TJ)	74986	82713	125941	138693	199770
Geothermal (TJ)	18314	23811	29536	37693	45984
Solar thermal (TJ)	24	55	206	1062	2385
Liquid biofuels (TJ)	4931	6616	12393	33046	50648
Hydro-energy (KWh)	2695584	3019330	3535864	3981698	4328966

Source: International Energy Agency (2021)

Global Non-Renewable Energy Production

Non-Renewable Energy	2000	2005	2010	2015	2020
Crude oil production (TJ)	140028014	152742607	151456893	162222188	151558678
Natural gas (TJ)	10444537	11930474	14038920	16453474	19137387
Bituminous coal (TJ)	63155067	84720244	103180166	106962488	107692503

Source: International Energy Agency (2021)

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Correlations

		GDP	Coal	Crudeoil	Naturalgas	Hydro
GDP	Pearson Correlation	1	.802**	.916**	-.373	-.302
	Sig. (2-tailed)		.000	.000	.088	.172
	N	22	22	22	22	22
Coal	Pearson Correlation	.802**	1	.780**	-.704**	.018
	Sig. (2-tailed)	.000		.000	.000	.937
	N	22	22	22	22	22
Crudeoil	Pearson Correlation	.916**	.780**	1	-.467*	-.033
	Sig. (2-tailed)	.000	.000		.029	.882
	N	22	22	22	22	22
Naturalgas	Pearson Correlation	-.373	-.704**	-.467*	1	-.157
	Sig. (2-tailed)	.088	.000	.029		.486
	N	22	22	22	22	22
Hydro	Pearson Correlation	-.302	.018	-.033	-.157	1
	Sig. (2-tailed)	.172	.937	.882	.486	
	N	22	22	22	22	22

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

**ECONOMIC ANALYSIS OF CROP PRODUCTION AND FOOD SUSTAINABILITY
IN NIGERIA (2001-2020)**

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Abstract

Crop production in Nigeria is one of the economic activities that are targeted towards achieving sufficient food production and consumption in the country. This is because, sufficiency in food production leads to food sustainability and possibility of exportation of excess production that are not consumed within the country. This study therefore seeks to determine the effect of crop production on food sustainability in Nigeria between 2000 and 2020. In order to achieve this aim, this study utilized variables which include crop production index, food production index and net food export index which were obtained from World Bank database across the period under review. The study shows a trend analysis and used both correlation and multiple regression analyses to reveal the causal relationship and the effect of crop production on food sustainability in Nigeria. The findings reveal that there is a significant positive relationship among the variables; and that crop production index and net export index have statistical positive but insignificant effect on food production index in Nigeria. This led to the conclusion that eventhough crop production may lead to food sustainability, the production volume and rate have not provided food sufficiency in Nigeria. It is therefore recommended that government should boost crop production through its economic policies that encourages and support local production and also give incentives for food manufacturing companies to increase production and export of finished goods.

Keywords: Crop production index, food production index, food export index, food import index, net export index

INTRODUCTION

Crop production in Nigeria is one of the economic activities that are targeted towards achieving sufficient food production and consumption in the country (Adebayo & Olagunju 2015). This is because, sufficiency in food production leads to food sustainability and possibility of exportation of excess production that are not consumed within the country. It is a general and very common fact in Nigeria that before the discovery the oil in 1957 and the subsequent oil boom through the 1970s and 1980s, the mainstay of the economy was

agriculture and other activities in its value chain (Obuks & Banake 2015). However, the crude oil exploration resulted to a paradigm shift from productive agricultural activities to petroleum, thereby reducing the multifunctional relevance of the agricultural sector especially the food and crop production to the background (Adenle, Weding & Azadi 2019). This situation has led to dwindling nature in the crop and food production indexes thereby distorting the food import and export balance that existed in the pre-oil economy.

Despite the significant foreign earnings reserves derived from the said oil sector, and plunging same into the economy, poverty, hunger and food insufficiency remain on the increase trajectory in the country (Nwanpka, 2017). This necessitated various government policies and instruments with the view to diversifying the economy and refocuses it on crop and food production in order to attain food sustainability for economic growth and food security in the country among others (Felix & Basse 2018). This is because the natural, human and materials resources favour Nigeria to be able to ensure food sustainability for its teeming population and export excesses for foreign earnings that will stimulates broader economic development (Ndor, Obadiah & Nasir 2020).

There is no doubt of achieving this height however, there is a problem of commitment on the sides of the governments both at state and federal levels to create interests and enabling environment to ensure a return into effective and efficient agricultural system that will guarantee the desired food sustainability and production in the country. This study therefore considers the effect of crop production on food sustainability in Nigeria between 2000 and 2020. In order to achieve this, the study utilized variables which include crop production index, food production index and net food export index in Nigeria across this period under review.

Research Objectives

The main objective of this study is to examine the effect of crop production on food sustainability in Nigeria. The specific objectives therefore are:

- i. to examine the effect of crop production in Nigeria on food sustainability in the country
- ii. to analyze the effect of the net food export into Nigeria on food sustainability in the country

Hypotheses of the Study

In this study, the statements of hypotheses to be tested are stated in null forms as below:

H₀₁: Crop production has no significant positive effect on food sustainability in Nigeria.

H₀₂: Net food export has no significant positive effect on food sustainability in Nigeria.

CONCEPTUAL REVIEW

The concept reviewed in this study include, crop production and food sustainability. This is because they are the basic concepts used in this study

Crop Production

Crop production comprises food crops which are considered fit for human consumption with certain nutritional values nutritive. However, certain food without nutritional values yet consumed by human such as coffee and tea are still inclusive in crop production. Omodero (2021) considers that crop production does necessarily translate into food availability with respect to quality and quantity but instead, it is to be evaluated from the position of suitability

for nutritive and healthy consumption when it comes to hygiene and safety. The crop production, consumption costs and market forces often determine crop availability (Jerzak & Smiglak-Krajewska 2020).

Food Sustainability

Food sustainability according to Gassner, Harris, Mausch, Terheggen, Lopes, Finlayson and Dobie (2019) is a developing approach in agricultural science that promotes the social and economic benefits for the people now without putting at risk the chances or capacity of the future generation to fulfilling their proper food demands and in doing so, without causing harms to the ecological process. This implies that any pollution or degradation of the social, environment and/or ecological processes in the cause of food production render it not sustainable in long-terms; rather the processes must be given top priority (Adenle, Weding & Azadi 2019). One approach or strategy through which food sustainability can be attained is through sustainable effective and efficient farming system. This includes being sustainable in crop production, sustainable in domestic and rural economy and also being sustainable in the ecological and environmental agricultural system (Obuks & Banake 2015).

Food sustainability ensures the minimization of waste and portrays less unfavourable impact to the environment while retaining its still profitability (Pawlak & Kołodziejczak 2020). These food production systems are produced to be friendly to the ecosystem and environment. The eco-friendly environment could be achieved by reducing or completely eliminating the use of disastrous or hazardous substances during the period of crop production and/or processing such as the use of synthetic compound fertilizer, organophosphates and additive to farm animal feeds etc (Gasner et al., 2019). These substances also have the potentials to damage the environment, human and animal health and therefore need to be avoided (Omodero, 2021).

LITERATURE REVIEW

Omodero (2021) examines the impact of food production and agricultural outputs on poverty rate in Nigeria. The study used data sourced from internationally database spanning across 11 years from 2009 to 2019. In the study, necessary diagnostic tests and regression analysis were carried out which revealed that the food production index has positive and statistically significant impacts on poverty reduction, while on the other hand, agricultural output has an inconsequential negative impact on poverty reduction. It was therefore recommended that agricultural infrastructure such as sufficient power supply, modern farming equipment, storage facilities, credit facilities and large markets should be provided to ensure sustainable food production.

In another vein, Ndor, Obadiah and Nasir (2020) investigate the myriads of challenges that constitute a setback for the progression of agricultural sector activities in Nigeria and reveal that some of these undesirable challenges include the negativities of climate change and the current deliberate destruction in traditional system of farming. It was therefore concluded that these problems possess the tendencies to adversely affect food production, food security and food sustainability in the country. One strategy that this study developed as a solution to the challenges is the practice of sustainable crop production.

Kadir and Amalia (2020) assessed the extent of agricultural sector contributions to the performance of non-agricultural sectors in the rural communities and their combined effect on poverty in the areas. The study collected data across 17 years from 2002 to 2018 and analyzed them statistically by applying simultaneous equations and linear regression model. It was evident that agricultural activities enhanced non-agricultural sectors while the sectors alleviated poverty to some extent. Thus, this gives the indication that the agricultural sector

drives the economy towards growth, and also serves as an effective mechanism to reducing poverty in the rural communities.

In addition, Omodero and Amah (2019) examine the contributions of components of agriculture on consumption cost reductions in Nigeria by utilizing data from 1981 to 2017 which were analysed with the use of ordinary least squares method. It was revealed that livestock and crop production have positive and statistically valid impact on lowering consumption cost. The study also simultaneously revealed that fishery had a negative influence, but forestry was not significantly harmful to its consumption. Similarly, John and Dankawu (2018) carried out a study that spanned from 1981 to 2014 and used the combination of principal component analysis and ‘vector error correction model’ to analyze the effect of agriculture on poverty reduction in Nigeria. It was discovered that shocks on all agriculture components in Nigeria had a sufficient influence on poverty reduction.

In a different research, Ayodeji and Oladokun (2018) examine the effect of agricultural productivity on poverty alleviation in Nigeria by using the ‘Johansen co-integration test’ and multiple regression analysis. In the study, they covered the period from 2000 to 2016 and reveal that the budgetary allocations of government and financial institutions’ credit facilities to agricultural sector were not sufficient to boost the sector to the level that it could significantly reduce poverty in Nigeria. Against expectation, the study showed that microfinance banks credits to agriculture and the food production index positively impacted on poverty and hunger reduction in Nigeria.

Based on the literature reviewed, there is an existential gap in literature that is yet to be explored. This area however involved how the crop production and the net food importation have affected food sustainability. This study focusing on these variables in Nigeria, and covering a period of 2001 to 2021, further covers geographical and periodical gap which also exist in the body of literature. It is based on these gaps in knowledge that this study on the economic analysis of crop production and food sustainability in Nigeria is premised.

METHODOLOGY

In this study, ex-post facto and experimental research designs were utilized. The experimental design affords the collections relevant materials from several sources, for instance, journal articles, books and publication in gazettes and magazines among others. On the other hand, the ex-post facto design supports the use of secondary validated data and records which reduced the needs for manipulation of the data to be used for the study. The study utilized secondary data spreading across 2000 to 2020. The data were collected from the World Bank database. The study conducted abnormal data cleaning processes which include screening of data, investigative check and treatment of missing values.

At the screening stage, the study eliminated outliers, excess data inconsistent distributions and other inferences. The study further used statistical package (SPSS v. 23.0), excel sheet and descriptive statistical tools to select the data from 2000-2020. In addition, this study conducted some diagnostic analyses and tests to ensure the suitability of the model, normality and data set. The treatment phase includes elimination of wrong data and performing extrapolation for missing values.

Model Specification

The functional relationship between the dependent variable (food sustainability (FS)) and independent variable (crop production (CP)) in addition to the mediating variable (net food export (NFE)) is presented as below:

$$FS = f(CP, NFE) \dots\dots\dots 1$$

The econometric function is therefore presented as:

$$FS = \alpha_0 + \alpha_1 CP + \alpha_2 NFE + \mu \dots\dots\dots 2$$

Where: α_0 = intercept of the association between FS and CP; α_1 and α_2 = slope of CP and NFE, μ = error term of the equation.

Table 1: Variable measurement

Var.	Measurement	Authors	Apriori expectation
FS	Food production index	Omodero, C. (2021)	
CP	Crop production index	Omodero, C. (2021)	$\alpha_1 = +ve$
NFE	Food export index – Food import index	(Jerzak & Smiglak 2020)	$\alpha_2 = -ve$

Source: Researcher’s compilation (2022)

Methods of Data Analysis

This study conducts several analyses which include; trend analysis to show the direction of the data cross the period under review; descriptive statistics to summarize the data; normality test to indicate the level of balance of the data; correlation analysis to shows the direction and strength of the relationship between the variables and; multiple regression analysis to test the hypotheses of the study.

ANALYSIS OF DATA

Trend Analysis

The trend shows the production index which measures the changes observed in the production of given commodity in given year in relation to the base year. Therefore the crop and food productions indexes in Nigeria between 2000 and 2020 shows a similar trend as shown in figures 1 and 2 respectively. These trends have not shown appreciable positive trajectory which indicates that the level of increase in the productions crop and food in the country across the years has remained abysmally low.

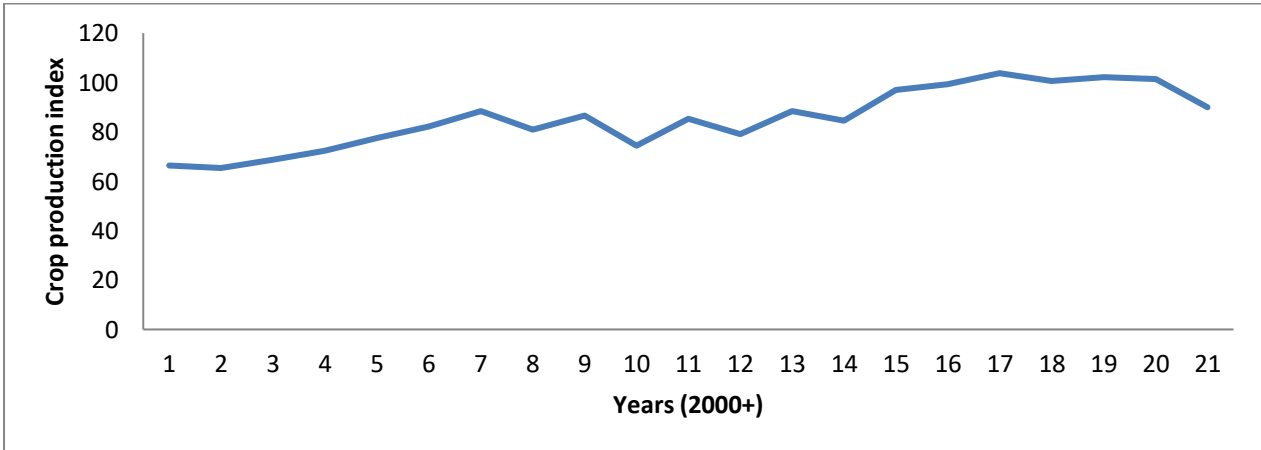


Fig. 1: Graph of the crop production index in Nigeria (2000-2020)

Source: Researcher’s compilation (2022)

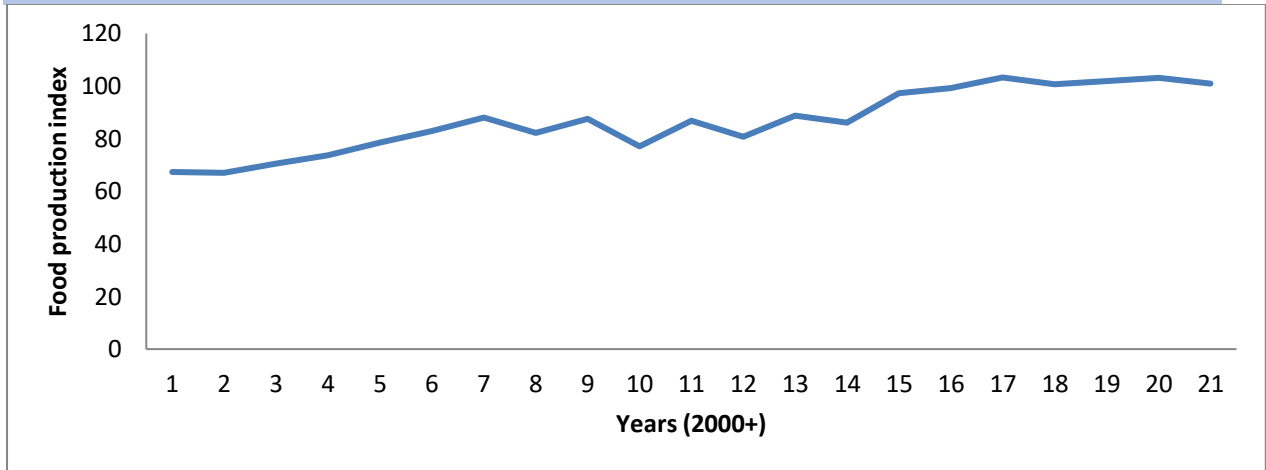


Fig. 2: Graph of the food production index in Nigeria (2000-2020)

Source: Researcher’s compilation (2022)

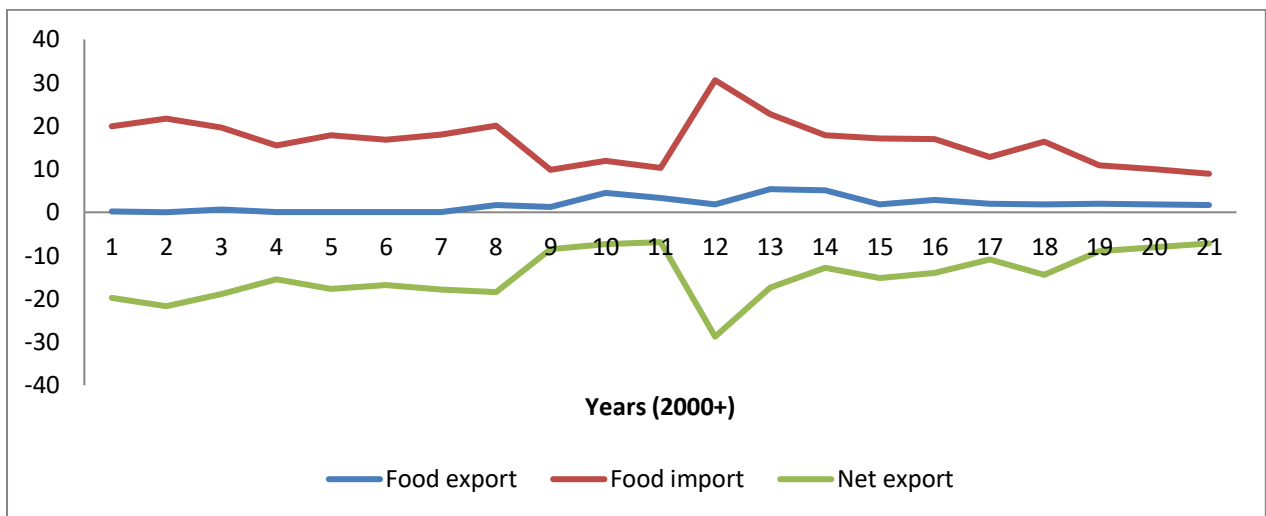


Fig. 3: Graph of Net food export index in Nigeria (2000-2020)

Source: Researcher’s compilation (2022)

Furthermore, food sustainability within the country may not necessarily depend on the crop production within the country but the relationship between the food import and export. The analysis indicates that the food import index in Nigeria between the periods under review is higher than the food export index. This is an attempt to ensure increasing food availability in the country which gave the net export index to be completely negative as shown in figure 3.

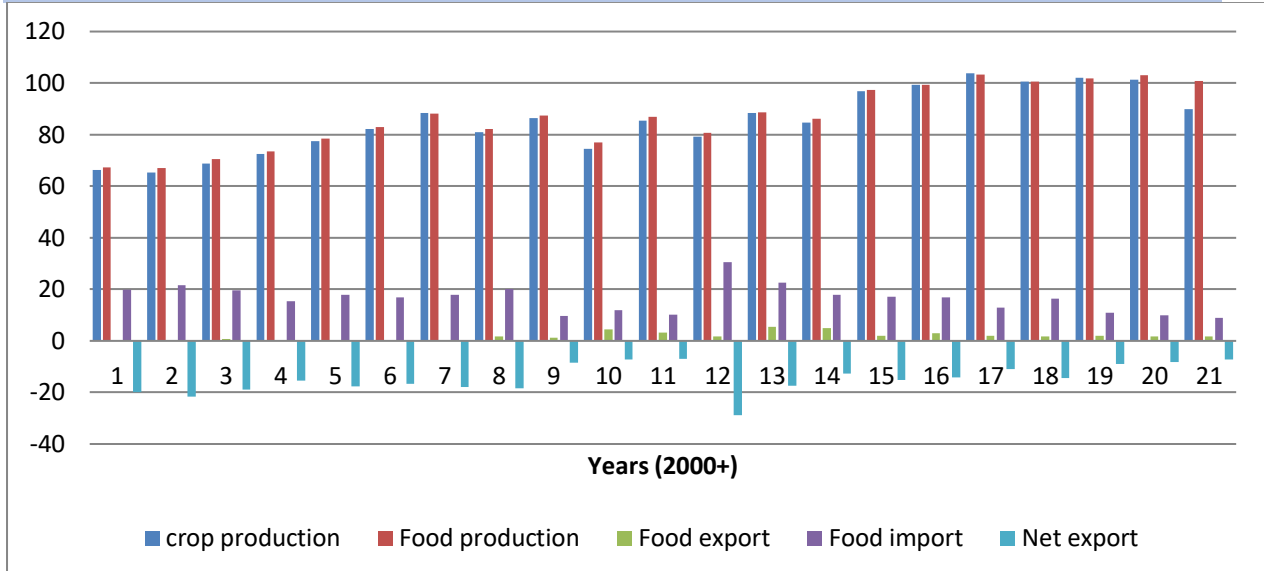


Fig. 4: Graph of food sustainability in Nigeria (2000-2020)
Source: Researcher’s compilation (2022)

The figure 4 summaries the food production and food availability which indicate that both crop and food productions indexes are always at per across the period. The food exportation index is very low compare with the food importation index which makes the net food export index to be negative. This is an indication that the country is not earning aggregately from food export as the food import completely outweigh the former.

Descriptive statistics

The descriptive statistics analysis of the data reveals that the data is consistence between 2000 and 2020 as shown by the standard deviation in relation to the mean. Also, the negative skewness and kurtosis values indicates that all the variables crop production index, food sustainability index and net food export index are likely to move in the downward trend than otherwise as shown in table 3.

Table 2: Descriptive statistics

Variables	Min.	Max.	Mean	Std Deviation	Skewness	Kurtosis
Crop production index	65.37	103.77	85.643	12.117	-0.102	-1.052
Food production index	67.04	103.29	86.841	12.012	-0.099	-1.149
Net food export index	-28.77	-6.91	-14.647	5.659	-0.458	0.299

Source: Researcher’s computation (2022)

Multicollinearity test

The multicollinearity test of the data was carried out using Variance Inflation Factor (VIF) as shown in table 3. The VIF is 1.315 which is less than 10 benchmarks (Gujarati & Porter 2009) indicates that there is no multicollinearity between the explanatory variables used in this study.

Table 3: Multicollinearity test

Tolerance	VIF	1/VIF
0.760	1.315	0.760

Source: Researcher’s computation (2022)

Correlation analysis

The correlation analysis of this study is carried out using Pearson correlation matrix at 0.05 level of significance (*) in a 2-tailed test which reveals that food production index has very strong (0.979) positive relationship with crop production index which is an indication that increase in crop production would significant affect food production index as shown in table 4. However, net food import index has average (0.542) positive and significant association with food production index

Table 4: Correlation analysis

	<i>CPI</i>	<i>FPI</i>	<i>NFE</i>
<i>CPI</i>	1.000	0.979*	0.490*
<i>FPI</i>	0.979*	1.000	0.542*
<i>NFE</i>	0.490*	0.542*	1.000
	0.024	0.011	

Source: Researcher’s computation (2022)

Multiple regression analysis and discussion

The result of the regression analysis shows that $R = 0.981$ which indicates that the correlation (R) value is 98.1% which implies a very stable relationship among the variables, i.e food sustainability index, crop production index and net food export index. Also R^2 which is the coefficient of determination gives a value of 0.963 which is also very high. This is an indication that 96.3% of the factors affecting food production index are captured in the model with only 3.7% variation outside the model. In addition, the Durbin-Watson of 1.201, shows that there is no auto-correlation among the variables. Finally, the f-statistic has a value of 231.986 (i.e $f > 2$) and the p-value of 0.000 (i.e $p < 0.05$) indicates that the model is statistically significant, and that CPI and NFI jointly affect FPI.

Table 5: Multiple regression analysis

Model	R	R-Sq.	D-W	Df	F	p-value
1	0.981	0.963	1.201	20	231.986	0.000 ^b
		B	Std. Error	t	Sig.	
(Constant)		9.727	5.445	1.786	0.091	
Crop production index		0.930	0.052	17.962	0.000	
Net food export index		0.174	0.111	1.573	0.133	

Source: Researcher’s computation (2022)

In addition, the t-statistics values are used to explain the effect of the individual variables, i.e CPI and NFI, on FPI. The result in table 5 further shows that CPI has a t-statistic of 17.962 with p-value of 0.000 which indicates that CPI has a positive and significant effect on FPI. This is an indication that the “Crop production has significant positive effect on food sustainability in Nigeria” (i.e H_0 is rejected). Thus, this result is supported by the findings of (Omederu, 2021; Ayodeji and Oladokun, 2018) in their study using agricultural productivity components. The two studies showed that crop production is significantly relevant in reducing poverty and consumption cost, respectively.

The implication of the findings of this study presents that food sustainability which is function of food production index is significantly affected by the amount of crop production. This findings is agreed upon as shown by the studies of (Adenle, Weding and Azadi 2019; Ayodeji and Oladokun 2018) which also revealed that increase in food and crop production will guarantee food security and set the country on the path of economic prosperity.

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Also, NFE has t-statistic of 1.573 and with p-value of 0.133 which indicates that NFI has a positive but statistically insignificant effect on FPI. This indicates that “Net food export has no significant positive effect on food sustainability in Nigeria” (i.e H_0 is accepted). This study further presents that food importation in Nigeria completely outweighed food exportation from the country, and this affects the balance of trade in areas of commodity market which resulted in negative net food export. This situation has the tendency to contribute to food sustainability within country but at the moment has no significant effect which agrees with the findings of similar studies (Brunori, et al., 2020; Kadir & Amalia 2020; Ndor, Obadiah & Nasir, 2020).

CONCLUSION

This study reveals that eventhough crop production may lead to food sustainability in Nigeria, the current production volume and rate have not provided food sufficiency in Nigeria which has led to over-dependence on food importation. The net food exportation of the country is currently and consistently on the negative over the period which had also affected the economy negatively as the currently has negative balance of trade in the food and commodity market. There is therefore the need to boost crop production with the aim to providing food sustainability and possible export of food and commodity products. In order to achieve this, it is therefore recommended that government should boost crop production through its economic policies that encourage and support local production and also give incentives for food manufacturing companies to increase production and export of finished goods.

References

- Adebayo, O. and Olagunju K. (2015). *Impact of Agricultural innovation on improved livelihood and productivity outcomes among small holder farmers in Rural Nigeria*, A paper prepared for presentation at the 5th MSM Annual Research conference. Managing African Agriculture: Markets, Linkages and Rural Economic Development, 4th September. MSM, Maastrichi. The Netherlands.
- Adenle, A. A., Weding, K. & Azadi, H. (2019), Sustainable agriculture and food security in Africa: The role of innovative technologies and international organizations. *Technol. Soc.*, 58, 1–17.
- Ayodeji, E. A., & Oladokun, B. S. (2018), Agricultural productivity and poverty reduction in Nigeria (2000-2016), *International Journal of Innovative Research & Development*, 7(9): 330-338.
- Brunori, G., Branca, G. Cembalo, L. D’Haese, M. & Dries, L. (2020) Agricultural and Food Economics: The challenge of sustainability, *Agricultural and Food Economics* 8(12), 1-12.
- Eseyin, O., Toluyemi, S. & Oni, O. (2016), Investment in agricultural sector: Implication for poverty reduction in Nigeria (1985-2012) *American Journal of Business and Society*, 1(3): 118-128.
- Felix E. O. & Basse, E. A. (2018) Agriculture Promotion Policy 2016-2020 and Rural Development in Nigeria: Challenges and Prospects, *Journal of Humanities and Social Science*; 23(2): Ver. 4-24.
- Food and Agricultural Organization (FAO, 2019), Food Production Index (2004-2006=100), Food and Agriculture Organization, Electronic files, accessed on 12 February, 2022 from website <<http://www.fao.org/waicent/faostat/agricult/indice.htm>>
- Gassner, A., Harris, D., Mausch, K., Terheggen, A., Lopes, C., Finlayson, R. & Dobie, P. (2019), Poverty eradication and food security through agriculture in Africa: Rethinking objectives and entry points, *Outlook on Agriculture*, 48(4): 309-315.
- Gujarati, D.N. and Porter, D.C. (2009) *Basic Econometrics* (5th Ed.). Boston: McGraw-Hill Irwin. ISBN 978-0-07- 337577-9

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

- Jerzak, M.A. & Smiglak-Krajewska, M. (2020), Globalization of the market for vegetable protein feed and its impact on sustainable agricultural development and food security in EU countries illustrated by the example of Poland, *Sustainability* 12, 888.
- John, M.A. & Dankawu, M.U. (2018), Effect of agriculture on poverty reduction in Nigeria: A Multifaceted approach using principal component analysis. *IOSR Journal of Humanities and Social Science*, 23(6): 35-43.
- Kadir, K. & Amalia, R. (2020), Economic growth and poverty reduction: The role of the Agricultural sector in rural Indonesia, A paper presented at the Seventh *International Conference on Agricultural Statistics. ICAS VII Rome*, 26-28 October
- Ndor, E., Obadiah, A. & Nasir, U. (2020) A review of sustainable agricultural development and economic growth: Nigerian experience, *World Journal of Advanced Research and Reviews*, 08(01), 019–025.
- Nwankpa, N. N. (2017) Sustainable agricultural development in Nigeria: A way out of hunger and poverty, *European Journal of Sustainable Development*; 6(4): 180.
- Obuks, A. E. & Banake E. S. (2015), Developing a sustainable agricultural, industrial, infrastructural thriving Nigeria: A Logic Model Approach for Development, *International Journal of Development and Economic Sustainability*, 3(6): 12.
- Omodero, C. (2021), Sustainable agriculture, food production and poverty lessening in Nigeria, *International Journal of Sustainable Development and Planning*, 16(1); 81-87.
- Omodero, C.O. & Amah, K.O. (2018) Role of agriculture in reducing consumption expenditure in Nigeria, *Journal of Management and Sustainability*, 8(4): 130-138.
- Osabohien, R., Matthew, O., Gershon, O., Ogunbiyi, T., & Nwosu, E. (2019). Agriculture development, employment generation and poverty reduction in West Africa, *The Open Agriculture Journal*, 13: 82-89.
- Pawlak, K. & Kołodziejczak, M. (2020), The Role of Agriculture in Ensuring Food Security in Developing Countries: Considerations in the Context of the Problem of Sustainable Food Production, *Sustainability* 12(5488); 3-20.

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Appendices

Year	CPI	FPI	NFE
2000	66.4	67.25	-19.78
2001	65.37	67.04	-21.69
2002	68.7	70.53	-18.94
2003	72.46	73.57	-15.47
2004	77.53	78.45	-17.7
2005	82.31	82.84	-16.77
2006	88.45	88.17	-17.9
2007	80.86	82.16	-18.43
2008	86.51	87.47	-8.49
2009	74.41	77.01	-7.29
2010	85.43	86.85	-6.91
2011	79.11	80.83	-28.77
2012	88.47	88.7	-17.36
2013	88.6	86.12	-12.78
2014	96.95	97.41	-15.15
2015	99.27	99.3	-14.48
2016	103.77	103.29	-10.89
2017	100.68	100.68	-14.48
2018	102.05	101.9	-8.95
2019	101.28	103.18	-8.12
2020	89.89	100.91	-7.23

Source: World Bank database (2022) and FAO, 2019.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Crop production index	21	65.37	103.77	85.6429	12.11654	-.102	.501	-1.052	.972
Food production index	21	67.04	103.29	86.8410	12.01248	-.099	.501	-1.149	.972
Net food export index	21	-28.77	-6.91	-14.6467	5.65895	-.458	.501	.299	.972
Valid N (listwise)	21								

Correlations

		Crop production index	Food production index	Net food export index
Crop production index	Pearson Correlation	1	.979**	.490*
	Sig. (2-tailed)		.000	.024
	N	21	21	21
Food production index	Pearson Correlation	.979**	1	.542*
	Sig. (2-tailed)	.000		.011
	N	21	21	21
Net food export index	Pearson Correlation	.490*	.542*	1
	Sig. (2-tailed)	.024	.011	
	N	21	21	21

** . Correlation is significant at the 0.01 level (2-tailed).

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*. Correlation is significant at the 0.05 level (2-tailed).

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.981 ^a	.963	.959	2.44701	1.201

a. Predictors: (Constant), Net food export index, Crop production index

b. Dependent Variable: Food production index

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2778.211	2	1389.106	231.986	.000 ^b
	Residual	107.782	18	5.988		
	Total	2885.993	20			

a. Dependent Variable: Food production index

b. Predictors: (Constant), Net food export index, Crop production index

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	9.727	5.445		1.786	.091		
	Crop production index	.930	.052	.938	17.962	.000	.760	1.315
	Net food export index	.174	.111	.082	1.573	.133	.760	1.315

a. Dependent Variable: Food production index

**AI-INDUCED WORK PRACTICES ENHANCING PRODUCTIVITY AND
ENGAGEMENT FROM BOARD ROOM TO SHOP FLOOR**

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Abstract

Technological advancements such as AI has significantly contributed to leadership decision-making in board rooms to shop floor decisions which in turn has enhanced business performance, innovation, product quality, employee engagement owing to better leadership decision making. We find AI becoming extensively reliable ensuring the cost-effectiveness of products through the reduction in cycle time due to real-time decision-making in the organizations. It is becoming extensively reliable in industries given that, the costs of capital are reduced by making production more efficient and flexible. This paper discusses the rationale of AI-induced work environment with the current advancements in smart manufacturing. The study looked at Board room decisions based on AI and Business Analytics and also the AI based decisions being taken by workers on the shop floor with the help of production supervisors and managers in order to enhance value real time.

The study establishes the relationship that AI is greatly associated with the significant gains in labour productivity and development of manpower in the manufacturing industry. Notably, the market such as ceramics, automotive, energy management are widely benefiting from the advantages of implementing AI through machine learning algorithms. We have elaborated the growth, advantages of AI in industry, and practical challenges faced by workers in adapting to the technology. On carefully analysing of the scholarly literature in the areas of AI in smart manufacturing, we find AI has significantly enhanced manufacturing and production processes and ensuring business sustainability by providing customised solutions to customers at a reasonable value. The study has confirmed the findings of other studies and has added the scholarly contributions by reinforcing the importance of AI in smart manufacturing and upskilling of workers in use of the latest technologies to meet the emerging demands of customers and businesses.

Keywords: Smart manufacturing, Innovation, Technology Adaptation, Time, Cost efficiency.

**EFFECTIVENESS OF AI IN EMERGING HUMAN RESOURCE PRACTICES IN
THE IT INDUSTRY**

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Abstract

This study explores the effectiveness of artificial intelligence (AI) in HR practices. An effort has been made to investigate the applications of AI in HR, its implementation challenges and its scope. Transformation of HR in the areas of recruitment, performance management, training and rewards is now possible with a lot more precision owing to AI tools. This has helped in real-time and accurate performance assessments and managing conflicts. HR professionals are expected to develop new generation skills while keeping Human relations intact. New technology trends are driving new behaviours and leadership is focusing on strategic aspects of business and outsourcing routine and mundane operations. Platforms powered by artificial intelligence is providing guidance to HR leaders, helping them close the skill gap in talent in their organizations. AI is contributing substantially to the talent acquisition, hiring and selection processes. The study followed a systematic review of literature covering Recruitment, PMS, Training and Rewards. On reviewing various scholarly literature, it is evident that AI drives various HR decisions as a business enabler which provides the HR business partner a strategic outlook towards the people dimension of business. This paper focuses on qualitative research and collaborated with various scholarly findings in the impact of AI on HR functions. The study revealed that artificial intelligence is positively related to HR practices that are a game changer for business sustainability.

Keywords: Technology, Training, Development, Talent Acquisition, Hiring and Recruitment

**CAUSES OF PROJECTS ABANDONMENT IN NIGERIA (2002 – 2020): AN
EMPIRICAL INVESTIGATION**

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Abstract

This paper attempt to investigate the causes of project of abandonment in Nigeria between 2002 to 2020. Primary and secondary data were used in assessing the causes of projects abandonment in the study area. Tables and percentages are the tools for data analysis employed. The analysis shows that, projects are abandoned in Nigeria because of poor budgeting, contractors not being paid, initiation of white elephant projects, awarding projects to family and friends including political associates and the outbreak of Covid-19 pandemic. Policy recommendations like adequate budgeting, prompt payment of contractors, need for laudable government projects to be backed by national or state assemblies, desirable projects must be continued irrespective of which administration initiated them.

Key Words: Abandoned projects, Aborted projects, White elephant projects.

**THE EUROPIAN GREEN EGREEMENT AND ITS IMPACT ON CIVIL AVIATION
SECTOR**

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Abstract

Nothing unites the world more than the need of necessity of the actions for to mitigating global climate change in the 21 century. This problem cannot be considered in the context of one particular country, region, or even a continent. The current debates regarding climate change are mainly focused on greenhouse gas emissions. The role of fossil fuels (natural gas, oil, coal) in emitting greenhouse gases is particularly big. In such probes, the usage of alternative, renewable sources acquires urgency from year to year. Europe, with international organizations and its member states, has coordinated to tackle the global problem of climate change. Program is known as „Green Agreement“. Fast growing source of greenhouse gas emission is civil aviation sector, but one of the three priorities of the working, is reduction of negative impact on the environment. The urgency of the topic is due to the following circumstances, the frequency of usage of aviation transport is growing both locally and internationally. Ambitions and visions of the sector are really interesting on the one hand in conditions of frequent flights, but on the other hand in terms of negative impact reduction on environment.

In the framework of theoretical-methodological research, studies conducted by international civil aviation organizations, as well as governments and non-governmental organizations have been studied.

Keywords: Civil Aviation, Green Agreement, greenhouse gas emission, climate change.

Climate change will be a major challenge for the world in the coming decades. According to a well-argued study by scientists, if the Earth's temperature rises above 2 degrees by 2050, global warming will be inevitable and will lead to active melting of the world's ice sheet, rising sea levels, changing precipitation distribution, reducing yields. The number of diseases will increase, migrants will start to flow out of the flooded areas. Carbon dioxide, methane, nitrous oxide create the effect of a natural greenhouse in the atmosphere, maintaining the average temperature of the earth's surface up to 15 degrees. The cause of global warming is the intensity of consumption of greenhouse gases by the world population for domestic and industrial purposes. The greenhouse gas sectors are: energy (coal-fired power plants), transport, agriculture. According to a report published by the Intergovernmental Panel on Climate Change in 2021, the concentration of CO₂ in the atmosphere in 2019 was the highest in at least 2 million years. Arctic ice fell to its lowest level since 1850 in 2010-2011. At the end of the summer of 2011, the area of Arctic sea ice was smaller than at any time in the past 1,000 years. In addition, since the 1950s, the synchronous melting of the world's glaciers has begun, creating an unprecedented fact over the past 2000 years, which in turn has led to rising water levels on the Earth's surface, as well as rising temperatures. Changes in the conditions for the formation of air masses, in turn, have changed the atmospheric and climatic fronts.

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The movement of warm air masses in most land areas has become intense since the 1950s. Agricultural and ecological drought depends on the affected biome. Lack of soil moisture, excessive evaporation during the vegetation period affects crop production (IPCC-Intergovernmental Panel on Climate Change, 2021).

With the increase in global warming the likelihood of extreme changes increases. The reduction in emissions in 2020 was driven by measures taken by governments to minimize the spread of Covid-19, which had previously slowed world population movement and industrialization, but the concentration of CO₂ in the atmosphere continues to rise in 2022. (IPCC-Intergovernmental Panel on Climate Change, 2021). People will become the main victims of the current imbalance in the ecosystem in the future. The mortality rate of the world population may increase, their ability to work can be limited, however in fairness it should be noted that the impacts of climate change may vary between countries and regions. A society placed in socially unequal conditions will be more sensitive to harmful influences and equipped with less leverage to resist. Consequently they will be the least protected from the threats posed by global change. Experts say there is still time to avoid the most negative outcome.

The EU aims to become the world's first climate-neutral continent by creating a competitive economy based on efficient use of resources, where there will be no more greenhouse gas emissions by 2050, economic growth will no longer depend on the use of resources and no place and no people will be left without a green deal. Achieving the goal requires appropriate measures in all sectors of the economy. In particular:

- Investing in environmentally friendly technologies;
- Support the industry by encouraging innovation;
- Implementation of cleaner, healthier and cheaper forms of private and public transport;
- Decarbonization of the energy sector;

Work with international partners to improve environmental standards. (European Commission, European Green Deal).

The European Green Deal is a precondition for a sustainable EU economy. Europe has turned the challenges associated with global climate change into an opportunity to take care of the future. Europe provides both financial and technical assistance to countries where the process is difficult.

European Commission President Ursula von der Leyen said: "The European Green Deal is our new growth strategy, it will help us reduce emissions as well as create jobs" (EU for Georgia). The Executive Vice-President of the European Commission responded to the program with the following words: "We offer a dramatic and inclusive transformation for the benefit of the people and the preservation of a healthy planet for future generations" (EU for Georgia). A third of the € 1.8 trillion, as well as the EU's seven-year budget, will be a source of funding for the implementation of the European Green Deal (European Commission, European Green Deal). As we have already mentioned, the EU will become climate-neutral by 2050, therefore the European Parliament will introduce the European Climate Law that will turn political will into a legal obligation, (European Parliament, Legislative Train Schedule, European Green Deal 02.2022), thus giving investment the right direction, which in turn will help stimulate innovation in many productive sectors, including the transport industry.

According to the Global Energy Agency, transport accounts for 25% of global CO₂ emissions. Thus, in parallel with the expected growth of demand in both the cargo and passenger sectors, in order to have zero emissions in 2050, by 2030 its amount must be reduced by 20% as part of the regime of energy efficient operational and technical measures (International Energy agency. 2021).

The annual general meeting of the International Air Transport Association (IATA) in Boston has approved a resolution for the global air transport industry stating that net zero carbon

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emissions will be achieved by 2050. This commitment is in line with the goal of the Paris Agreement to ensure that global warming does not exceed 1.5°C (IATA. 2021). This commitment is in line with the purpose of the Paris Agreement to ensure that global warming does not exceed 1.50 C. (IATA. 2021).

The path taken by the civil aviation sector to reduce emissions and eliminate them even more is complex and difficult. A collective effort must be made by all stakeholders in the industry. Both the private and public sectors must work together to finally end aviation's dependence on fossil fuels.

The plan of civil aviation is as follows: use of sustainable aviation fuel, development of new aircraft technology, development of solar, hydrogen sources of electricity. The Boston Resolution requires all civil aviation stakeholders to commit to mitigating adverse impacts through policies, products and activities through concrete actions and within a set timeframe. among them:

- Fuel companies to provide the market with a large-scale supply of sustainable fuels;
- Governments, together with air navigation service providers, eliminate inefficiencies in air traffic management and airspace infrastructure;
- Aircraft manufacturers to introduce high-tech engines into production, which in turn means piloting and developing new energy sources with the support of local government;
- Airport operators provide the infrastructure for the cost-effective delivery of SAF.

In addition to the listed joint efforts, future plans implemented by private companies and projects already implemented show that environmental policy has not been included in the industry's agenda only within the framework of the Green Deal. For example, in 2015, in Kerala, India, Cochin City Airport (through a public-private partnership) became the first airport in the world to use a fully solar energy source. 46,000 solar panels generate so much energy that the airport is completely self-sufficient. Over the next 25 years, the project will avoid 300,000 tonnes of CO₂, which is equivalent to planting 3 million trees. (ICAO. 2016)

Since 2010, Airbus has been developing solar-powered unmanned aerial vehicle technology to enable the aircraft to operate using only sunlight as energy. The company says their goal is to lay the groundwork for building commercial jets with alternative engines in the future. (AIRBUS, Solar flight)

Conclusion

Climate care projects are driven by the need to avoid an ecological catastrophe, so all future projects in the sectors of the economy (all stakeholders) will be burdened with an obligation to care for the environment. Aviation business is no exception in this regard. The general problem that leads to global warming is becoming more and more urgent. The aviation business in the 21st century is working in the field of social-ethical marketing. The industry is trying to reduce the negative impact on the environment and that is why it has united around a commitment called the observance of environmental norms. The implementation of ambitious projects with large investments requires the support of governments at the local level, as well as the implementation of market-based measures. Civil aviation has gone through many stages of development and at each stage demonstrates what was considered incredible yesterday, has already been implemented today, has a great future and has the ability to make utopian atmospheric care plans a reality for tomorrow.

References

AIRBUS. Solar flight. Harvesting the Sun's rays to power aircraft.

<https://www.airbus.com/en/innovation/zero-emission/solar-flight>

Aviation Benefits Beyond Borders. First Solar-powered Airport.

<https://aviationbenefits.org/case-studies/the-first-solar-powered-airport/>

An official website of the European Union. European Commission. A European Green Deal.

https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

EEAS, Climate, Environment & Energy, Be the wave against climate change. 21.09.2020.

https://www.eeas.europa.eu/climate-environment-energy/bethewave-against-climate-change_ka

IATA, Pressroom, press release N66. 04, October, 2021.

<https://www.iata.org/en/pressroom/2021-releases/2021-10-04-03/>

Icao. Uniting Aviation. Sustainable Alternative Fuels. Cochin International Airport - world's First Solar-Powered Airport. 2016.

https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2016/ENVReport2016_pg177-177.pdf

International Energy Agency. Report-Tracing Transport 2021.

<https://www.iea.org/reports/tracking-transport-2021>

PCC-Intergovernmental Panel on Climate Change, Climate change 2021. The physical Science Basis, Summary for Policymaker.

https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf

PARATHYROID ORGANOID TRANSPLANTATION INTO
PARATHYROIDECTOMIZED RATS

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Abstract

Parathyroid glands are endocrine organs being mainly in control of the secretion of parathyroid hormone (PTH) to regulate blood calcium level. Parathyroid cells secrete PTH that administers calcium homeostasis by acting on the bone, kidney, and small intestine. PTH deficiency leads to chronic hypocalcemia, organ calcinosis, kidney and heart failure, painful muscle spasms, neuromuscular problems, and memory problems. Parathyroid gland as an endocrine organ is suitable to mimic micro-anatomy using the organoid system *in vitro* and to test the activity *in vivo*. Here, we demonstrated the transplantation of induced pluripotent stem cell derived parathyroid organoids into sternocleidomastoid (SCM) muscle of rats after parathyroidectomy. Male rats were sensitized to light by intra-abdominal injection of 5-aminolevulinic acid hydrochloride (5-ALA, 300 mg/kg) solution and then left in dark environment for two hours. At the end of the incubation, Zoletile anesthesia was administered, neck area was cut open. Xenon light source (405 nm) was used for imaging parathyroid tissues. Red fluorescence radiation was able to easily differentiate parathyroid tissues. Organoid transplantation was done into sternocleidomastoid (SCM) muscle. After 14 days, the weight, feed, and water consumption rates of the animals were measured and monitored every two days. Parathyroid-related tissues including bone, kidney and small intestine were collected to analyze by IHC, ICC, WB, and qPCR. Moreover, their PTH release into the serum was measured with a PTH ELISA kit and rats from each group secreted PTH. Also, amount of serum calcium and phosphorus was measured with the ICP-MS device. According to these measurements, calcium and phosphorus were secreted despite the organoid transplantation in all groups. In this way, the therapeutic role and clinical applicability of parathyroid organoids in living organisms were shown for the first time in the literature. This model can be used for alternative cell sources and new techniques in clinical therapy.

Keywords: Parathyroid, Organoid, Calcium, Transplantation

**İNSAN HAYATI İÇİN ÖNEMLİ OLAN AZOT, YAŞAM İÇİN TEMEL
MADDELERDEN BİRİDİR**

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Özet

Doğa, insan yaşam ortamının rolünü oynar, durumu toplumun refah ve gelişme düzeyini belirler. Bir dizi fiziksel, kimyasal ve biyolojik olay bakımından zengindir. İnsanlar ihtiyaç duydukları her şeyi - hava, su, maddi mallar, sanayi için hammaddeler, vb - doğadan alır ve kullanırlar. İnsanlar enerji için petrol, kömür ve diğer doğal yakıtları yaktıkça, dünyanın her yerinde sıcaklık yükselir. Bu yakıtları kullanırken, atmosferi ısıtan karbondioksit açığa çıkar. Ama başka sorunlar da var. Karbon bitkiler için hayati öneme sahiptir. Ancak bilim adamları bunun başka yönleri olduğunu söylüyorlar. Araştırmalar, bu yüzyılın sonunda CO2 etkisi altında yetiştirilen pirincin daha düşük protein, demir, çinko ve B vitamini seviyelerine sahip olacağını göstermiştir

Anahtar Kelimeler: Azot, Biyopolimerler-proteinler, Nükleik asitler

**NITROGEN, IMPORTANT FOR HUMAN LIFE, IS ONE OF THE MAIN
SUBSTANCES FOR LIFE**

Abstract

Nature plays the role of human living environment, its condition determines the level of welfare and development of society. It is rich in a number of physical, chemical and biological phenomena. Humans get and use everything they need - air, water, material goods, raw materials for industry, etc. - from nature. As people burn oil, coal and other natural fuels for energy, the temperature rises around the world. When using these fuels, carbon dioxide is released, which heats the atmosphere. But there are other issues. Carbon is vital for plants. However, scientists say there are other aspects to this. Research has shown that by the end of this century, rice grown under the influence of CO2 will have lower levels of protein, iron, zinc and vitamin B

Keywords: Nitrogen, Biopolymers-proteins, Nucleic acids

Doğa, insan yaşam ortamının rolünü oynar, durumu toplumun refah ve gelişme düzeyini belirler. Bir dizi fiziksel, kimyasal ve biyolojik olay bakımından zengindir. İnsanlar ihtiyaç duydukları her şeyi - hava, su, maddi mallar, sanayi için hammaddeler, vb - doğadan alır ve kullanırlar. İnsanlar enerji için petrol, kömür ve diğer doğal yakıtları yaktıkça, dünyanın her yerinde sıcaklık yükselir. Bu yakıtları kullanırken, atmosferi ısıtan karbondioksit açığa çıkar. Ama başka sorunlar da var. Karbon bitkiler için hayati öneme sahiptir. Ancak bilim adamları bunun başka yönleri olduğunu söylüyorlar. Araştırmalar, bu yüzyılın sonunda CO2 etkisi altında yetiştirilen pirincin daha düşük protein, demir, çinko ve B vitamini seviyelerine sahip olacağını göstermiştir (Kerimova R.C., Rzayeva S.C., Əzizova Ə.N.,2022).

Diğer araştırmalar, karbondioksit seviyeleri arttıkça mısır, bezelye ve soya fasulyesinin bileşiminin de değiştiğini göstermiştir. Daha fazla CO2, bitki daha büyük. Ancak havadaki ekstra karbon ile topraktaki besinler arasında bir denge olmalıdır. Bir bitkinin büyümesi için havadaki karbondioksiti emmesi gerekir. Havadaki karbondioksit ne kadar fazlaysa, o kadar büyüktür. Ancak bir bitkinin protein ve bazı vitaminlere sahip olabilmesi için topraktan azot da alması gerekir. Azot seviyeleri değişmedi. Çinko ve demir gibi mineraller yoktur. Böylece bitki büyüdü ama besin maddeleri azaldı. Azot içermeyen vitaminler daha iyidir. C vitamini esas olarak karbondan oluşur. CO2'de bir artış, C vitamininde bir artış anlamına gelir (Lamsal, L. N. et al.,2015).

Azot, organizmaların oluşumunda ve hayati işlevlerinde yer alan organik bileşiklerin yapısal bir birimi olan bir biyoelementtir. Önemli biyopolimerler - proteinler, nükleik asitler (DNA, RNA) ve ayrıca bazı vitaminler ve hormonlar içerir. Havadaki azot hacimce %78 ve ağırlıkça %75.50'dir. Metabolik süreçler için azot gereklidir. Hücrelerin tüm önemli kısımları (sitoplazma, çekirdek, kabuk vb.) protein moleküllerinden oluşur. Proteinler insan beslenmesinin önemli bir parçasıdır. Azot, vücuda proteinler ve diğer azotlu bileşikler içeren gıdalar yoluyla girer. Bu maddeler gastrointestinal sistemde parçalanır ve daha sonra vücudun kendi spesifik amino asitlerini ve proteinlerini ürettiği amino asitler ve küçük moleküllü peptitler şeklinde emilir. Bazı esansiyel amino asitler (temel amino asitler: valin, lösin, izolösin, treonin, femnilalanin, triptofan, lizin, arginin, histidin, metiyonin) insan vücudu tarafından sentezlenemez ve gıda ile "hazır" durumdadır. Azotun vücuttaki fizyolojik rolü, öncelikle proteinler ve amino asitler, metabolizmaları ve hayati süreçlere katılımları ile ilgilidir (Zhang, R. et al.).

Amino asitler, proteinlerin, hormonların, vitaminlerin, pigmentlerin ve diğer maddelerin biyosentezindeki birincil bileşiklerdir. Proteinler, canlı bir organizmada bir dizi hayati işlevi yerine getirir: plastik (hücrelerin, dokuların, organların organellerinin bir parçasıdır); enzimatik (kimyasal reaksiyonların biyolojik katalizörleridir); birikim (hücre ve vücutta etki mekanizmalarını sağlar); nakliye (ürünleri taşır); rezerv (yumurtadaki organizmanın oluşumunu sağlar, yumurtlar); koruma (bağışıklık oluşturmaya yardımcı olur), vb (Kerimova R.C., Həsənova X.Ə., Cəfərova Q.K.,2022).

İşlenmiş proteinler vücutta enerji salınımı ile parçalanır ve nihai yıkım ürünleri oluşur: NH3, CO2 ve H2O. Hayvanlar ve insanlar, proteinlerden ve bitki ve hayvanların diğer azotlu ürünlerinden azot alırlar. Hayvanlar ağırlıkça %1 ila %10 nitrojen içerir ve yün ve boynuzlar %15'e kadar nitrojen içerir. Hayvanlar ağırlıkça %1 ila %10 nitrojen içerir ve yün ve boynuzlar %15'e kadar nitrojen içerir. Azot (üre şeklinde) vücuttan idrar, dışkı, solunan nefes, ayrıca ter, tükürük ve saç yoluyla atılır.

Vücuda giren azotun ana kaynakları şunlardır:

Hayvansal kökenli ürünler - et, balık, kümes hayvanları. Bitkisel ürünler - bezelye, soya, mercimek, ceviz, mantar. Ekşi süt ürünleri.

N₂O oksijen ile karıştırıldığında gaz anestezisi için nitrik (I) oksit kullanılır. Sodyum nitrit NaNO₂ spazmodik bir ajandır.

Tüm canlı organizmaların proteinleri 20 amino asit içerir. Doğada 10'u vazgeçilmez olan ve hayvanlar ve bitkiler tarafından alınması gereken 180 amino asit vardır. Azot (N₂), baklagil ailesine ait bitkilerle simbiyoz halinde baklagillerle birleştiğinde, bir hektar toprak yılda 200-300 kg azotla zenginleştirilirken, serbest yaşayan bakteriler toprağı 15-30 kg azotla zenginleştirebilir. Yılda azot. Azotu sabitleyen çok sayıda bakteri vardır. Nitrosomonas, nitrobakteri bakterileri, organik kalıntıların nitrik asit ve nitratlara ayrışması sırasında oluşan amonyağı oksitler (nitrik asit, nitrat tuzları oluşturmak için mineral tuzlarla reaksiyona girer). Oksidasyon işlemi iki aşamada gerçekleşir (nitrit NO₂- ve ardından nitrat NO₃- oluşumu):

Nitrosomonas: $2\text{NH}_3 + 3\text{O}_2 \rightarrow 2\text{HNO}_2 + \text{H}_2\text{O} + \text{enerji}$ Nitrobacter: $2\text{HNO}_2 + \text{O}_2 \rightarrow 2\text{HNO}_3 + \text{enerji}$ bazen nitrojen (I) oksidi N₂ O'ya, nadiren nitrojen (II) oksidi NO'ya indirger). Bu deoksidasyon işlemi nitrojen oksitlerin birikmesini önler (yüksek konsantrasyonlarda toksiktirler). Bitkiler, topraktan çözünür nitratlar ve amonyum tuzları (NH₄⁺) formundaki azotu emer. Tuzlar, biyosentez sürecinde hızla amino asitlere ve proteinlere dönüştürüldüğü gövdelere ve yapraklara taşınır. Proteinler, herhangi bir canlı organizmanın ayrılmaz bir parçasıdır. Azot, bitki kütlesinin %0,3 ila 4,5'ini oluşturur. Azot, sapların ve yaprakların büyümesini artırır. Azot yokluğunda bitki büyümesi yavaşlar, küçük yapraklar oluşur, sararmaları görülür, daha az klorofil oluşur, yapraklar uçuk yeşil ve erken sararır, büyüme yavaşlar, gövde ince ve zayıf dallanır, yeni yapraklar olur. daha küçük ve kuru ve döküldü. Uzun süreli nitrojen açlığı olduğunda, yaprakların yeşil rengi sarı, turuncu veya kırmızıya döner (Vlemmix, T. et al.,2015).

Toprakta bol miktarda azot bulunduğunda bitkinin çok iyi büyüdüğüne dair göstergeler vardır. Bu bitkiler ahududu, ısırgan otu, demir, sürünen. Standart sıcaklık ve basınçlarda son derece kararlı olan ve atmosferin %78'ini oluşturan azot gazı, gıda ve kimyasalların depolanmasında kullanılmaktadır. Çok soğuk (-196 °C) olan sıvı nitrojen, çok düşük sıcaklıklarda yapılması gereken dondurma işlemlerinde kullanılır. Sperm bankalarında spermelerin dondurulması sıvı nitrojen ile gerçekleştirilir. Ticari olarak en değerli nitrojen bileşiği amonyaktır (NH₃). Güçlü bir çözücü olan amonyak, gübrelerin bir parçası olan ve plastik endüstrisinde önemli bir yere sahip olan "türevlerin" imalatında kullanılmaktadır. Azot, organik bileşiklerin, özellikle proteinlerin yapısında yer alan çok önemli bir elementtir. Tüm nitrojen bileşikleri ya oksitleyicidir ya da güçlü reaktiflerdir. Bu nedenle uygun koşullar altında şiddetli tepki verirler. Bunlara TNT (trinitrotoluen) ve amonyum nitrat dahildir (Singh, V. et al.,2020).

Azot sabitleyen bakteriler havadaki azotu emebilir ve onu amonyağa dönüştürebilir. Bu bakteriler ya serbestçe yaşarlar (örneğin azotobakteriler, siyanobakteriler, azospiriller) ya da baklagillerin köklerinde bulunurlar (bu bakteriler rizobium tipi bakterilerdir). Bir hektar toprak atmosferde 70.000 tondan fazla serbest azot içerir ve bu azotun bir kısmı yalnızca nitrifikasyonun bir sonucu olarak daha yüksek bitkileri beslemek için kullanılabilir (bitkilerin toprakta emebileceği azot miktarı büyük değildir). Nazal alkol - kalp ve solunum merkezini uyarmak için suda % 3-10'luk bir amonyak çözeltisi kullanılır (Ding, J. et al.,2020). Canlılar hayatta kalabilmek için oksijen ve karbondioksite, büyümek için nitrojene (N₂) ihtiyaç duyarlar. Azot, bir canlı organizmanın, özellikle nükleik asitler, proteinler ve vitaminlerin %15'ini oluşturur. Yani yaşamın devamı için ana bileşenlerden biri olarak kabul edilir. Atmosfer ayrıca yaklaşık %78 azot içerir. Ancak canlılar azot ihtiyaçlarını havadan karşılayamazlar, bu nedenle bu gazın bir şekilde canlıların kullanabileceği bir forma dönüştürülmesi gerekir. Bu gazın canlılar tarafından kullanılabilmesi için atmosfere geri dönüştürülmesi gerekir. Bu işlem mikroskopik bakteriler tarafından gerçekleştirilir (Lamsal, L. N. et al.,2015). Atmosferdeki azot çeşitli şekillerde dolaşır ve yeryüzüne girer. Azot, nitrik

asit şeklinde yağış yoluyla dünyaya girer. Nitrik asit, bakteriler tarafından toprakta nitrat iyonlarına dönüştürülür ve bitkiler sadece bununla beslenebilir (Bauwens, M. et al.,2020).

Azot gazı da doğrudan havadan toprağa girebilir. Bezelye ve fasulye gibi bazı baklagillerin köklerindeki bakteriler, havadaki azot gazını toprağa çeker. Burada muhteşem bir tasarımla karşılaşırız. Tüm organizmaların gelişimi için en önemli mineral azottur. Nükleik asit hücrelerindeki çoğu organel bu maddeye ihtiyaç duyar. Bitkiler büyümek için azota ihtiyaç duyar. Bu nedenle azot ve bitkiler dünyadaki neredeyse en faydalı işbirliğini kurmuştur (.Ding, J. et al.,2020).Bitkiler, bakterileri köklerinden çekmek için özel besinler salgırlar. Bakteriler daha sonra köklerdeki özel boşluklardan girerler, bitkinin köküne yerleşirler ve burada çoğalarak nodüller oluştururlar. Bu süreçler, yediğimiz sebzelerin, bitkilerin ve tahılların çoğunun büyümesi ve ekolojik dengenin nitrojen döngüsüyle sabit kalması için gereklidir (Керимова Р.Дж.. Гасанова Х. А..Якубова В. Н,2019).

Bakteriler azotun dolaşımına yardımcı olur.Bakteriler farklı yerlerde ve formlarda olsalar da aynı ekipman ve bilgilerle aynı reaksiyonu mükemmel bir şekilde gerçekleştirebilirler.Bu reaksiyonlar sırasında bakteriler tarafından kullanılan azotlu enzimler kompleksi oksijen gazına karşı çok hassastır. Oksijenle reaksiyona girdiğinde yok olur, bu nedenle proteinler demir bileşikleri ile reaksiyona girer. Ancak bu durum fotosentez yaparak oksijen gazı açığa çıkaran siyanobakteriler ve toprakta serbest olarak yaşayan azotobakteriler için sorun teşkil etmektedir.Bakteriler bu sorunla mücadele etmek için yaratılmıştır. Örneğin azotobakteriler ve türleri, diğer organizmalardan farklı olarak, en iyi solunum sistemine sahip olan metabolizma yoluyla hücrelerinde az miktarda oksijen depolayarak enzimlerini sürdürürler. Azotobakteriler ve türleri ayrıca çok yüksek düzeyde hücre dışı kimyasallar üretir. Bakteriler bu bileşiklerin oluşturduğu yapışkan sıvıdaki su moleküllerini korur ve açığa çıkan oksijen gazı miktarını kontrol eder. Azot gazı miktarını düzenleyen rizomlar gibi bakteriler, bitki köklerindeki düğümlerde oksijen tüketen moleküllere sahiptir. Sadece canlı bakteriler veya bakterisiz yaşayan bitkiler bu maddeyi üretemezler (Miyazaki, K. et al.,2020).

İnsanları ve diğer canlıları beslemek için azot gazının belirli formlara dönüştürülmesi gerekir. Azot gazı ve bileşikleri o kadar çeşitli ve boldur ki tüm dünyayı kaplarlar. Bu farklı kombinasyonlar için de bir sistem olmalıdır.

Kaynaklar

1.Kərimova R.C., Rzayeva S.C., Əzizova Ə.N. STRESS AND BIOLOGICAL REACTIONS OF SOME HEAVY METALS IN THE HUMAN BODY/ TOKYO SUMMIT 5th International Conference on Innovative Studies of Contemporary Sciences January 14-16, 2022 /Tokyo – Japan.səh 43-48

2.Kərimova R.C.,Həsənova X.Ə.,Cəfərova Q.K. DISEASES CAUSED BY COMPLICATIONS AND DEFICIENCIES OF HEAVY METALS IN THE HUMAN BODY/ TOKYO SUMMIT 5th International Conference on Innovative Studies of Contemporary Sciences January 14-16, 2022 /Tokyo – Japan.səh 48-53

3.Керимова Р.Дж.. Гасанова Х. А..Якубова В. Н . Влияние факторов риска на здоровье человека. Г.Москва Российский импакт-фактор: 0,19 Научно-методический журнал ;; Academy’’ № 11 (50), 2019, с. 54-58

4.Bauwens, M. et al. Impact of coronavirus outbreak on NO2 Pollution Assessed Using TROPOMI and OMI observations. Geophys. Res. Lett. 47, 87978 (2020).

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

5.Singh, V. et al. Diurnal and temporal changes in air pollution during COVID-19 strict lockdown over diferent regions of India. *Environ. Pollut.* 266, 115368 (2020).

6.Lamsal, L. N. et al. U.S. NO₂ trends (2005–2013): EPA Air Quality System (AQS) data versus improved observations from the Ozone Monitoring Instrument (OMI). *Atmos. Environ.* 110, 130–143 (2015).

7.Vlemmix, T. et al. MAX-DOAS tropospheric nitrogen dioxide column measurements compared with the Lotos-Euros air quality model. *Atmos. Chem. Phys.* 15, 1313–1330 (2015).

8.Ding, J. et al. NO_x emissions reduction and rebound in China due to the COVID-19 crisis. *Geophys. Res. Lett.* 47, 89912 (2020).

9.Miyazaki, K. et al. Air quality response in China linked to the 2019 novel coronavirus (COVID-19) lockdown. *Geophys. Res. Lett.* 47, 89184 (2020).

10.Zhang, R. et al. NO_x emission reduction and recovery during COVID-19 in East China. *Atmosphere* 11, 433 (2020).

11.Lamsal, L. N. et al. U.S. NO₂ trends (2005–2013): EPA Air Quality System (AQS) data versus improved observations from the Ozone Monitoring Instrument (OMI). *Atmos. Environ.* 110, 130–143 (2015).

12.Ding, J. et al. NO_x emissions reduction and rebound in China due to the COVID-19 crisis. *Geophys. Res. Lett.* 47, 89912 (2020).

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Özet

Karmaşık kan temini ve yüksek metabolik aktivite nedeniyle karaciğer, dolaşım bozukluklarına karşı çok hassastır. Karaciğer hasarının derecesi ve doğası esas olarak hasarlı kan damarlarına bağlıdır. Ayrıca, karaciğer hasarının derecesi, hasarın azalmış perfüzyon veya pasif durgunluk ile ilişkili olup olmadığına bağlıdır.

Anahtar Kelimeler: İskemik hepatit, Karaciğer şoku, Hepatik iskemi

THE CAUSE OF HEPATIC SHOCK

Abstract

Due to the complex blood supply and high metabolic activity, the liver is very sensitive to circulatory disorders. The degree and nature of liver damage depends mainly on the damaged blood vessels. Also, the degree of liver damage depends on whether the injury is associated with decreased perfusion or passive stagnation.

Keywords: Ischemic hepatitis, Liver shock, Hepatic ischemia

Karmaşık kan temini ve yüksek metabolik aktivite nedeniyle karaciğer, dolaşım bozukluklarına karşı çok hassastır. Karaciğer hasarının derecesi ve doğası esas olarak hasarlı kan damarlarına bağlıdır. Ayrıca, karaciğer hasarının derecesi, hasarın azalmış perfüzyon veya pasif durgunluk ile ilişkili olup olmadığına bağlıdır (Şahbazov R.O., Karakayah H., Haberal N.,2009). Bad Chiari sendromu, hepatik sinüzoid obstrüksiyon sendromu (venöz obstrüksiyon hastalığı), kalp yetmezliğine bağlı pasif hepatik durgunluk, hepatik enfarktüs ve iskemik hepatit dahil olmak üzere karaciğerin bilinen bir takım vasküler lezyonları vardır. İskemik hepatit olarak da bilinen hepatik şok, esas olarak karaciğere sistemik kan akışındaki azalmadan kaynaklanır. Çoğu durumda, etkilenen bireylerde belirgin bir semptom olmaksızın karaciğer fonksiyon bozukluğu meydana gelir. Büyük cerrahi, solunum yetmezliği, kanama, büyük enfeksiyonlar ve kalıcı şok gibi çeşitli faktörler karaciğer şokuna neden olabilir (Kərimova R.C., Eyvazov T.Ə.,2021). Yoğun bakım ünitesindeki hastalarda sistemik mikrodolaşım bozuklukları, zayıf inflamatuvar yanıt ve ters tedavi etkileri de hepatik şokta faktörlerdir.

Hepatik iskemiye yol açabilen hipotansiyon olarak da adlandırılan düşük kan basıncının birçok nedeni vardır. Bilimsel yayında bildirilen vakaların çoğu, %39-70 arasında değişen

hipoksik hepatitin altında yatan kalp yetmezliği ile ilgilidir (Kerimova R.C., Şahməmmədova S.O., Hasanova H.A., İsgəndərova Z.Şh.,2020). Düşük konuşma durumu, sepsis ve solunum yetmezliği ile sonuçlanan kalp yetmezliği durumları ile birlikte vakaların > %90'ını oluşturur. Yakın tarihli bir meta-analiz, hipoksik hepatit vakalarının %78'inin akut kalp krizinden kaynaklandığını buldu. Hastalar özellikle sağ kalp yetmezliği ile ilişkili pasif karaciğer obstrüksiyonu olduğunda risk altındadır.

Diğer risk faktörleri arasında en yaygın olanı septik şoktu. Vücutta ciddi değişikliklere neden olan bir enfeksiyonun sonucudur. Bazı literatürlere göre, hipoksik hepatitli hastaların %32'sinde septik şok teşhis edildi ve önde gelen ölüm nedeniydi. Literatürde iyi belgelenmiş diğer birincil durumlar arasında anemi, peritonit, hipovolemik şok, yaygın yanıklar, karasu humması ve uyku apnesi bulunur. Bazı ilaçların aşırı dozda alınması ayrıca fenasetin, NSAID'ler, antimikrobiyaller ve halotan anestezipler gibi iskemik hepatite neden olabilir. Sülfü ilaçları da iskemik hepatite neden olur. İskemik hepatit gelişiminden birçok faktör sorumludur. Ağır travma veya ameliyat geçiren hastalarda sarılık gelişimi ciddi bir faktördür. Kan transfüzyonları bilirubin yükünü artırabilir, hematomlar yeniden emilmeye eğilimlidir ve sepsis meydana gelebilir. Herhangi bir travma, cerrahi işlem, bazı ilaçların alınması, TPA ve şok sonucu iskemi / hipoksi, karaciğer hücre fonksiyonunun bozulmasına neden olabilir. Nadiren kolestatik sarılık gelişebilir. İskemik hepatitin klinik görünümü, ALT, AST ve LDH'de önemli artışlarla birlikte akut viral hepatiti taklit eder, ancak alkalik fosfataz, bilirubin ve PTT biraz anormaldir. Altta yatan nedenin düzeltilmesi ile karaciğer fonksiyonu 5-10 gün içinde normale döner (Calhoun J., Partolina M., Vithoori S. et al.,2005).

Sonuç

Karaciğer şoku, yetersiz kan akışı ve karaciğere yetersiz oksijen verilmesinden kaynaklanan iskemik hepatit olarak da bilinir. Karaciğere azalan kan akışı genellikle şok veya hipotansiyonun sonucudur. Kalp yetmezliği, solunum yetmezliği, viral hepatit gibi enfeksiyonlar, ameliyat sonrası kan pıhtılaşması ve ilaçların ve toksinlerin neden olduğu karaciğer hasarı gibi iskemik hepatitin gelişiminden birçok faktör sorumludur. Bu durum genellikle dolaşım, kalp veya solunum yetmezliği gibi altta yatan ciddi tıbbi durumlardan kaynaklanır ve %50'den fazla hastane ölümüne yol açabilir.

Hepatit teriminin kullanımı kendi içinde tam olarak doğru değildir, çünkü iskemik hepatitte, iltihaplanma süreci nedeniyle karaciğer hasarı oluşmaz. Bununla birlikte, akut viral hepatit veya toksik hepatitte (örneğin, asetaminofen toksisitesi) olduğu gibi, iskemik hepatitte aminotransferaz seviyelerinde keskin bir artış meydana gelir. Bu nedenle iskemik hepatit şüphesi olan hastalarda toksik hepatit ve viral hepatit de ayırıcı tanıda düşünülmelidir. Hepatik şok (veya şok karaciğer) terimi yaygın olarak kullanılmasına rağmen iskemik hepatit terimi tercih edilmelidir. Bu nedenle şok olmayan hastalarda da iskemik hepatit görülür. İskemik hepatitte yaygın karaciğer hasarı, onu fokal karaciğer hasarı ile karakterize olan hepatik enfarktüstən ayırır. İskemik hepatit vakalarında klinik, laboratuvar ve histolojik özellikler durgun hepatopatininkine benzerdir. Bunun nedeni, her iki hastalığın nedeninin kalp debisinde bir azalma olmasıdır (CO - kalp debisi, (kalp hızı x kalp hızı)). Birçok iskemik hepatit vakası konjestif kalp yetmezliği ile ilişkilidir. Bununla birlikte, iskemik hepatitin çeşitli başka nedenleri vardır.

Klinik özellikler:

Şok veya bozulmuş hemodinamiğe neden olan herhangi bir patoloji veya hastalık, iskemik karaciğer hasarına yol açabilir (Гараев Г.Ш., Керимова Р.Дж.,2013). Çeşitli çalışmalara göre, iskemik hepatitlerin sadece %50'si şok nedeniyle gelişir.

İskemik karaciğer hasarı aşağıdaki nedenlerle de ortaya çıkabilir:

fokal karaciğer yetmezliği (örn. hepatik orak hücre krizi, karaciğer transplantasyonu sırasında hepatik arter trombozu veya müküler portal ven trombozu olan hastalarda hepatik arter trombozu).

şiddetli solunum yetmezliği,

sistemik hipoksemi

obstrüktif uyku apnesi

alt ekstremitelerin akut iskemisi.

Karaciğer yetmezliği olan hastaların muayenesi genellikle önceden var olan hemodinamik bozuklukları ortaya çıkarır. Çok nadir durumlarda, yarı akut veya subklinik bir süreç olarak iskemik karaciğer hasarı gelişebilir (örneğin, karaciğer perfüzyonunun geçici veya kısa süreli bozulması). Bu tür subklinik gelişim sıklıkla önceden var olan pasif durgunluğu ve portal hipertansiyonu olan hastalarda gözlenir. İskemik hepatit tanısı genellikle bir hipotansiyon olayından sonra karaciğer enzimlerindeki artıştan sonra konur. (Duenschede F., Erbes K.,2007).

Teşhis:

Yukarıda tanımlanan klinik vakalarda ayırıcı tanıda iskemik hepatit düşünülmelidir. Karaciğer enzimlerinde veya aminotransferazlarda keskin bir artış (1.000 ünite / L veya normalin üst sınırının 50 katı), iskemik hepatit dahil olmak üzere sadece bir dizi başka hastalıkta gözlenir. İskemik hepatite ek olarak, aminotransferazlardaki bu artış, akut viral hepatit ve ilaçların veya toksinlerin neden olduğu akut karaciğer hasarı durumlarında da görülür (örneğin, asetaminofen toksisitesi, bazı doğal bitkisel ilaçların alınması).

Nadir durumlarda, aşağıdaki durumlarda aminotransferazlarda böylesine keskin bir artış gözlemlenebilir:

Otoimmün hepatitin alevlenmesi durumlarında

Kronik hepatit B enfeksiyonunun spontan reaktivasyonu (reaktivasyonu)

Kronik hepatit B enfeksiyonu olan hastalarda hepatit D virüsü enfeksiyonu.

Akut Bad-Chiari sendromu (özellikle portal ven trombozu eşlik ettiğinde), hepatik sinüzoidal obstrüksiyon sendromu, HELLP (hepatit, karaciğer enzimlerinde yükselme, trombosit tükenme sendromu), akut hepatik obezite ve hepatik enfarktüs. Yukarıda listelenen patolojilerin veya hastalıkların tümü, karaciğer biyokimyasal testlerinin sonuçlarına göre ayırt edilemez. Ancak bazı özelliklerine dikkat edilerek iskemik hepatit, viral hepatitten ayırt edilebilir: Viral hepatitte LDQ (laktat dehidrojenaz) düzeylerinde erken ve hızlı artışlar oldukça nadirdir. Akut hepatitli hastaların kan testinde ALT/LDQ oranı ALT / LDQ <1.5 ise iskemik hepatitin daha fazla göstergesidir. Aminotransferaz seviyelerindeki hızlı düşüşler, başlangıçtaki hızlı artıştan sonra iskemik hepatitin karakteristiğidir ve diğer nedenlerin neden olduğu hepatit için tipik değildir (Дьякова И.Н.,2005). İskemik hepatit vakalarında, böbreklerin akut tübüler nekrozu dahil olmak üzere diğer hedef organlarda hipoperfüzyon belirtileri gözlemlenebilir. Bu nedenle, karaciğer enzimlerinde bir artış ile birlikte kandaki kreatinin seviyesindeki erken bir artış, iskemik hepatitin daha fazla göstergesidir.

Ayrıca iskemik hepatit şüphesi olan hastaların muayenesine şunlar da eklenebilir:

akut viral hepatit için serolojik testler

kandaki asetaminofen seviyeleri

Doppler US inceleme ile portal ve hepatik venlerin ve hepatik arterin incelenmesi

Kalp yetmezliği ve solunum yetmezliği taraması.

Hastaların fizik muayenesinde iskemik hepatite özgü herhangi bir spesifik bulgu ortaya çıkmayabilir. Bazen sağ üst karın bölgesinde ağrı olabilir.

Patoloji:

İskemik hepatitin histolojik belirtisi, iskeminin süresine ve şiddetine bağlı olarak santral ven çevresindeki hepatik yapının çökmesi ile ilişkili olan hepatik asinüsün 3. bölgesindeki hepatositlerin nekrozudur. Daha şiddetli ve uzun süreli iskeminin bir sonucu olarak nekroz hepatositlerin orta zonuna kadar uzanabilir. Nadir hastalarda, esas olarak orta bölgede nekroz gözlenebilir. İskemik hepatit vakalarında histolojik inceleme çok az sayıda inflamatuvar hücre ortaya çıkarır (De Oliveira M., Graf R., Clavien P.,2008). Muayene çok az sayıda inflamatuvar hücre ortaya çıkarır.

Ek olarak, özellikle kardiyojenik şoklu hastalarda pasif durgunluğu gösteren histolojik değişiklikler tespit edilmiştir. Bu histolojik değişiklikler arasında şişme, sinüzoidlerin dejenerasyonu ve asinüsün 3. bölgesinde değişen derecelerde hemorajik nekroz, obezite benzeri değişiklikler ve değişen derecelerde kolestaz ve ilişkili safra kanalı trombüsleri bulunur. Kronik veya tekrarlayan kalp yetmezliği olan hastalarda 3. bölgede retikülin ve kollajen birikimi gözlenir. Sonunda, fibröz bantlar merkezi damarlara uzanır. Şiddetli hasara rağmen, karaciğerin yapısı iskemik olay ortadan kaldırıldıktan sonra normale dönebilir (Cai Z., Semenza G.,2005).

Tedavi önlemleri:

İskemik hepatit tedavisinin temeli, kalp debisinin restorasyonu ve hemodinamiğin ihlaline yol açan nedenlerin ortadan kaldırılmasıdır. Karaciğer perfüzyonunu kötüleştirilebileceğinden aşırı agresif diürez önerilmez. Hastalarda hedef organların hipoperfüzyonu, bozulmuş böbrek fonksiyonuna ve bilinçteki değişikliklere özellikle dikkat edilerek yakından izlenmelidir. İskemik hepatit için spesifik bir tedavi yoktur. Bir dizi çalışma, intravenöz dopamin infüzyonunun ("böbrek" veya "kalp" dozunda) karaciğere kan akışını artırabileceğini ve hatta artırabileceğini göstermiştir. Bununla birlikte, klinik faydaları net olarak belirlenmemiştir. Dopamin infüzyonu sonucu karaciğere artan kan akışının, mezenterik damarlardaki dopamin vazodilatasyonuna veya artmış kalp debisine bağlı olabileceği düşünülmektedir. Aynı zamanda, artan kalp debisi karaciğer perfüzyonunu iyileştirir. Bununla birlikte, karaciğer fonksiyonu üzerindeki etkisi bilinmemektedir. Bu nedenle, kardiyovasküler sistemi desteklemek için farmakolojik tedavi seçimi, karaciğer perfüzyonu üzerindeki etkisine göre değil, hastanın genel hemodinamiğine göre yapılmalıdır. Bir dizi rapor, antidepresanların neden olduğu iskemik hepatit için intravenöz N-asetilsistein tedavisini bildirmiştir (Керимова Р.Дж., Гараев Г.Ш.,2013).

Tahmin etmek:

İskemik hepatitin şiddeti hemodinamik bozukluğun süresine bağlıdır. Prognoz daha çok altta yatan sistemik hastalığın şiddeti ile ilişkilidir. Yoğun bakım ünitesindeki hastalarda gözlenen iskemik hepatit, septik şok gelişimi, böbrek yetmezliği veya koagülopati durumlarında vazopressör tedavi ihtiyacı çok yüksek mortalite ile ilişkilidir. Hipotansiyonun ortadan kaldırılmasından sonra, kandaki aminotransferaz seviyesi genellikle 7-10 gün içinde normale döner. Kandaki bilirubinin normalleşmesi daha uzun sürer. Bilirubinde kalıcı bir artış ve uzamış protrombin zamanı, akut karaciğer yetmezliği gelişimini gösterir. Sirozlu hastalarda iskemik hepatit gelişimi %60-100 mortalite ile ilişkilidir. Kronik konjestif kalp yetmezliği olan hastalarda veya mevcut sirozu olan hastalarda iskemik hepatitli hastalarda da akut karaciğer yetmezliği görülür (Дуданова О.П.,2000).

Şok veya hemodinamik bozukluklara neden olan herhangi bir patoloji veya hastalık iskemik karaciğer hasarına neden olabilir. Çeşitli çalışmalara göre, iskemik hepatitlerin sadece %50'si şok nedeniyle gelişir. İskemik hepatit genellikle ilk kez karaciğer enzimlerinin yükseldiği bir hipotansiyon olayından sonra teşhis edilir. Bazı durumlarda, hastalar akut hepatit semptomları

yaşarlar (örn. mide bulantısı, kusma, iştahsızlık veya iştahsızlık, güçsüzlük ve sağ üst karında ağrı). Bu nedenle akut hepatitin ayırıcı tanısında iskemi daha sık görülen diğer nedenlerle (örn. viral enfeksiyon, ilaçlar, toksinler, otoimmün hastalıklar, metabolik bozukluklar) birlikte düşünülmelidir.

Kaynaklar

1.Kərimova R.C.,Şahməmmədova S.O.,Hasanova H.A.,İsgəndərova Z.Şh. Karaciğer hastalığının etyolojisi./4.ÇUKUROVA ULUSLARARASI BİLİMSEL ARAŞTIRMALAR KONGRESİ 21-23 ŞUBAT 2020 / ADANA.səh 225-230

2.Kərimova R.C., Eyvazov T.Ə. ETIOLOGY OF LIVER CIROSIS /INTERNATIONAL GEVHER NESİBE HEALTH SCIENCES CONFERENCE-VIII November 19-20, 2021/ISTANBUL, TURKEY. səh 108-112

3.Гараев Г.Ш.,Керимова Р.Дж.//Состояние белкового обмена в крови в динамике хронической интоксикации.//Міжнародної науково –практичної Конференції,фармацевтичні та медичні науки;актуальні питання.Дніпропетровськ.2013.

4.Керимова Р.Дж.,Гараев Г.Ш.Изменение некоторых показателей белкового обмена в условиях хронической интоксикации в зависимости от длительности ишемии печени.//Клінічної лабораторної медицини -2013,том 8,N4,с139-145.

5.Şahbazov R.O., Karakayah H., Haberal N. və b. Qaraciyərin işemik-reperfizion zədələnmələrinin qarşısının alınmasında istifadə olunan fosfolipidlərin qaraciyərin funksional göstəricilərinə təsiri // Azərbaycan Tibb jurnalı, 2009, № 3, s. 96-99

6.Додж М., Кината К., Стинсон К. Эффективная работа с Excel / пер. с англ. СПб: Питер, 2007, 1068с.

7.Дуданова О.П. Диагностическое значение белков экстрацеллюлярного матрикса при хроническом гепатите и циррозе печени // Клиническая медицина, 2000, № 9, с. 40-43

8.Дьякова И.Н. Влияние феруловой кислоты на поведение ишемизированных крыс в тесте «открытое поле» / Тез. докл. Междунар. науч. конф. М., 2005, с. 170-171

9.Cai Z., Semenza G. PTEN activity is modulated during ischemia and reperfusion: involvement in the induction and decay of preconditioning // Circ Res., 2005, v. 97, p. 1351-1359

10.Calhier J., Partolina M., Vithoori S. et al., Conditional macrophage ablation demonstrates that resident macrophages initiate acute peritoneal inflammation // J Immunol., 2005, v. 174, p. 2336-2342

11.De Oliveira M., Graf R., Clavien P. Ischemic preconditioning: promises from the laboratory to patients—sustained or disillusioned // Am J Transplant., 2008, v. 8, p. 489-491

12.Duenschede F., Erbes K. Protection from hepatic ischemia/reperfusion injury and improvement of liver regeneration by alpha-lipoic acid // Shock., 2007, v. 27, p. 644-651

THE PHYSICAL ACTIVITY LEVELS OF GERIATRIC INDIVIDUALS WITH DIABETES

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Abstract

This descriptive study was conducted with 105 patients between 09.20.2020 and 06.20.2021 in order to determine the physical activity levels of geriatric individuals diagnosed with diabetes mellitus. Prior to the study, permission was taken from the ethics committee, the institution, and patients. The population of the study consisted of all geriatric diabetic patients who had applied to the Family Health Center and the sample consisted of patients who met the research criteria in accordance with the power analysis and volunteered to participate in the study. Research data were collected using a questionnaire, the Standardized Mini-Mental Test, and the International Physical Activity Questionnaire. In the evaluation of activities, the criterion was that each activity had to be performed for at least 10 minutes at a time and a score of "MET-minutes/week" was obtained by multiplying the minutes, days, METs (multiples of resting oxygen consumption). Physical activity levels were classified as physically inactive (<600 MET-min/week), low level of physical activity (600 – 3000 MET-min/week), and adequate level of physical activity (>3000 MET-min/week). Mann-Whitney U, Kruskal-Wallis, Pearson Chi-square, and Fischer exact tests were used in the analysis of the data. The mean age of the patients was 72±5.6; 38.1% were aged between 65-69; 46.6% were male; 30.4% had diabetes diagnosis for 6-10 years; 70.4% received oral antidiabetic drug and diet treatment. The mean score of the individuals on the physical activity questionnaire was 473.7±617.8 and 74.2% of the individuals were inactive. Among the geriatric individuals, those who were aged 75 or over, female, single, illiterate, knew what can happen when not complied with the treatment, follow medical nutrition treatment, communicate with a diabetes nurse, exercise regularly, know the importance of physical activity in diabetes treatment, and practice physical activity in accordance with diabetes treatment and as recommended had higher mean physical activity scores ($p<0.05$). In conclusion, it is recommended to evaluate geriatric individuals' physical activity levels and support them individually since their physical activity levels are insufficient.

Keywords: Diabetes, geriatrics, physical activity, quality of life, nursing

DİYABETİ OLAN GERİATRİK BİREYLERİN FİZİKSEL AKTİVİTE DÜZEYLERİ

Özet

Bu araştırma, diabetes mellitus tanısı alan geriatric bireylerin fiziksel aktivite düzeylerinin belirlenmesi amacıyla 20.09.2020-20.06.2021 tarihleri arasında 105 hasta ile tanımlayıcı olarak yapıldı. Araştırma öncesi etik kuruldan, kurumdan ve hastalardan izin alındı. Araştırmanın evrenini Aile Sağlığı Merkezi'ne başvuran geriatric tüm diyabetik hastalar, örneklemini ise güç analizi doğrultusunda çalışma kriterlerine uygun ve çalışmaya katılmaya gönüllü olan hastalar oluşturdu. Araştırmanın verileri Soru Formu, Standardize Mini Mental Test ve Uluslararası Fiziksel Aktivite Anketi ile toplandı. Aktivitelerin değerlendirilmesinde her bir aktivitenin tek seferde en az 10 dakika yapılıyor olması ölçütü alındı ve dakika, gün,

MET değeri (istirahat oksijen tüketiminin katları) çarpılarak “MET-dakika/hafta” olarak bir skor elde edildi. Fiziksel aktivite düzeyleri; fiziksel olarak aktif olmayan (<600 MET-dk/hafta), fiziksel aktivite düzeyi düşük olan (600 – 3000 MET-dk/hafta) ve fiziksel aktivite düzeyi yeterli olan (>3000 MET-dk/hafta) şeklinde sınıflandırıldı. Verilerin değerlendirilmesinde Mann-Whitney U, Kruskal-Wallis, Pearson Ki-kare ve Fischer kesin testi kullanıldı. Hastaların yaş ortalamasının 72 ± 5.6 , %38,1’inin 65-69 yaşları arasında, %46,6’sının erkek, %30,4’ünün diyabet tanı süresinin 6-10 yıl arasında ve %70,4’ünün tedavisinin oral antidiyabetik ilaç ve diyetten oluştuğu belirlendi. Bireylerin fiziksel aktivite anketi puan ortalamasının $473,7\pm 617,8$ olduğu ve %74,2’sinin aktif olmadığı tespit edildi. Geriatrik bireylerden 75 yaş ve üzeri, kadın, bekar, okur-yazar olmayan, tedaviye uymadığı zaman neler olabileceğini bilen, tıbbi beslenme tedavisine uyan, diyabet hemşiresi ile görüşen, düzenli egzersiz yapan, diyabet tedavisinde fiziksel aktivitenin önemini bilen, fiziksel aktiviteyi diyabet tedavisine uygun ve önerildiği şekilde yapanların fiziksel aktivite puan ortalamalarının daha yüksek olduğu saptandı ($p<0,05$). Sonuç olarak geriatrik bireylerin fiziksel aktivite düzeyleri yetersiz olduğu için fiziksel aktivite düzeylerinin değerlendirilmesi ve bireysel olarak desteklenmeleri önerilmektedir.

Anahtar kelimeler: Diyabet, geriatri, fiziksel aktivite, yaşam kalitesi, hemşirelik

**THE IMPORTANCE OF HORMONAL AND ANTIBACTERIAL DRUGS IN THE
TREATMENT OF ISTHMIC-CERVICAL INSUFFICIENCY**

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Abstract

Isthmic-cervical insufficiency is one of the most common causes of pregnancy disorders. The incidence during pregnancy is 0.8-1%, the second trimester of pregnancy-20%, in premature births-30%. The main indication is a shortening of the cervix by 25mm up to 27 weeks of gestation. Etiopathogenetic factors are intraamniotic infection and a defect in collagen synthesis. The solution is to perform cervical cerclage or pessary placement at 14-16 weeks of gestation (up to 24 weeks). Isthmic-cervical insufficiency has a high risk of developing infectious-inflammatory processes and pregnancy disorders. The aim of our study is to evaluate the treatment that prevents pregnancy and the development of infectious and inflammatory diseases in women who have undergone cervical surgery or pessary due to isthmic-cervical insufficiency. The main group consisted of 18 women who underwent cervical cerclage and pessary-12 underwent cervical cerclage and 16 underwent pessary. For the prevention of premature birth micronized progesterone –Dyufaston (10mg) was prescribed per os daily for up to 34 weeks of pregnancy, Lactojinal (1 vaginal capsule) intravaginal for the prevention of infectious-inflammatory diseases. The control group retrospectively included the childbirth cards of 16 women who were diagnosed with isthmic-cervical insufficiency and whose pregnancies ended at different stages. In the main group 14 (77,8%) women had a natural birth at 38-39 weeks of pregnancy. Cervicitis was observed in 2 (11,2%) women from the main group during pregnancy and bacterial vaginosis was observed in 2 (11,2%). After removal of the sutures (11,2% in 2 women) and removal of the pessaries (11,2% in 2 women) the pregnancies were terminated by caesarean section at 37-38 weeks taking into account the symptoms of cervicitis and bacterial vaginosis. Of the 16 women in the control group, 4 (25%) had a natural childbirth and 12 (75%) women had various complications: premature rupture of the membranes at 32-34 weeks of gestation 7 (43,75%) and 5 (31,25%) women, acute cervicitis and vaginosis were noted. For these reasons 7 (43,75%) women had premature births, and 5 (31,25%) women had their pregnancies terminated by caesarean section. The results show that the use of hormonal and antibacterial drugs in women who underwent surgery during pregnancy due to isthmic-cervical insufficiency optimizes the outcome of pregnancy.

Key words: isthmic-cervical insufficiency, cervical cerclage, pessaries

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Abstract

In materials science, zinc oxide (ZnO) powders have many applications. Among them, energy technology has shown significant progress in recent years. ZnO is a direct bandgap semiconductor with high electron mobility. ZnO semiconductor was chosen because of these properties in the study. Hydrothermal method, which is a method suitable for synthesis with high purity at low temperatures, was used as a ZnO particles production technique. By using different temperatures in the synthesis of ZnO powder, the effect of temperature on the morphological properties was investigated. The physical properties of the ZnO particles were analyzed with XRD (X-ray diffraction), SEM (scanning electron microscopy) and raman spectroscopy. The analysis results of the synthesized ZnO particles were examined and optimal temperature value was determined. (This study is supported by Kahramanmaraş Sutcu Imam University BAP with the project number 2021/3-27 M.)

Keywords: Hydrothermal Method, ZnO, temperature

INTRODUCTION

In modern applications such as power generation, the use of semiconductor nanomaterials has paved the way for research in materials science. Zinc oxide is an interesting material for many technological applications. Zinc oxide (ZnO), a typical n-type semiconductor with the wide band gap of 3.37 eV, has been extensively studied for application in many fields (Polsongkram et al., 2008; San et al., 2018). Many different methods are used in the production of ZnO particles (Ristić et al., 2005). There are many studies in the literature such as thermal annealing (Adam et al., 2018; Lekoui et al., 2021), chemical precipitation (Jin et al., 2020), spray pyrolysis (Khanlary & Tarzi, 2021; Lee et al., 2021a, 2021b; Nair et al., 2020), hydrothermal (Ashfold et al., 2007; Hassanpour et al., 2017; Liang et al., 2019; Ocakoglu et al., 2015; Sekiguchi et al., 2000; Xie et al., 2011) and sol-gel (Azam et al., 2010; Rani et al., 2008; Vafae & Ghamsari, 2007) methods. Hydrothermal method is a promising method to produce ideal material with special morphology due to its low cost, low temperature, high efficiency and variable basic parameters (Chankhanittha & Nanan, 2018; Hu et al., 2007). In this study, ZnO particles were produced using the hydrothermal method. During the synthesis phase, other parameters, (pH, solvent, pressure and experiment time) except temperature were kept constant. Zinc nitrate ($Zn(NO_3)_2 \cdot 6H_2O$) salt was used as a zinc source in the precursor solutions of ZnO particles produced by hydrothermal method. ZnO particles were produced at different temperatures and the effect of temperature on the morphology and structure was investigated.

The base solutions, 0.1M zinc nitrate $Zn(NO_3)_2 \cdot 6H_2O$ was dissolved in 50 ml deionized water and 0.1M hexamethylene tetramine (HMT, $C_6H_{12}N_4$) in 50 ml deionized water separately. Both solutions were combined and mixed on a magnetic stirrer for 10 minutes. The solutions were then put into the teflon-coated autoclave and ZnO particles were produced at different temperatures in the muffle furnace. Test temperature; It was selected as 100°C, 120°C, 140°C, 160°C, 180°C and 200°C. ZnO particles were filtered from the solution, which was left to cool at room temperature. ZnO particles were washed with distilled water to get rid of the organic components in it. In order to eliminate the hydroxide phase in the structure of the synthesized ZnO particles, it was annealed in a split furnace at 450°C for 1 hour. The production processes of ZnO particles and the schematic view of the experimental mechanisms are shown in Figure 1.

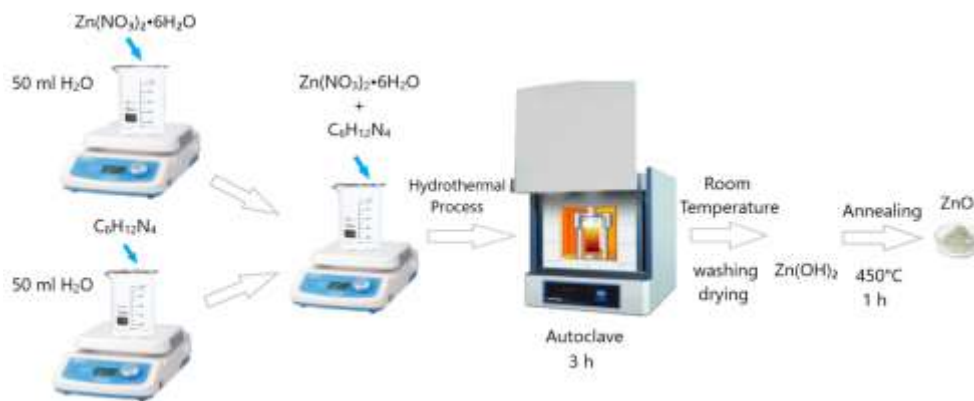


Figure 1. Synthesis steps of ZnO particles

RESULTS

X-Ray Diffraction (XRD) Results

The diffraction pattern of ZnO materials was made using Philips X'pert PRO brand XRD (X-ray diffraction) device. Diffraction pattern peaks of ZnO particles; It was observed that $2\theta=32.6^\circ$, 35° , 36.8° , 47.8° , 56.5° , 62.5° and 67.6° . The planes corresponding to these angle values are respectively; (100), (002), (101), (102), (110), (103) and (112). The planes corresponding to these angle values show that the obtained particles are the hexagonal crystalline ZnO phase (PDF-2, reference code: 01-079-2205). XRD graphs of ZnO particles produced from zinc nitrate sources at different temperatures are given in Figure 2.

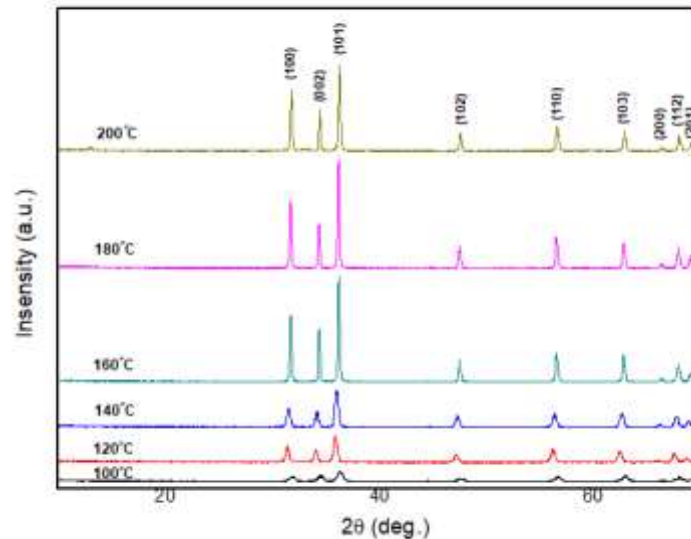


Figure 2. XRD spectrum of ZnO particles produced at different temperatures

When the XRD graphs are examined in Figure 2, the peak intensity of ZnO produced at 160 °C, 180 °C and 200 °C is higher than the other temperatures.

Scanning Electron Microscopy (SEM) Analysis

Morphological structures of ZnO materials obtained from different temperatures were examined by Scanning Electron Microscopy (SEM). SEM images of ZnO particles produced from zinc nitrate salt at different temperatures are given in Figure 3.

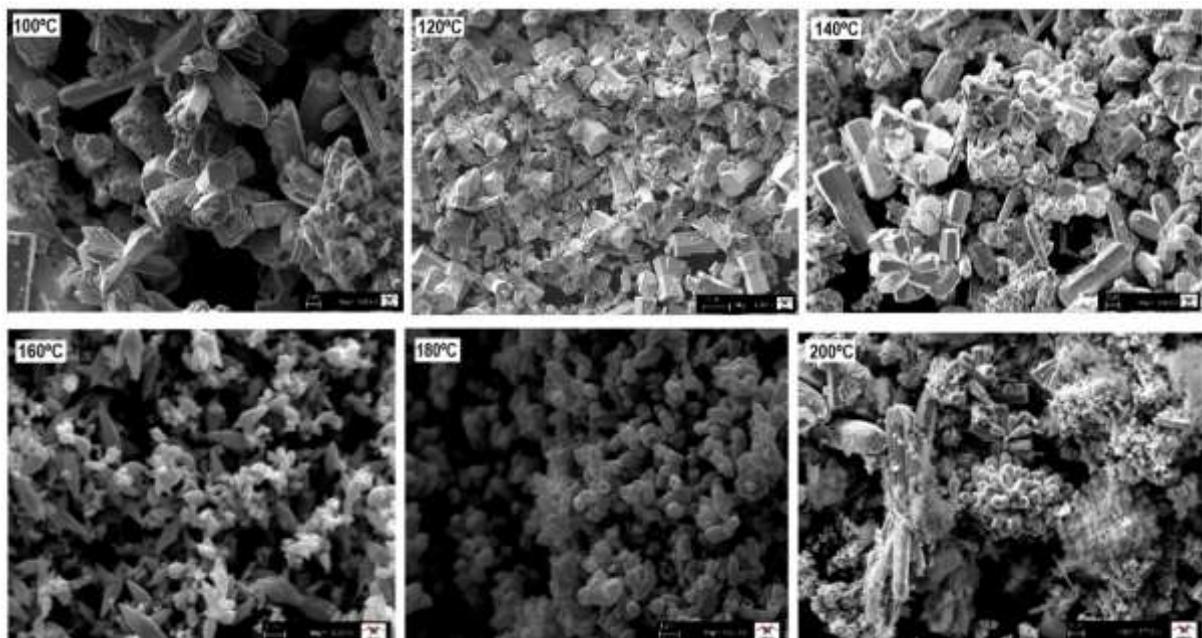


Figure 3. SEM images of ZnO particles produced at different temperatures

Raman Spectrum Analysis

Raman spectroscopy; It is a technique used for structural defects, irregularities and crystallization. Raman spectra of ZnO particles produced from at different temperatures are given in Figure 4.

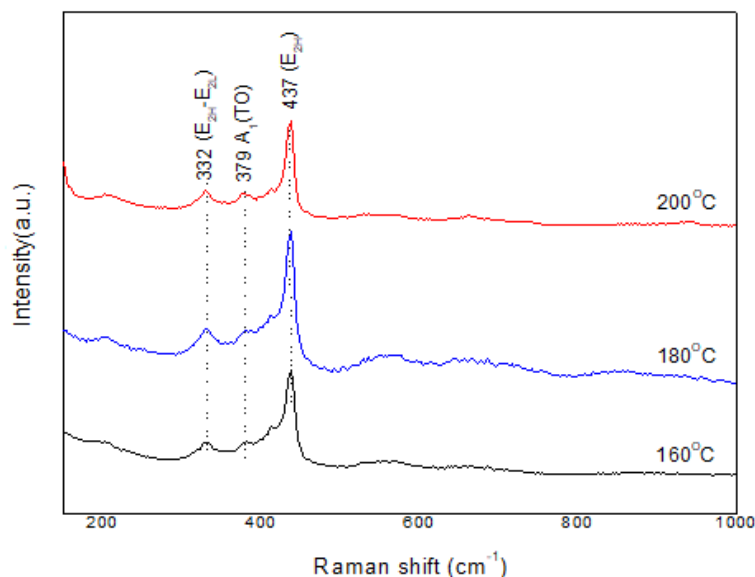


Figure 4. Raman spectrum of ZnO particles produced at different temperatures

In the Raman spectra, peaks belonging to the E_{2H} vibrational mode were observed around 437 cm⁻¹ for the hexagonal wurtzite structured ZnO particles. There are similar studies in the literature (Hadžić et al., 2016).

DISCUSSION

In the study, the effect of ZnO particles prepared by hydrothermal method on the morphology and structure by changing the reaction temperature was investigated. When the XRD patterns of ZnO powders produced at different temperatures were examined, similar results were obtained. However, it was determined that the corresponding peaks were attenuation in ZnO produced at 100°C, 120°C and 140°C. In the SEM images of ZnO particles, it was seen that the particle size decreased as the temperature increased. It was determined from the SEM images that the ZnO structure was formed as a hexagonal rods. Different phonon modes can be detected by Raman spectroscopy. Considering the XRD and SEM results of ZnO particles, Raman spectroscopy analyzes were performed at 160 °C, 180 °C and 200 °C. In the Raman spectra of ZnO particles with hexagonal wurtzite structure, peaks belonging to the E_{2H} (high-frequency phonons) vibrational mode were observed around 437 cm⁻¹. The peak around 332 cm⁻¹ corresponds to the E_{2H}-E_{2L} mode and the peak around 379 cm⁻¹ corresponds to the A₁(TO) (polar optic) mode.

CONCLUSION

ZnO particles were produced at different temperatures (100°C, 120°C, 140°C, 160°C, 180°C and 200°C) using the hydrothermal method. XRD, SEM and Raman analyzes of the produced ZnO particles were performed. As a result of the analysis, it was observed that ZnO particles were formed as hexagonal rods at all temperatures. It was determined that the particle size decreased from micro size to nano size as the temperature increased. The optimum temperature value was determined by considering the particle size as well as the homogeneity of the structure. When the results were examined, it was determined that the ZnO particles produced at 180 C were homogeneous and nano-sized.

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REFERENCES

- Adam, R. E., Pozina, G., Willander, M., & Nur, O. (2018). Synthesis of ZnO nanoparticles by co precipitation method for solar driven photodegradation of Congo red dye at different pH. *Photonics and Nanostructures - Fundamentals and Applications*, 32; 11–18.
- Ashfold, M. N. R., Doherty, R. P., Ndifor-Angwafor, N. G., Riley, D. J., & Sun, Y. (2007). The kinetics of the hydrothermal growth of ZnO nanostructures. *Thin Solid Films*, 515;8679–8683.
- Azam, A., Ahmed, F., Arshi, N., Chaman, M., & Naqvi, A. H. (2010). Formation and characterization of ZnO nanopowder synthesized by sol-gel method. *Journal of Alloys and Compounds*, 496(1–2);399–402.
- Chankhanittha, T., & Nanan, S. (2018). Hydrothermal synthesis, characterization and enhanced photocatalytic performance of ZnO toward degradation of organic azo dye. *Materials Letters*, 226(36);79–82.
- Hadžić, B., Romčević, N., Romčević, M., Kuryliszyn-Kudelska, I., Dobrowolski, W., Narkiewicz, U., & Sibera, D. (2016). Raman study of surface optical phonons in hydrothermally obtained ZnO(Mn) nanoparticles. *Optical Materials*, 58; 317–322.
- Hassanpour, A., Bogdan, N., Capobianco, J. A., & Bianucci, P. (2017). Hydrothermal selective growth of low aspect ratio isolated ZnO nanorods. *Materials and Design*, 119; 464–469.
- Hu, H., Huang, X., Deng, C., Chen, X., & Qian, Y. (2007). Hydrothermal synthesis of ZnO nanowires and nanobelts on a large scale. *Materials Chemistry and Physics*, 106(1); 58–62.
- Jin, X., Ma, Z., Liu, G., Hu, D., Song, C., & Huang, Q. (2020). In-situ ionothermal precipitation of well-dispersed ZnO nanoparticles onto 2-dimension neat graphene sheets with excellent photocatalytic activity. *Journal of Environmental Chemical Engineering*, 8(4); 104030.
- Khanlary, M. R., & Tarzi, S. (2021). Study of structural, optical and morphological properties of ZnO/ZnS heterostructures deposited by spray pyrolysis method. *Optical and Quantum Electronics*, 53(1); 1–10.
- Lee, Y., Fujimoto, T., Yamanaka, S., & Kuga, Y. (2021a). Evaluation of photocatalysis of Au supported ZnO prepared by the spray pyrolysis method. *Advanced Powder Technology*, 32(5); 1619–1626.
- Lee, Y., Fujimoto, T., Yamanaka, S., & Kuga, Y. (2021b). Formation and Evaluation of Au/ZnO Particles by a Spray Pyrolysis Method. *MATEC Web of Conferences*, 333; 02010.
- Lekoui, F., Amrani, R., Filali, W., Garoudja, E., Sebih, L., Bakouk, I. E., Akkari, H., Hassani, S., Saoula, N., Oussalah, S., Albalawi, H., Alwadai, N., & Henini, M. (2021).

Investigation of the effects of thermal annealing on the structural, morphological and optical properties of nanostructured Mn doped ZnO thin films. *Optical Materials*, 118(May); 111236.

- Liang, Q., Qiao, F., Cui, X., & Hou, X. (2019). Controlling the morphology of ZnO structures via low temperature hydrothermal method and their optoelectronic application. *Materials Science in Semiconductor Processing*, 89; 154–160.
- Nair, V. G., Jayakrishnan, R., John, J., Salam, J. A., Anand, A. M., & Raj, A. (2020). Anomalous photoconductivity in chemical spray pyrolysis deposited nano-crystalline ZnO thin films. *Materials Chemistry and Physics*, 247(February); 122849.
- Ocakoglu, K., Mansour, S. A., Yildirimcan, S., Al-Ghamdi, A. A., El-Tantawy, F., & Yakuphanoglu, F. (2015). Microwave-assisted hydrothermal synthesis and characterization of ZnO nanorods. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, 148; 362–368.
- Polsongkram, D., Chamninok, P., Pukird, S., Chow, L., Lupan, O., Chai, G., Khallaf, H., Park, S., & Schulte, A. (2008). Effect of synthesis conditions on the growth of ZnO nanorods via hydrothermal method. *Physica B: Condensed Matter*, 403(19–20); 3713–3717.
- Rani, S., Suri, P., Shishodia, P. K., & Mehra, R. M. (2008). Synthesis of nanocrystalline ZnO powder via sol-gel route for dye-sensitized solar cells. *Solar Energy Materials and Solar Cells*, 92(12); 1639–1645.
- Ristić, M., Musić, S., Ivanda, M., & Popović, S. (2005). Sol-gel synthesis and characterization of nanocrystalline ZnO powders. *Journal of Alloys and Compounds*, 397(1–2); 4–7.
- San, X., Li, M., Liu, D., Wang, G., Shen, Y., Meng, D., & Meng, F. (2018). A facile one-step hydrothermal synthesis of NiO/ZnO heterojunction microflowers for the enhanced formaldehyde sensing properties. *Journal of Alloys and Compounds*, 739; 260–269.
- Sekiguchi, T., Miyashita, S., Obara, K., Shishido, T., & Sakagami, N. (2000). Hydrothermal growth of ZnO single crystals and their optical characterization. *Journal of Crystal Growth*, 214; 72–76.
- Vafaei, M., & Ghamsari, M. S. (2007). Preparation and characterization of ZnO nanoparticles by a novel sol-gel route. *Materials Letters*, 61(14–15); 3265–3268.
- Xie, J., Wang, H., Duan, M., & Zhang, L. (2011). Synthesis and photocatalysis properties of ZnO structures with different morphologies via hydrothermal method. *Applied Surface Science*, 257(15); 6358–6363.

**THE IMPORTANCE OF BIOMARKERS IN THE TREATMENT OF PATIENTS
WITH METASTATIC COLORECTAL CANCER**

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Abstract

Colorectal cancer (CRC) is the third most common type of cancer worldwide. CRC survival rates vary dramatically based on stage. Unfortunately, approximately 50% of patients with CRC develop distant metastases. Treatment algorithm in metastatic colorectal cancers (mCRCs); are designed according to patient characteristics, tumor characteristics and biomarker profile. Biomarkers such as RAS/BRAF mutations, microsatellite instability (MSI), human epidermal growth factor receptor (HER2) amplification or NTRK (neurotrophic tyrosine receptor kinase) gene fusions represent major tools for personalized therapeutic strategies.

In 2009, the American Society of Clinical Oncology (ASCO) and the National Comprehensive Cancer Network (NCCN) published guidelines recommending that all patients with mCRC undergo testing to detect mutations in codons 12 and 13 of the KRAS gene. It is known that activating mutations in codons 12 and 13 of the KRAS gene identify patients who have a poor clinical response to EGFR-targeted therapies. In 2010, the NCCN suggested that BRAF testing can be considered for KRAS wild type mCRC. In 2014, the NCCN suggested that all patients with mCRC should be tested for RAS (KRAS and NRAS) and MSI should be considered for all patients with CRC \leq 70 years. In 2015, ASCO emphasized that anti-EGFR should only be considered in RAS wild type patients. A year later, MMR/MSI to all patients without any age limit was recommended by NCCN. NCCN added trastuzumab and pertuzumab treatment options for amplified ERBB2 (HER2) and RAS wild-type colon cancer and recommended NTRK gene fusion testing in 2019. However, a retrospective study has shown that only 40% of patients with metastatic colorectal cancer received biomarker testing prior to treatment. Despite guideline recommendations and significant therapeutic implications, overall biomarker testing rates in mCC remain unsatisfactory.

As a result, molecular profiling will potentially reduce exposure to expensive and ineffective treatments, leading to improved patient outcomes.

Keywords: ASCO, biomarkers, metastatic colorectal cancers, NCNN

FONKSİYONEL SÜT ÜRÜNLERİNİN ANTİVİRAL VE ANTİMİKROBİYAL ÖZELLİKLERİNİN ARAŞTIRILMASI

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Özet

Fonksiyonel gıdalar, vücudun ihtiyaç duyduğu temel besin öğelerinin yanında sağlık açısından ek faydalar sağlayan gıdalar olarak tanımlanmaktadır. Bu gıdalar, işlem görmemiş doğal bir besin maddesi olabileceği gibi fonksiyonel bir besin öğesiyle zenginleştirilmiş bir gıda da olabilmektedir. Günümüzde, fonksiyonel gıdaların sağlığa yararlarını kanıtlayan araştırmaların artışına paralel olarak tüketicilerin söz konusu gıdalara olan ilgisi de artmıştır. Fonksiyonel süt ürünlerinin fonksiyonel gıdalar arasında önemli bir yeri vardır. Geleneksel süt ürünlerinin birçoğu, içerdikleri esansiyel besin öğelerinden dolayı fonksiyonel gıda olarak tanımlanmaktadır. Söz konusu ürünler, immüoglobülin, laktoferrin, laktoperoksidaz ve lizozim gibi biyoaktif bileşenler ve süt proteininin parçalanması sonucu ortaya çıkan peptitleri ihtiva etmeleri nedeniyle antiviral ve antimikrobiyal özellikler göstermektedirler. Ayrıca doğal ortamlardan (insan, hayvan, bitki) izole edilebilen ve bazı fermente gıdaların üretiminde starter kültür olarak kullanılan Laktik Asit Bakterileri (LAB) bakteriyosin, reuterin ve diasetil gibi bazı antimikrobiyal bileşikler sentezleyebilmektedir. Bu bileşikler patojen mikroorganizmalarla yarışabilme, ortamda canlı kalabilme ve bağırsaklarda koloni oluşturabilme özellikleri sayesinde gıdalarda koruyucu ve güvenlik sağlayıcı olarak önemli bir rol oynamaktadırlar. Böylece bağışıklık sistemini güçlendirerek enfeksiyonlara karşı direnç sağlamaktadır. Vitamin ve minerallerle zenginleştirilmiş sütler, probiyotik eklenmiş yoğurt ve ayran, kefir, kımız, boza ve yakult fonksiyonel süt ürünlerine örnek olarak gösterilebilirler. Sütün probiyotik mikroorganizmalarla fermantasyonu yoluyla elde edilen probiyotik süt ürünlerinin, tüketicilerin bağışıklık fonksiyonlarını güçlendirdiği ve hastalanma riskini azaltma potansiyelinin bulunduğu, yapılan çalışmalarla ortaya konulmuştur. Probiyotik özellik gösteren bu mikroorganizmaların ürettikleri bakteriyosinler, aynı zamanda gıda ürünlerinde biyo koruyucu olarak kullanılmaktadır. Gıdalara bakteriyosin ilavesi ile gıda ürünlerinde bozulmalara yol açan mikroorganizmaların üremesi ve gelişmesi engellenerek gıdaların raf ömrü uzatılabilmekte ve ekonomik kayıplar en aza indirgenebilmektedir. Bu çalışmanın amacı fonksiyonel süt ürünlerinin antiviral ve antimikrobiyal özelliklerinin incelenmesidir.

Anahtar Kelimeler: Süt ürünleri, Antiviral, Antimikrobiyal, Fonksiyonel gıda

INVESTIGATION OF ANTIVIRAL AND ANTIMICROBIAL PROPERTIES OF FUNCTIONAL DAIRY PRODUCTS

Abstract

Functional foods are defined as foods providing additional health benefits in addition to the basic nutrients needed by the body. These foods could be an unprocessed natural nutrient also they could be enriched with a functional nutrient. Today, in parallel with the increase in research proving the health benefits of functional foods, consumers' interest in these foods has also increased. Functional dairy products have an important place among functional foods. Many traditional dairy products are defined as functional foods because of the essential nutrients they contain. These products are showed properties antiviral and antimicrobial because they contain bioactive components such as immunoglobulin, lactoferrin, lactoperoxidase and lysozyme, and peptides resulting from the breakdown of milk protein. Besides, Lactic Acid Bacteria (LAB), which can be isolated from natural environments (human, animal, plant) and used as a starter culture in the production of some fermented foods, can synthesize some antimicrobial compounds such as bacteriocin, reuterin and diacetyl. These compounds play an important role as a preservative and safety provider in foods, thanks to their ability to compete with pathogenic microorganisms, to survive in the environment and to form colonies in the intestines. In this way, they strengthen the immune system and provides resistance against infections. Milk enriched with vitamins and minerals, probiotic-added yoghurt and ayran, kefir, kumis, boza and yakult are examples of functional dairy products. Studies have shown that probiotic dairy products obtained by fermentation of milk with probiotic microorganisms strengthen the immune functions of consumers and have the potential to reduce the risk of getting sick. Bacteriocins produced by these microorganisms, which show probiotic properties, are also used as bioprotective in food products. With the addition of bacteriocin to foods, the growth and development of microorganisms causing deterioration in food products can be prevented, thus extending the shelf life of foods and minimizing economic losses. The aim of this study is to examine the antiviral and antimicrobial properties of functional dairy products.

Keywords: Dairy products, Antiviral, Antimicrobial, Functional food

1. GİRİŞ

Günümüzde gelişmiş ve gelişmekte olan ülkelerde beslenme alanındaki eğilimler sürekli olarak değişim göstermektedir. Yıllar boyunca insanlar, gıdaları açlıklarını gidermek ve hayatta kalmak amacıyla tüketirken şimdilerde gıdaların hayat kalitesini artırmaya ve sağlığı geliştirmeye yönelik etkilerini göz önünde bulundurarak daha bilinçli bir şekilde beslenmeye çalışmaktadır. Dünya genelinde sağlıklı ve bilinçli beslenmedeki artış; yaşam sürelerinin uzaması, refah düzeylerinin artması ve bireylerin yaşam kalitelerini iyileştirme arzusu ile ilişkilendirilebilmektedir (Sakandar ve Zhang, 2021). Son yıllarda bazı besin öğelerinin hastalıkların önlenmesindeki ve tedavisindeki etkinliğinin fark edilmesi nedeniyle fonksiyonel gıdalar ve nutrasötikler önem kazanmıştır (Coşkun, 2005). Fonksiyonel gıdalar, vücudun ihtiyaç duyduğu temel besin öğelerinin yanında sağlık açısından ek faydalar sağlayan gıdalar olarak tanımlanmaktadır.

Günümüzde, fonksiyonel gıdaların sağlığa yararlarını kanıtlayan araştırmaların artışına paralel olarak tüketicilerin söz konusu gıdalara olan ilgisi de artmıştır. Fonksiyonel süt ürünlerinin fonksiyonel gıdalar arasında önemli bir yeri vardır. Söz konusu ürünler sağlık üzerinde

olumlu etkileri sebebiyle gıda sanayinde hızlı bir artış göstermektedirler (Seçkin ve Baladura, 2011). Süt ve süt ürünlerinin, fonksiyonel bir bileşen ile zenginleştirilmesiyle elde edilmekte olan fonksiyonel süt ürünlerine örnek olarak vitamin ve minerallerle zenginleştirilmiş sütler, probiyotik ve prebiyotik ilaveli yoğurt ve peynirler, fermente edilmiş süt ürünleri gösterilebilir. Bu gıdalar bireylerin bağırsak florasına katkı sağlayarak bağışıklık sisteminin güçlenmesine yardımcı olmaktadır (Koçak ve Taş, 2013). Epidemiyolojik çalışmalar, fermente süt ürünlerinin tüketiminin metabolik sendrom, tip 2 diyabet ve kardiyovasküler hastalık riskinin azaltılması ile ilişkilendirmektedir (Furse vd., 2019). Ayrıca süt ve süt ürünleri esansiyel besin öğelerinin birçoğunu içermesinin yanında antimikrobiyal ve antiviral etki gösteren biyoaktif bileşenler ve canlı mikroorganizmalar da içermektedirler (Arslaner ve Salık, 2018). İçerdikleri bu bileşenler sayesinde gıda ürünlerinin kısa sürede bozulmalarını önleyerek raf ömürlerini uzatırken aynı zamanda tüketicilerin gastrointestinal sisteminde olumlu etkiler yaratmaktadır. Bu çalışmada fonksiyonel süt ürünlerinin antiviral ve antimikrobiyal etkileri araştırılmıştır.

2. FONKSİYONEL SÜT ÜRÜNLERİ

2.1.Fonksiyonel bir bileşen ile zenginleştirilmiş sütler

İnsan sağlığı için oldukça önemli bir mineral olan kalsiyum, sütün zenginleştirilmesinde sıklıkla kullanılmaktadır. Kalsiyumun kemik ve diş sağlığının korunmasında önemli bir rol oynadığı bilinmektedir. Bununla birlikte, kalsiyuma ek olarak çinko, magnezyum, demir gibi mineraller ve A, D, C gibi vitaminler de eklenerek süt fonksiyonelleştirilmektedir (Sezen ve Koçak, 2006). Zenginleştirme amacıyla kullanılan diğer bir bileşen ise omega-3 yağ asitleridir. Omega-3 yağ asitleri 3 tanedir; bunlar eikozapentaenoik asit (EPA), dokosaheksaenoik asit (DHA) ve α -linolenik asit (ALA)'dır (Altuntaş, 2021). Yağlı balıklar omega-3 bakımından en zengin olan gıdadır ancak günlük beslenmede her zaman yeterli miktarda tüketilemediklerinden dolayı yetersizlikler görülebilmektedir. Genellikle yetersizliği giderebilmek amacıyla balık yağı kapsülleri ya da omega-3 yağ asitlerinin katıldığı gıdalar tüketilmektedir (Çimen ve Ertaş Öztürk, 2021). Bu noktada omega-3 yağ asitleri ile zenginleştirilmiş süt ve süt ürünleri tüketmek besin öğesi yetersizliklerini önleyebilmek için iyi bir alternatif olarak gösterilmektedir.

2.2.Fermente süt ürünleri

Fermantasyon en eski gıda koruma ve işleme yöntemlerinden biri olarak bilinmektedir. Gıdaların raf ömrünü uzatmakla beraber, fermantasyon sürecinde gıdaların hem tadı hem de besin değeri olumlu bir şekilde artmaktadır. Fermente gıdaların üretiminde patojenik olmayan bakteri, mantar ve mayalar gibi mikroorganizmalar ve kompleks besin öğelerinin parçalanmasında rol oynayan proteaz, amilaz ve lipaz gibi enzimler aracılığıyla üretilmektedir (Karaçıl ve Tek, 2013). Fermente gıdalardaki en yaygın ve dominant mikroorganizmaların laktik asit bakterileri (LAB) olması sebebiyle, fermente gıdaların sağlık üzerindeki karakteristik faydaları bu bakteriler ile ilişkilendirilmektedir (Beena vd., 2012).

Yoğurt, *Lactobacillus bulgaricus* ve *Streptococcus thermophilus* bakterilerinin belirli sıcaklıktaki faaliyeti sonucu süttten elde edilen fermente bir üründür. Süte kıyasla yoğurt daha besleyicidir ve iyi bir protein, kalsiyum, fosfor, riboflavin, tiamin, B12 vitamini, folat, niasin, magnezyum ve çinko kaynağıdır. Sütteki laktoz, fermantasyon sırasında laktik aside dönüşmesinden dolayı laktoz intoleransı olan bireyler, herhangi bir olumsuz etki olmaksızın yoğurt tüketebilirler (Gahruie vd., 2015).

Geleneksel olarak kefir, kefir danelerinin sütü fermente etmesi sonucunda elde edilen homojen kıvamda olan, hafif asidik, ekşimsi bir içecektir. Endüstriyel kefir üretiminde ise kefir danelerinden elde edilen kültür kullanılmaktadır. Kefir daneleri doğal olarak canlı mikroorganizmaları içermesinden dolayı fermantasyon yapabilme yeteneğine sahiptirler. Bu mikroorganizmalar; laktik asit bakterileri (*Leuconostoc*, *Lactobacillus*, *Streptococcus*, *Lactococcus*, *Enterobacter*, *Acinetobacter*, *Enterococcus*, ve *Pseudomonas spp.*), asetik asit bakterileri ve mayalardır (*Kluyveromyces*, *Candida*, *Saccharomyces*, *Rhodotorula*, *Zygosaccharomyces*) (de Oliveira vd., 2013). Mayalar, kefir bakterilerinin büyümesine elverişli bir ortamın oluşturulmasında önemli bir rol oynar ve kefirin lezzet ve aromasına katkıda bulunan peptitler, amino asitlerler, vitaminler, etanol ve CO₂ gibi çeşitli metabolitler üretirler (Lazda vd., 2020). Kefirin besin değeri, süt bileşimi, kullanılan kefir danelerinin mikrobiyolojik bileşimi, fermantasyon süresi ve saklama koşulları gibi farklılıklar nedeniyle değişkendir (Damiana D. Rosa vd., 2017). Kefir, vücudun ihtiyaç duyduğu makro ve mikro besin öğelerini dengeli bir şekilde almak için iyi bir kaynaktır.

Çok eski zamanlardan beri Orta Asya Türkleri tarafından tüketilen kıymız kısrak sütünde üretilen az miktarda alkol (%2) ihtiva eden fermente bir içecektir. Geleneksel yöntemde kısrak sütü sağıldıktan hemen sonra, ellerinde mevcut olan kıymız mayası ile mayalandırılarak çeşitli hayvan derilerinden elde edilen tulumların içerisine koyularak fermente edilmektedir. Bir karıştırıcı ile tulumun içerisindeki kısrak sütü ve maya sürekli karıştırılarak, kıymız 3-8 saat içerisinde tüketime hazır hale gelmektedir (Tegin ve Gönülalan, 2014). Yapılan çalışmalarda kıymızda LAB ve *Saccharomyces cartilaginosus*, *Candida mycoderma*, *Candida pseudotropicalis* gibi mayaların bulunduğu saptanmıştır (Ender vd., 2016). Kıymızın ticari üretiminde inek ve kısrak sütü belirli oranlarda karıştırılarak, kıymız kültürü ilavesi ile üretilmektedir (Tegin ve Gönülalan, 2014).

3. FONKSİYONEL SÜT ÜRÜNLERİNİN ANVİRAL VE ANTİMİKROBİYAL ÖZELLİKLERİ

Probiyotik ve fermente süt ürünleri canlı mikroorganizmalar içermektedir. Bunlardan en sık karşımıza çıkan laktik asit bakterileridir (LAB). Probiyotik özellik gösteren LAB, üst solunum yolu enfeksiyonları ve viral gastroenteritlerinde etkili olabilen mekanizmalara sahiptir (Ögel ve Öztürk, 2020). Bu mekanizmalar iki ana katagoride sınıflandırılabilir. Birincisi organizmanın kendisi ve konakçı/virüsle doğrudan iletişime geçtiği mekanizmalardır. Bu gibi probiyotik LAB'nin orijini gıdalar veya kapsül formundaki suplementler olabilir. İkincisi LAB tarafından fermente edilen gıda ürünlerinde üretilen antiviral ve antimikrobiyal metabolitlerle ilgili mekanizmalardır. Organizma aynı olsa da sütler, tahıllar, baklagiller veya sebzeler gibi fermente gıda ürünlerindeki farklılıklar nedeniyle metabolitler farklılık gösterebilmektedirler. LAB'in ürettikleri metabolitlerden biri olan bakteriyosinler, bakterisidal aktivite gösteren aktif proteinlerden olup üretilen bakteriyosinin türüne bağlı olarak *Staphylococcus aureus*, *Listeria spp.*, *Bacillus cereus*, *Clostridium perfringens* gibi bazı patojenik etki gösteren bakterileri inhibe edebilmektedirler (Dinçer vd., 2010). Mandal vd. (2016), biyoaktif peptitlerin genellikle konakçının hücre reseptörlerine bağlanarak virüslerin bağlanmasını engellediğini bildirmiştir. Probiyotiklerin enzimatik aktiviteleri ile üretilen biyoaktif peptitler, virüs partiküllerine doğrudan bağlanarak da antiviral etki gösterebilmektedir (Ögel ve Öztürk, 2020). Bakteriyosinler üreticileri (LAB) üzerinde bakterisidal etki göstermeyip sınırlı sayıda patojen bakterileri inhibe etmeleri sebebiyle antibiyotikler için bir alternatif olabilecekleri düşünülmektedir (Evren vd., 2006). Aynı zamanda LAB ve bakteriyosinler uzun zamandır doğal bir gıda koruyucu olarak bazı gıdalarda kullanılmaktadır. Bu sayede gıda ürünlerinde bozulmalara yol açan mikroorganizmaların üremesi ve gelişmesi engellenerek gıdaların raf ömrü uzatılabilmekte ve ekonomik kayıplar en aza indirgenebilmektedir (Dinçer vd., 2010).

Fermente st rnleri, gastrointestinal saėlıėın korunması ve tedavisi iin olduka nemlidirler. Acurcio vd. (2017) *Lactobacillus plantarum* (B7) ieren probiyotik fermente stn *Salmonella enterica*'ya karşı etkisini deėerlendirmiřlerdir. *S. enterica* ve fermente st deney farelerine oral yolla vermiřlerdir. Deneyde kullanılan fermente st, Brezilya'nın geleneksel peynirinden izole edilen *L. plantarum*'un steril ste inoklasyonu sonucunda elde etmiřlerdir. Yedi gn boyunca erkek farelerin yarısını fermente stle, diėer yarısını ise sterilize edilmiř stle beslemiřlerdir. Probiyotik fermente stle tedavinin, kontrol grubuna kıyasla histolojik lezyonları, bakteriyel translokasyonu ve kilo kaybını azaltarak koruyucu bir etki gsterdiėi bulunmuřtur. Ayrıca, fermente st ile tedavi edilen fareler *S. enterica* poplasyonundaki azalmayla birlikte antiinflamatuvar sitokinlerde (IL-6 ve IFN-y) azalma gstermiřtir (Acurcio vd., 2017). Yapılan bařka bir alıřmada ise *Lactobacillus casei* ieren probiyotik yoėurdun ishal bireyler zerindeki etkisini arařtırmak iin insanlar zerinde randomize bir alıřma yrtlmřtur. Probiyotik yoėurt tketiminin kontrol grubuna kıyasla ortalama diyare sresini nemli lde azalttıėı sonucuna varılmıřtır. Ayrıca, probiyotik fermente stlerin zellikle bakteriyosinlerin sentezi yoluyla gastrointestinal sistem patojenlerine karşı inhibitr etkisini sıanlarda yapılan birok bulgu ortaya ıkarmıřtır (Rigo-Adrover & Knipping, 2019).

Probiyotik LAB'in antiviral etki mekanizmasının yeri ile ilgili olarak baėırsaklardan sıklıkla bahsedilmektedir. Bununla birlikte, arařtırmalar, baėırsakların tek antiviral etki alanı olmadığını gstermektedirler. Gastrointestinal sistem (GIS) aėızda bařlayıp anste bitmektedir. Aėız ve burun, GIS'in evre ile temas eden ilk kısmıdır. Probiyotikler kapsl řeklinde vcudaya alındıklarında doėrudan mideye ve oradan da baėırsaklara ulařmaktadır ancak probiyotik zellikteki gıda rnleri tketildiėinde aėızla temas sz konusudur. Bu sayede gıdalarla birlikte alınan probiyotikler bademciklerde ve farinkste kolonize olarak bu blgelerde antiviral ve antimikrobiyal zellikler gsterebilmektedirler (gel ve ztrk, 2020).

4. SONU

Deėiřen yařam kořullarıyla birlikte tketicilerin beslenme alıřkanlıkları da zaman ierisinde deėiřmektedir. İerikleri deėiřtirilmiř veya fonksiyonel bir bileřenle zenginleřtirilmiř gıda rnlerinin retiminin ve tketiminin tm dnyada yaygınlařtıėı grlmektedir. Fonksiyonel st rnlerinin makro ve mikro besin ėeleri, antimikrobiyal ve antiviral bileřenler ynnden olduka zengin olmaları sayesinde insan saėlıėı zerinde pek ok olumlu etkileri bulunmaktadır. zellikle fermente st rnlerinin enfeksiyonlara karşı koruyucu ve tedavi edici etkilerinin olduėu alıřmalar sonucunda gsterilmiřtir. Bu gıda rnlerinin ierisinde bulunan canlı mikroorganizmalar, doėrudan virs ve bakterilerin aktivasyonunu inhibe edebildikleri gibi kendi rettikleri metabolitler sayesinde de patojen mikroorganizmalar zerinde etki gsterebilmektedirler. Benzer řekilde, probiyotik bakteriler tarafından retilen biyoaktif peptitler virs partikllerine doėrudan baėlanarak antiviral etki gsterebilmektedir. retilen bu antimikrobiyal ve antiviral metabolitler konakının saėlıėını korumaya yardımcı olmaktadır. Saėlıklı ve kaliteli bir yařam iin yeterli ve dengeli bir řekilde beslenmek ok emlidir. Ayrıca fonksiyonel etkileri kanıtlanmıř olan gıdaları bilinli bir řekilde gnlk beslenmeye eklemek baėıřıklık sistemini gçlendirerek hastalıklara yakalanma riskini azaltabilmektedir. Sz konusu olumlu etkilerin daha ok bilinir hale gelmesiyle birlikte zamanla daha fazla sayıda fonksiyonelleřtirilmiř gıdaların piyasaya sunulacaėı tahmin edilebilmektedir.

KAYNAKÇA

- [1] Sakandar, H. A., & Zhang, H. (2021). Trends in Probiotic (s)-Fermented milks and their in vivo functionality: A review. *Trends in Food Science & Technology*, 110, 55-65.
- [2] Coşkun, T. (2005). Fonksiyonel besinlerin sağlığımız üzerine etkileri. *Çocuk Sağlığı ve Hastalıkları Dergisi*, 48(1), 61-84.
- [3] Seçkin, A. K. & Baladura, E. (2011). Süt ve süt ürünlerinin fonksiyonel özellikleri - Functional properties of milk and dairy products . *Celal Bayar University Journal of Science* , 7 (1) , 27-38 .
- [4] Koçak, Ç. & Taş, T. K. (2013). Fonksiyonel Süt Ürünlerinin Bağışıklık Sistemi Üzerine Etkisi ve Yakult Örneği . *Akademik Gıda* , 11 (3-4) , 114-118 .
- [5] Furse, S., Torres, A.G., Koulman, A. (2019). Fermentation of milk into yoghurt and cheese leads to contrasting lipid and glyceride profiles. *Nutrients*. 11(9):2178, doi: 10.3390/nu11092178.
- [6] Sezen, A., & Koçak, C. (2006). Fonksiyonel süt ürünleri teknolojisindeki gelişmeler. *Türkiye*, 9, 24-26.
- [7] Altuntaş, S. (2021). Yoğurttta Zenginleştirme Olanaklarının Teknolojik Yönü ve Güncel Gelişmeler. *Avrupa Bilim ve Teknoloji Dergisi* , Ejosat 2021 Ocak , 230-238.
- [8] Çimen, H. & Ertaş Öztürk, Y. (2022). Omega-3 Yağ Asitlerinin Kardiyovasküler Hastalıklar Üzerine Etkisi. *Aydın Sağlık Dergisi* , 8 (1) , 1-16.
- [9] Karaçıl, M. Ş. & Tek, N. A. (2013). Dünyada Üretilen Fermente Ürünler: Tarihsel Süreç ve Sağlık ile İlişkileri . *Uludağ Üniversitesi Ziraat Fakültesi Dergisi* , 27 (2) , 163-174 .
- [10] Beena Divya, J., Kulangara Varsha, K., Madhavan Nampoothiri, K., Ismail, B. and Pandey, A. (2012), Probiotic fermented foods for health benefits. *Eng. Life Sci.*, 12: 377-390.
- [11] H.H. Gahrue, M.H. Eskandari, G. Mesbahi, M.A. Hanifpour **Scientific and technical aspects of yoğurt fortification: A review** *Food Science and Human Wellness*, 4 (2015), pp. 1-8.
- [12] Leite, A. M. D. O., Miguel, M. A. L., Peixoto, R. S., Rosado, A. S., Silva, J. T., & Paschoalin, V. M. F. (2013). Microbiological, technological and therapeutic properties of kefir: a natural probiotic beverage. *Brazilian journal of microbiology*, 44(2), 341-349.
- [13] Lazda, I., Krūmiņa, A., Zeltiņa, I., Krūmiņa, N., Ķibilds, J., Siksnā, I., ... & Derovs, A. (2020). Microbial community of kefir and its impact on the gastrointestinal microbiome in health and disease. In *Proceedings of the Latvian Academy of Sciences. Section B. Natural, Exact, and Applied Sciences.*
- [14] Rosa, D. D., Dias, M. M. S., Grzeńkowiak, U. M., Reis, S. A., Conceição, L. L., Peluzio, M. D. C. G. (2017). Milk kefir: Nutritional, microbiological and health benefits. *Nutr. Res. Rev.*, 30 (1), 82–96.

[15] Tegin, R. A. A., & Gönülalan, Z. (2014). Bütün Yönleriyle Doğal Fermente Ürün Kımız. *Manas Journal of Engineering*, 2(1), 21-34.

[16] Ender, G., Karagözlü, C., Yerlikaya, O., & Akbulut, N. (2006). Dünyada ve Türkiye’de tüketimi artan fermente süt içecekleri. *Türkiye*, 9, 24-26.

[17] ÖGEL, Z. B., & ÖZTÜRK, H. İ. (2020). Antiviral mechanisms related to lactic acid bacteria and fermented food products. *Biotech Studies*, 29(1), 18-28.

[18] Dinçer, E., KIVANÇ, M., & Karaca, H. (2010). Biyokoruyucu olarak laktik asit bakterileri. *Gıda*, 35(1), 1-8. Evren, M., Albayram, C., Apan, M. (2006), Laktik asit bakterilerinin oluşturduğu antimikrobiyel maddeler. *Türkiye 9. Gıda Kongresi*, Mayıs 24-26, Bolu, Türkiye, 977-980.

[19] Rigo-Adrover, M. D. M., & Knipping, K. (2019). Prevention of rotavirus diarrhea in suckling rats by a specific fermented milk concentrate with prebiotic Mixture (Vol. 11).

[20] Acurcio, L. B., Bastos, R. W., Sandes, S. H.d. C., Guimarães, A. C.d. C., Alves, C. G., Reis, D. C.d., et al. (2017). Protective effects of milk fermented by *Lactobacillus plantarum* B7 from Brazilian artisanal cheese on a *Salmonella enterica* serovar Typhimurium infection in BALB/c mice. *Journal of Functional Foods*, 33, 436–445.

[21] Mandal, S. M., Pati, B. R., Chakraborty, R., & Franco, O. L. (2016). New insights into the bioactivity of peptides from probiotics. *Frontiers in Bioscience*, 8, 450-459.

PHARMACOKINETICS OF DICLOFENAC AND INTERACTION WITH
SULFONAMIDE-TRIMETHOPRIM IN SHEEP

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Abstract

The use of NSAIDs along with antibiotics is common in the treatment of infectious diseases (1). However, the combined use of several drugs often results in unpredictable interactions (2). The aim of this study is to reveal the pharmacokinetic appearance of diclofenac alone and after the administration of sulfadoxine-trimethoprim.

In the study, 18 male Ivesi sheep aged 2-4 years with an average weight of 50 ± 5 kg were used. The sheep were randomly divided into three groups: (1) diclofenac (IM), (2) diclofenac (IV), (3) diclofenac (IM) + sulfadoxine-trimethoprim (IV). Blood was drawn from all animals at 2, 5, 10, 15, 30, 45 minutes and 1, 2, 3, 4, 5, 6, 7, 8, 10, 12 and 24 hours after drug administration and their plasmas were separated. The plasma diclofenac level was determined using HPLC-UV (3).

The plasma concentration of diclofenac was measured for up to 12 hours when co-administered with sulfadoxine-trimethoprim. It was determined that the C_{max} of diclofenac decreased significantly when co-administered with sulfadoxine-trimethoprim ($p < 0.05$). The terminal elimination half-life ($T_{1/2}$), area under the plasma concentration-time curve (AUC), mean residence time (MRT), and volume of distribution at steady state (V_z) of diclofenac increased significantly ($p < 0.05$), clearance (Cl) decreased ($p < 0.05$). The bioavailability of diclofenac was 93% for the control and 99% for the combined group.

These findings indicate that the absorption and elimination of diclofenac decreased when administered with sulfadoxine-trimethoprim, while its bioavailability increases with the duration of its stay in the body. Diclofenac is known to be metabolized in the liver by P450 enzymes (4). It has been reported that sulphadoxine inhibits these P450 enzymes (5). Therefore, its plasma levels appear to be maintained for a longer period of time, as its concomitant administration with sulfadoxine-trimethoprim reduces the metabolism of diclofenac.

Keywords: Diclofenac, sulfadoxine-trimethoprim, sheep, interaction

ROLE OF LAUGHTER THERAPY IN SCHOOL HEALTH SERVICES

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Abstract

Laughter therapy; It is a therapy that combines correct breathing and childlike exercises with laughter exercises without any reason, and positively affects health. Dr. Laughter therapy, developed by Kataria, is a therapeutic method using yoga breathing techniques. Laughter therapy consists of clapping and warming exercises, deep breathing exercises, childlike games and laughter exercises. Laughter, which affects people's individual and social lives, provides a balance in the body's chemicals and hormones. Laughter therapy physiologically; It stimulates circulation by relaxing the muscles and breathing. It reduces stress hormones and acts as a pain reliever. It strengthens the immune system. It has a positive effect on mental functioning. Laughter therapy is psychological; It increases mental health, self-confidence and energy by removing the symptoms of anxiety and depression. It increases happiness and quality of life. It provides an environment for the development of interpersonal relationships. For this purpose, laughter therapy is actively used in school health services as well as being used in many areas of health. School health services are services that evaluate, protect and improve the health of students and staff working in the school. It is seen that the health services required to be provided for the school community are carried out by school health and occupational health nurses, which are sub-specialties of public health nursing on university campuses. In the national and international literature, it is seen that the application of laughter therapy in school health is limited and the number of studies is low. As a result of the studies examined, laughter therapy on university students in school health; It has been seen that it is effective in reducing anxiety and depression symptoms, increasing happiness and school life adjustment, reducing status and trait anxiety, reducing systolic, diastolic blood pressure and pulse rate, increasing cortisol and dehydroepiandrosterone levels, and reducing premenstrual syndrome symptoms.

Keywords: Laughter Therapy, School Health, Services

EFFECT OF ATRAZINE, A TRIAZINE HERBICIDE, ON PHOSPHOLIPID
SUBCLASSES FRACTION IN THE LIVER OF *Oreochromis niloticus*

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Abstract

The present study was conducted to demonstrate the toxic effects of a triazine herbicide, Atrazine, on the fatty acid in the liver tissue phospholipid subclasses (phosphatidylcholine (PC), phosphatidylethanolamine (PE), phosphatidylinositol (PI) and phosphatidylserine (PS)) of freshwater fish *Oreochromis niloticus*. The fish were exposed to 0.935 mg/L Atrazine (1/10 of the 96-hour LC50 values) for 14 day. At the end of the 14th day, liver tissues were taken from the sacrificed fish and homogenized in chloroform / methanol solution. Fatty acids in the phospholipid subclasses were converted to fatty acid methyl esters. Gas chromatography instrument with FID detector was used for the analysis of fatty acid methyl esters. The effects of atrazine on PC, PE, PI and PS were valid for the total saturated fatty acids (SFAs), monounsaturated fatty acids (MUFAs) and polyunsaturated fatty acids (PUFAs). When the fatty acids in the phospholipid subclasses in the liver tissue of control fish were examined, the most important fatty acids were C14:0, C16:0 and C18:0 from SFA, C16:1(n-7) and C18:1 from MUFA, C18:2(n-6), C20:4(n-6) and C22:6(n-3) from PUFA. Irregular increases and decreases were recorded on the 14th day. The results were statistically significant at $P < 0.05$ level. In this study, the toxicity of Atrazine on the liver phospholipid subclasses (phosphatidylcholine, phosphatidylethanolamine, phosphatidylinositol, phosphatidylserine) fatty acids of *Oreochromis niloticus* was demonstrated.

Keywords: Triazine herbicide, Atrazine, Liver, Phospholipid subclasses, *Oreochromis niloticus*

Özet

Mevcut çalışma, tatlısu balığı olan *Oreochromis niloticus*'un karaciğer dokusu fosfolipit alt grup (Fosfatidilcolin (PC), Fosfatidiletanolamin (PE), Fosfatidilinositol (PI), Fosfatidilserin (PS)) fraksiyonundaki yağ asitleri üzerinde bir triazin herbisit olan Atrazin'in toksik etkilerini göstermek için yapıldı. Balıklar, 0.935 mg/L Atrazin'e (96 saatlik LC₅₀ değerlerinin 1/10) 14 gün maruz bırakıldı. 14. günün sonunda kurban edilmiş balıklardan karaciğer dokuları alınarak kloroform / metanol çözeltisi içinde homojenize edildi. Fosfolipit alt sınıflarındaki yağ asitlerinin, yağ asidi metil esterlerine dönüşümü sağlandı. Yağ asidi metil esterlerinin analizi için FID dedektörüne sahip gaz kromatografi aleti kullanıldı. Kontrol balığının karaciğer dokusundaki Fosfolipit alt sınıflarındaki yağ asitleri incelendiğinde, en önemli yağ asitleri SFA'dan C14:0, C16:0 ve C18:0, MUFA'dan C16:1(n-7) ve C18:1, PUFA'dan C18:2(n-6), C20:4(n-6) ve C22:6(n-3) olarak bulunmuştur. 14. günde düzensiz artış ve azalışlar kaydedildi. Sonuçlar $P < 0.05$ düzeyinde istatistiksel olarak anlamlıdır. Bu çalışmada Atrazin'in *Oreochromis niloticus*'un karaciğer fosfolipit alt sınıf (Fosfatidilcolin (PC),

Fosfatidiletanolamin (PE), Fosfatidilinositol (PI), Fosfatidilserin (PS)) yağ asitleri üzerindeki toksisitesi gösterildi.

Anahtar Kelimeler: *Oreochromis niloticus*, Triazin herbisit, Atrazin, Karaciğer, Fosfolipit alt grup

GİRİŞ

Pestisitler, dünya nüfusunun hızla arttığı çağımızda, açlık sorununun çözülebilmesi için tarımsal üretimi artırmada büyük oranda kullanılmaktadır. Pestisitlerin kullanımı, hedef alınmayan organizmaların doğal popülasyonlarında istenmeyen düzensizliklere, tüm ekosistemde dengesizliğe, besin ağının değişimine veya besin zincirinin kırılmasına yol açabilir (Dökmeci, 1988). Triazin bir herbisit olan Atrazin, 1950'li yıllardan bu yana üretilen, ormancılıkta ve tarımda sıklıkla kullanılan bir pestisittir. Bağlarda, meyve, narenciye bahçelerinde, çim alanlarda, geniş yapraklı yabancı otların kontrolünde, şeker kamışı bulunan alanlarda ve çayırılık alanlarda kullanıldığı görülmektedir. Dünya geneline bakıldığında yıllık 70.000-90.000 tonluk kullanımıyla en fazla kullanılan pestisittir.

Fosfolipitler; yapısal elementlerin sentezi, membranların permeabilite işlemlerinin düzenlenmesi ve enerji kaynağı olarak rol oynamaktadır (Reddy ve ark. 1991). Fosfolipit seviyelerindeki azalmalar, membran bütünlüğü ve permeabilitesinde şiddetli zararlara sebep olmaktadır (Srinivas ve ark. 1991).

Atrazin'in *O.niloticus* için 96 saatlik LC50 değeri 9,35 mg/L olarak bildirilmiştir (Hussein ve ark, 1996). Atrazin'in sucul canlılarda meydana getirdiği toksik etkiler ile ilgili başka araştırmalar da bulunmaktadır. Ramesh ve ark. (2009) tarafından yapılan bir çalışmada Atrazin'in *Cyprinus carpio* için 24 saatlik LC50 değeri 18.5 ppm olarak bildirilmiştir. Son yıllarda *O. niloticus*, akuatik çevredeki kirleticilerin biyolojik etkilerini incelemek için indikatör organizmalar olarak kullanılmaktadır (Almedia ve ark., 2002).

Balıklarda karaciğer, organik kirleticilerin biyotransformasyonu ve zararlı metallerin ekskresyonu için başlıca organdır. Çevresel kirleticilere karşı kanıtlanmış duyarlılığı ve metabolizmadaki merkezi fonksiyonlarından ötürü karaciğer; sadece memeliler değil, aynı zamanda balıklarda da organik ve inorganik kimyasalların letal ve subletal etkileriyle ilişkili toksikolojik araştırmalarda önemli oranda dikkat çekmiştir (Wester ve Canton, 1986). Pestisitlerin biotransformasyon, ekskresyon ve depo işlemlerinde balık karaciğeri önemli fonksiyonlar üstlenmektedir. Detoksifikasyon mekanizmalarındaki işlevlerinden ötürü, önemli bir metabolik organ olan karaciğer, pestisit etkisine maruz kalan balıkların yaşayabilmeleri için çok önemli görülmektedir (Arnold ve ark. 1995).

Ayrıca, lipid bileşenleri stres etkenlerine ve çevresel değişikliklere karşı çok hassastır. Bu nedenle, mevcut araştırmada, Atrazin'in subletal konsantrasyonlarına maruz bırakılan *O. niloticus*'un karaciğer fosfolipit alt sınıf (colin, etanolamin, inositol, serin) yağ asitlerinde meydana gelebilecek değişikliklerin belirlenmesi amaçlanmıştır.

MATERYAL VE METOD

Canlılar Çukurova Üniversitesi Su Ürünleri Fakültesi yetiştirme havuzlarından sağlandı. Test grupları Atrazin maruziyet, aseton kontrol ve kontrol grupları olarak belirlendi. Atrazin konsantrasyonu LC₅₀ değerlerinin onda biri dikkate alınarak ve aseton içinde çözülerek hazırlandı (0.935 mg/L Atrazin). Yağ asitlerinde meydana gelecek değişiklikleri belirlemek amacıyla, deney gruplarının her birinden 14. günün sonunda 3'er balık çıkarıldı. Sakrifiye edilen balıklardan alınan solungaç dokusu kloroform / metanol (2:1, v/v) çözeltisi içinde homojenize edildi. İnce tabaka kromatografisi (TLC) ile fosfolipid fraksiyonları elde edildikten sonra fosfolipidlerdeki yağ asitlerinin, yağ asidi metil esterlerine dönüşümü sağlandı. Fosfolipit alt sınıflarının ayrılmasında önceden hazırlanmış 20 cm X 20 cm

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ebadındaki pleytler % 1.8 borik asit çözeltisi ile tamamen nemlendirildi. Nemlendirilen pakalar 10 dak. açık havada kurutulduktan sonra 100 °C sıcaklığındaki fırında 15 dak. aktive edildi. Tamamen kuruyan plakalar fırından çıkarılıp soğuyan plakaların alttan 2 cm yukarisına dokudan ekstrakte edilen lipit numunesi tatbik edildi. Lipit tatbik edilen plakalar azot gazı altında kurutularak vakit kaybetmeden içinde kloroform/etanol/su/trietilamin (30:35:7:35, v/v) karışımının bulunduğu yürütücü tank içine yerleştirildi. Pleytler havada kurutulduktan sonra, 2'7' dikloroflorosein püskürtülerek, Fosfolipit alt sınıf lipit fraksiyonları UV lambası altında görülür hale getirilmiştir. Standartlar yardımıyla saptanan fosfolipit alt sınıf fraksiyonuna ait bantlar kazılarak reaksiyon tüplerine aktarılmıştır. Her fraksiyona, ayrı ayrı 4 ml metanol ve 3-5 damla sülfirik asit damlatılarak 2 saat geri soğutucu altında 85 °C'de ısıtılmıştır. Böylece yağ asitlerinin, yağ asiti metil esterlerine dönüşümü sağlanmıştır. Çözelti soğuduktan sonra, hekzan kullanılarak metil esterleri ekstrakte edilmiştir. PL alt sınıfına ait yağ asiti metil esterlerinin analizi için FID dedektörüne sahip gaz kromatografi aleti kullanılmıştır.

BULGULAR

Tablo 1. Atrazine maruz kalan *O. Niloticus*'un karaciğer dokusundaki fosfolipid alt sınıf (PC, PE, PI ve PS) fraksiyonundaki yağ asidi yüzdelerinin 14. günde kontrollerle olan karşılaştırılması

Yağ saitleri	Fosfatidilkolin (PC)		Fosfatidiletanolamin (PE)		Fosfatidilinositol (PI)		Fosfatidilserin (PS)	
	Kontrol Grup	Atrazin Grup	Kontrol Grup	Atrazin Grup	Kontrol Grup	Atrazin Grup	Kontrol Grup	Atrazin Grup
C14:0	3.68±0.33	1.62±1.34	3.01±0.39	1.36±0.14	1.19±0.10	2.00±0.24	2.78±0.24	4.26±0.35
C15:0	1.19±0.12	0.17±0.03	0.22±0.01	0.21±0.01	0.31±0.11	0.91±0.72	0.27±0.02	0.25±0.02
C16:0	61.57±1.72	34.06±1.31	16.16±1.05	18.95±1.08	35.63±1.24	15.99±1.86	19.60±1.15	27.83±1.31
C17:0	1.38±0.11	0.57±0.06	0.31±0.10	0.61±0.20	1.30±0.12	0.57±0.06	0.81±0.07	0.74±0.05
C18:0	7.23±0.46	13.25±1.13	4.45±0.79	12.92±1.02	37.46±1.46	6.75±0.49	7.31±0.54	19.55±1.08
SFA	75.05±6.12	49.68±1.44	24.15±1.32	34.04±1.34	75.89±6.40	26.23±1.54	30.77±1.21	52.64±1.47
C16:1	2.43±0.24	1.68±1.38	1.89±0.28	3.63±0.54	1.10±0.10	6.10±0.44	5.22±0.40	4.40±0.41
C18:1	6.98±0.62	9.39±1.04	21.83±1.22	15.96±1.10	9.04±1.22	25.80±1.52	21.92±1.19	16.37±1.02
C20:1	0.39±0.08	0.17±0.03	0.38±0.10	0.35±0.03	0.42±0.04	0.40±0.02	0.46±0.10	0.24±0.01
MUFA	9.80±1.34	11.24±1.76	24.10±1.22	19.93±1.14	10.56±1.38	32.30±1.01	27.60±1.16	21.01±0.21
C18:2n-6	4.71±0.48	9.48±1.08	34.93±1.36	16.85±1.07	3.22±0.19	13.88±1.74	23.39±1.28	14.56±1.01
C18:3n-6	0.60±0.07	0.31±0.05	7.67±0.73	0.53±0.03	0.59±0.04	0.73±0.10	6.07±0.34	0.43±0.10
C18:3n-3	0.15±0.02	0.16±0.02	0.22±0.02	0.25±0.02	0.26±0.02	0.36±0.02	0.59±0.07	0.41±0.10
C20:2n-6	0.45±0.14	0.52±0.04	0.19±0.02	0.34±0.03	0.10±0.01	0.34±0.02	0.22±0.02	0.13±0.01
C20:3n-6	0.27±0.02	0.81±0.10	0.14±0.01	1.25±0.02	0.56±0.04	0.83±0.10	0.37±0.03	0.62±0.15
C20:4n-6	1.17±0.11	19.30±0.78	1.12±0.11	19.49±1.22	2.98±0.32	14.64±1.17	1.91±0.82	4.89±0.34
C20:5n-3	1.39±0.28	0.92±0.18	2.03±0.27	0.53±0.03	0.67±0.18	1.98±0.10	3.27±0.35	1.59±0.64
C22:4n-6	0.69±0.09	1.05±0.12	0.39±0.03	1.73±0.46	2.07±0.30	1.72±0.44	0.52±0.03	1.92±0.72
C22:5n-6	0.27±0.03	1.92±1.62	0.23±0.02	1.35±0.22	0.51±0.04	1.53±0.22	0.33±0.02	0.40±0.02
C22:5n-3	0.96±0.10	0.87±0.08	0.59±0.07	0.53±0.04	0.15±0.01	0.67±0.08	0.82±0.10	0.13±0.01
C22:6n-3	4.50±0.50	3.75±0.66	4.23±0.44	3.18±0.13	2.45±0.32	4.78±0.35	4.15±0.58	1.27±0.51
PUFA	15.16±0.85	39.08±1.40	51.74±1.62	46.02±1.34	13.56±1.93	41.47±1.36	41.64±1.40	26.35±1.13
n-3	7.00±0.60	5.69±0.50	7.07±0.60	4.49±0.43	3.53±0.91	7.80±0.67	8.83±0.98	3.40±0.58
n-6	8.16±0.84	33.39±1.36	44.67±2.87	41.53±1.40	10.03±2.05	33.67±1.44	32.81±1.29	22.95±1.11
n-3/n-6	0.86	0.17	0.16	0.11	0.35	0.23	0.27	0.15

S.F.A.: Doymuş Yağ Asitleri. M.U.F.A.: Tekli Doymamış Yağ Asitleri. P.U.F.A.: Aşırı Doymamış Yağ Asitleri.

Kontrol balıklarının karaciğer dokusundaki fosfolipid (PL) alt gruplarındaki yağ asitleri incelendiğinde, en önemli yağ asitleri Σ SFA'dan C16:0, C18:0, Σ MUFA'dan C18:1, Σ PUFA'dan C18:2n-6, C20:4n-6 ve C22:6n-3 olarak bulunmuştur. 14. günde düzensiz artış ve azalışlar kaydedildi. Sonuçlar $P < 0.05$ düzeyinde istatistiksel olarak anlamlıdır.

14 gün boyunca Atrazin'in subletal konsantrasyonuna maruz bıraktığımız balıkların karaciğer dokularındaki fosfatidilkolin (PC) yağ asitlerinde, kontrol grubu ile karşılaştırıldığında önemli değişiklikler kaydedildi. C18:0'da % 88.31, C18:1'de % 34.54, C18:2n-6'da % 101.36 ve C20:4n-6'da % 1549.18 oranında artış; C16:0'da % 44.68 ve C22:6n-3'te 16.72 oranında azalış önemli görülmüştür.

0.935 μ g/L Atrazin uygulanan balıkların 14. günde PC'nin Σ SFA, Σ MUFA ve Σ PUFA'ları incelendiğinde, Σ SFA'da % 33.81 oranında azalış görüldü. Σ SFA'daki bu azalış C16:0'dan kaynaklandığı tespit edildi. Σ MUFA'da % 14.24 oranında artış tespit edildi. Σ MUFA'daki bu artışın C18:1'den kaynaklandığı görüldü. Σ PUFA'da ise % 157.77 oranında bir artış tespit edildi. Σ PUFA'daki bu artışın C18:2n-6 ve C20:4n-6'dan kaynaklandığı görülmektedir. n-3 PUFA'da % 18.72 oranında azalma, n-6 PUFA'da % 309.16 oranında artma kaydedilmiştir. n-3 PUFA'daki azalma C22:6n-3'ten kaynaklanırken, n-6 PUFA'daki artış C18:2n-6 ve C20:4n-6'dan kaynaklanmıştır.

14 gün boyunca Atrazin'in subletal konsantrasyonuna maruz bıraktığımız balıkların karaciğer dokularındaki fosfatidiletanolamin (PE)'deki yağ asitleri kontrol grubu ile karşılaştırıldığında önemli değişiklikler kaydedildi. 14. günde C16:0'da % 17.26, C18:0'da % 190.25 ve C20:4n-6'da % 1639.96 oranında artış; C18:1'de % 26.90, C18:2n-6'da % 51.77 ve C22:6n-3'te % 24.76 oranında azalış görüldü. Ayrıca C18:3n-6'da kayda değer bir azalış tespit edildi.

Atrazin uygulanan balıkların 14. günde PE Σ SFA, Σ MUFA ve Σ PUFA'ları incelendiğinde, Σ SFA'da % 40.97 oranında artış görüldü. Σ SFA'daki bu artış C18:0'dan kaynaklandığı tespit edildi. Σ MUFA'da % 17.29 oranında azalış tespit edildi. Σ MUFA'daki bu azalışın C18:1'den kaynaklandığı görüldü. Σ PUFA'da ise % 11.15 oranında bir azalış tespit edildi. Σ PUFA'daki bu azalışın C18:2n-6 ve C22:6n-3'ten kaynaklandığı görülmektedir. n-3 PUFA'da % 36.49, n-6 PUFA'da ise % 7.03 oranında azalış kaydedilmiştir. n-3 PUFA'daki azalma C22:6n-3'ten kaynaklanırken, n-6 PUFA'daki azalış C18:3n-6'dan kaynaklanmıştır.

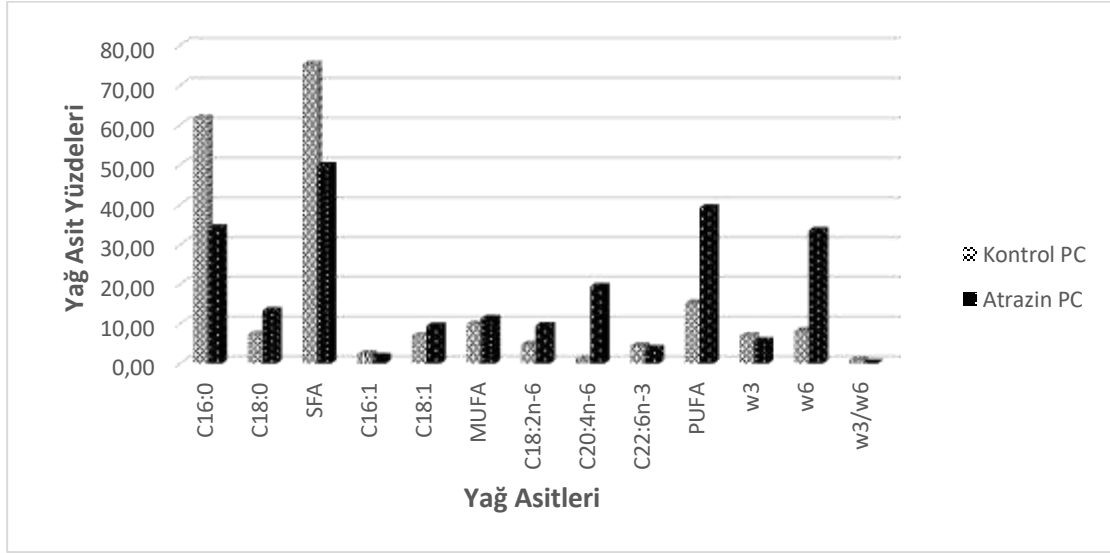
0.935 μ g/L Atrazin'e maruz bırakılan *O. niloticus* bireylerinin karaciğer dokularında 14. günün sonunda, fosfatidilinositol (PI) yağ asitleri kontrol grubu ile karşılaştırıldığında; C18:1'de % 185.40, C18:2n-6'da % 332.12, C20:4n-6'da % 391.21 ve C22:6n-3'te % 95.08 oranında artış; C16:0'da % 55.11 ve C18:0'da % 81.97 oranında azalış önemli sayılmaktadır.

14. gün sonunda Atrazin uygulanan balıkların PI Σ SFA, Σ MUFA ve Σ PUFA'ları incelendiğinde, Σ SFA'da % 65.43 oranında azalış görüldü. Σ SFA'daki bu azalışın C16:0 ve C18:0'dan kaynaklandığı tespit edildi. Σ MUFA'da % 205.88 oranında artış tespit edildi. Σ MUFA'daki bu artışın C16:1 ve C18:1'den kaynaklandığı görüldü. Σ PUFA'da ise % 205.79 oranında bir artış tespit edildi. Σ PUFA'daki bu artışın C18:2n-6, C20:4n-6 ve C22:6n-3'ten kaynaklandığı görülmektedir. n-3 PUFA'da % 120.92, n-6 PUFA'da % 34.21 oranında artış kaydedilmiştir. n-3 PUFA'daki artma C22:6n-3'ten kaynaklanırken, n-6 PUFA'daki artış C18:2n-6 ve C20:4n-6'dan kaynaklandığı tespit edilmiştir.

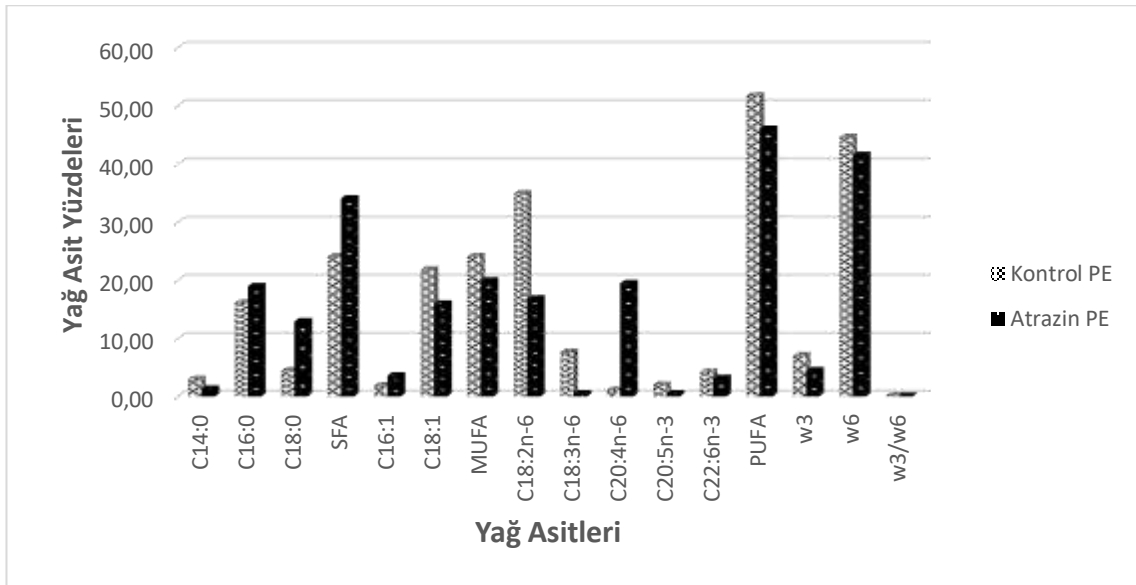
14 gün boyunca Atrazin'in subletal konsantrasyonuna maruz bıraktığımız balıkların karaciğer dokularındaki fosfatidilserin (PS) yağ asitlerinde, kontrol grubu ile karşılaştırıldığında önemli değişiklikler kaydedildi. C16:0'da % 41.99, C18:0'da % 167.51 ve C20:4n-6'da % 155.91 oranında artış; C18:1'de % 25.31, C18:2n-6'da % 37.73 ve C22:6n-3'te 69.40 oranında azalış önemli görülmüştür. Buna ek olarak C18:3n-6'da da önemli bir azalış tespit edildi.

0.935 μ g/L Atrazin uygulanan balıkların 14. günde PS'nin Σ SFA, Σ MUFA ve Σ PUFA'ları incelendiğinde, Σ SFA'da % 71.08 oranında artış görüldü. Σ SFA'daki bu artış C16:0 ve

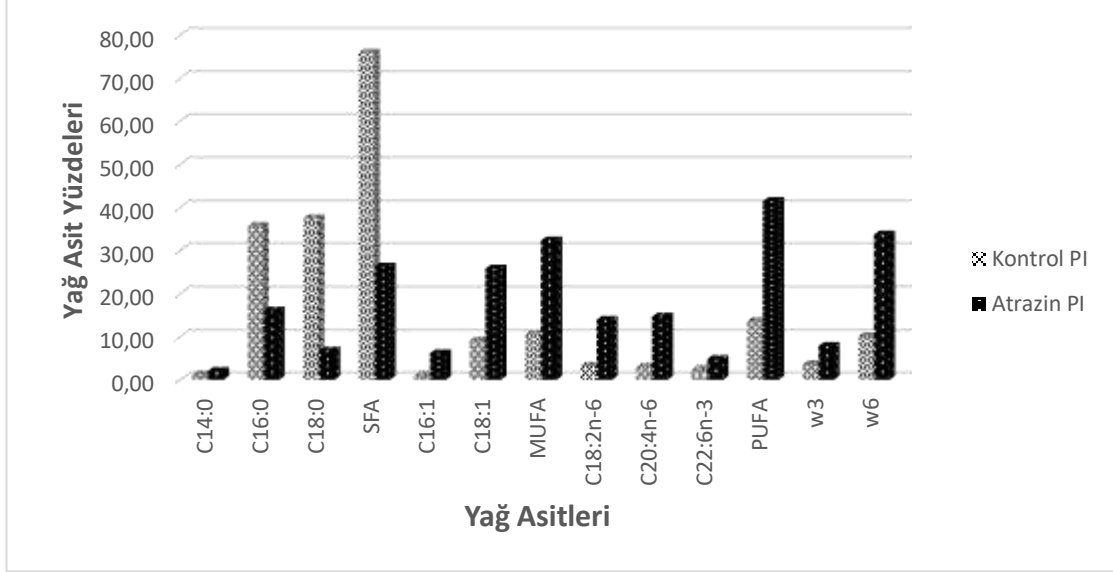
C18:0'dan kaynaklandığı tespit edildi. Σ MUFA'da % 23.89 oranında azalış tespit edildi. Σ MUFA'daki bu azalışın C18:1'den kaynaklandığı görüldü. Σ PUFA'da ise % 36.71 oranında bir azalış tespit edildi. Σ PUFA'daki bu azalışın C18:2n-6 ve C22:6n-3'ten kaynaklandığı görülmektedir. n-3 PUFA'da % 61.46, n-6 PUFA'da % 30.05 oranında azalış kaydedilmiştir. n-3 PUFA'daki azalma C22:6n-3'ten kaynaklanırken, n-6 PUFA'daki azalış C18:2n-6 ve C20:4n-6'dan kaynaklanmıştır.



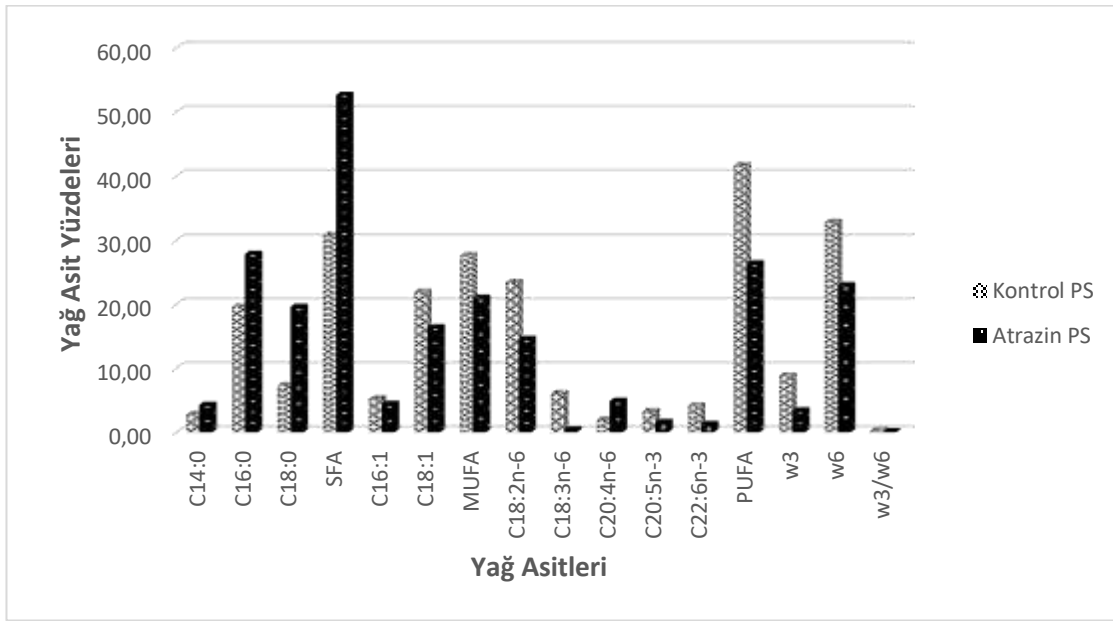
Grafik 1. Atrazin uygulanan *O. niloticus*'un karaciğer fosfolipid alt sınıfındaki (fosfatidilcolin (PC)) majör yağ asit yüzdelerinin 14. günde kontrollerle olan karşılaştırması



Grafik 2. Atrazin uygulanan *O. niloticus*'un karaciğer fosfolipid alt sınıfındaki (fosfatidiletanolamin (PE)) majör yağ asit yüzdelerinin 14. günde kontrollerle olan karşılaştırması



Grafik 3. Atrazin uygulanan *O. niloticus*'un karaciğer fosfolipid alt sınıfındaki (fosfatidilinositol (PI)) majör yağ asit yüzdelerinin 14. günde kontrollerle olan karşılaştırması



Grafik 4. Atrazin uygulanan *O. niloticus*'un karaciğer fosfolipid alt sınıfındaki (fosfatidilserin (PS)) majör yağ asit yüzdelerinin 14. günde kontrollerle olan karşılaştırması

TARTIŞMA VE SONUÇ

Çoklu doymamış yağ asitleri, hücre zarlarında esas olarak lipid peroksidasyonuna maruz kalanlardır. Lipid peroksidasyonu genellikle tek elektronlu hidrojen atomlarının yağ asitlerindeki konjuge çift bağlardan çıkarılmasıyla başlar ve sonuç olarak yağ asidi zinciri bir lipid radikali niteliği kazanır. Lipid peroksidasyonu, membran lipidlerinin oksidatif hasarının bir sonucu olarak hücre zarlarının yapısının bozulmasıdır. Hücre zarlarının bütünlüğü ve akışkanlığı, hücre kalıcılığı için önemlidir (Halliwell ve Gutteridge, 2006).

Pestisitlerin çoğu, yüksek bir lipofilite ile karakterize edilir. Bu nedenle, hücre zarlarının lipidleri ile etkileşime girmelerinin en yaygın yolu, pestisit moleküllerinin lipid çift tabakasının hidrokarbon bölgesine dahil edilmesini içerir. Membran fosfolipidlerinin polar

grupları bölgesinde pestisit moleküllerinin adsorpsiyonu, hidrofilik preparasyonlar ve lipofilik bileşiklerin lipid çift tabakası ile etkileşiminin karakteristiğidir (Golubev, 1993).

Bu çalışmanın sonuçları, *O. niloticus*'un karaciğer dokusundaki fosfolipid alt sınıflarının yağ asidi bileşimlerinin atrazinin toksik etkisinden etkilendiğini açıkça göstermektedir. Atrazinin PI, PE ve PS üzerindeki etkileri toplam SFA'lar, toplam MUFA'lar ve toplam PUFA'lar için geçerliydi. PC üzerindeki etki, atrazinin membran lipidlerine dahil edilmesi ve ROS üretiminin başlaması ile açıklanabilecek toplam SFA'larda ve toplam PUFA'larda tespit edildi. Bu oksijen radikalleri lipid peroksidasyonunu katalize eder.

Zhong et al. (2012) C20:3n-6, C20:4n-6 ve C22:6n-3 dahil çoklu doymamış yağ asitlerinin DDT maruziyetine yanıt olarak azaldığını göstermiştir. Bununla birlikte, C16:0, C18:0 dahil olmak üzere doymuş yağ asitlerinin yanı sıra tekli doymamış yağ asidi C18:1n-9, bir DDT maruziyetinde tutarlı bir şekilde arttı. Çalışmamızda PC'de C16:0 ve C22:6n-3, PE'de 18:1, C18:2n-6 ve C22:6n-3, PI'de C16:0 ve C18:0, PS'de C18:1, C18:2n-6 ve C22:6n-3 azaldı. PC'de C18:0, C18:2n-6 ve C20:4n-6, PE'de C16:0, C18:0 ve C20:4n-6, PI'de C18:1, C20:4n-6 ve C22:6n-3, PS'de C16:0, C18:0 ve C20:4n-6 arttı.

Bratberg ve ark. (2013) *Gadus morhua*'nın karaciğerindeki yağ ve kalıcı organik kirleticilerin etkilerini araştırdı. Karaciğerin yağ asidi bileşiminde birkaç küçük değişiklik bildirdiler. Morina karaciğerinin PC yağ asidi fraksiyonu 16:0, 18:1n-9, 20:5n-3 ve 22:6n-3 gibi büyük zirveler gösterdi. Tipik PE yağ asidi profili için yüksek bir 22:6n-3 zirvesi karakteristikti. Araştırmamızda atrazine maruz bırakılan balıkların PC yağ asidi bileşimi en yüksek C18:0 18:1n-9, 18:2n-6 ve 20:4n-6 seviyelerini içeriyordu. Tipik PE yağ asidi bileşimi 16:0, 18:0 ve 20:4n-6 ile tanınmıştır. Bu farklılıklar doku farklılıklarından kaynaklanabilir.

Bu çalışmada, atrazine maruz kalan grupta PS'nin C22:6n-3'ünde önemli bir azalma gözlemlendi. C22:6n-3, PS açısından çok zengindir. C22:6n-3 seviyesindeki değişikliklerin yağ asidi metabolizması üzerinde büyük etkisi vardır. Bu çalışmada, atrazin maruziyetine yanıt olarak PC ve PS'nin C22:6n-3'ünde düşüşler gözlemlendi, bu da aktivitelerdeki azalmaları veya desaturazların yokluğunu akla getiriyor.

Tatlı suda, hatta küçük konsantrasyonda bile Atrazin varlığı, balık fizyolojisi üzerinde zararlı etkilere neden olabilir ve doğal ortamda hayatta kala birliklerini potansiyel olarak bozabilir. Bu nedenle, bu tür zehirli zararlı bitki ilacı tarafından su ortamının olası kontaminasyonunu önlemek için kontrol önlemleri alınmalıdır.

REFERANSLAR

Almedia JA, Diniz YS, Marques SFG, Faine LA, Ribas BO, Burneiko RC, Novelli ELB 2002. The use of the oxidative stress responses as biomarkers in Nile tilapia (*Oreochromis niloticus*) exposed to in vivo cadmium contamination. *Environment International*, 27: 673-679.

Arnold H, Pluta HJ, Braunbeck T 1995. Simultaneous exposure of fish to Endosulfan and Disulfoton in vivo: ultrastructural, stereological and biochemical reactions in hepatocytes of male rainbow trout (*Oncorhynchus mykiss*) liver. *Aquatic Toxicology*, 33: 17-43.

Bratberg M, Olsvik PA, Edvardsen RB, Brekken HK, Vadla R, Meier S 2013. Effects of oil pollution and persistent organic pollutants (POPs) on glycerophospholipids in liver and brain of male Atlantic cod (*Gadus morhua*). *Chemosphere*, 90, 2157e2171.

Dökmeci G 1988. Toksikoloji: Akut Zehirlenmelerde Tanı ve Tedavi. Nobel Tıp Kitapevi, İstanbul.

Golubev VN 1993. Mechanisms of interaction of pesticides with the lipid bilayer in cell membranes. *Russ. Chem. Rev.*, 62 (7), 683.

Halliwell B, Gutteridge JMC 2006. Free Radicals in Biology and Medicine, fourth ed. Clarendon Press, Oxford.

Hussein SY, El-Nasser MA, Ahmed SM 1996. Comparative Studies on the Effects of Herbicide Atrazine on Freshwater Fish *Oreochromis niloticus* and *Chrysichthyes auratus* at Assiut. Egypt. Bulletin of Environmental Contamination and Toxicology, 57: 503-510.

Ramesh M, Srinivasan R, Saravanan M 2009. Effect of Atrazine (Herbicide) on blood parameters of common carp *Cyprinus carpio* (Actinopterygii: Cypriniformes). African Journal of Environmental Science and Technology, 3: 453-458.

Reddy ATV, Ayyanna K, Yellamma K 1991. Cypermethrin induced modulations in lipid metabolism of freshwater teleost, *Tilapia mossambica*. Biochemistry International, 23: 963-967.

Srinivas T, Prasad TAV, Raffi GM, Reddy DC 1991. Effect of atrazine on some aspects of lipid metabolism in freshwater fish. Biochemistry International, 23: 603-609.

Wester PW, Canton JH 1986. Histopathological study of *Oryzias latipes* (Medaka) after longterm β -hexachlorocyclohexane exposure. Aquatic Toxicology, 9: 21-45.

Zhong H, Dong L, Dong Q, Ke C, Fu J, Wang X, Liu C, Dai L 2012. Quantitative analysis of aberrant fatty acid composition of zebrafish hepatic lipids induced by organochlorine pesticide using stable isotope-coded transmethylation and gas chromatography-mass spectrometry. Anal. Bioanal. Chem, 404, 207e216.

**THE ROLE OF NITRIC OXIDE AND ITS STRUCTURAL COMPONENTS AS A
MEDIATOR OF INFLAMMATION IN DACRYOCYSTITIS IN NEWBORNS AND
CHILDREN UNDER 15 MONTHS**

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Abstract

Nitric oxide (NO) is the most important regulator and mediator in a variety of processes in the nervous, immune, and cardiovascular systems, as well as a universal transmitter in the development of various pathological conditions. Its anti-inflammatory effect is due to the inhibition of catalase, which stimulates the formation of hydrogen peroxide hydroxyl radical - peroxynitrate, harmful to infections. This property of nitric oxide is the most important for our research since it can be one of the moments providing an uncomplicated course of dacryocystitis of newborns. Due to the immaturity of children's immune systems under one year of age, these patients are extremely susceptible to various microbes. The development of a purulent process in this group of patients is especially dangerous. Meanwhile, dacryocystitis is one of the most common problems of ophthalmology among children under the age of one year.

To determine the content and significance of biochemical markers of nitric oxide and its structural elements in blood plasma as an indicator of an inflammatory reaction.

The basis of the work was made up of case histories and outpatient charts of patients with dacryocystitis of newborns who applied to the children's department of the Z. Aliyeva National Ophthalmological Center and the K. Farajeva Research Institute of Pediatrics. The concentration of NO and the quantitative determination of total nitrates and nitrites in blood serum were studied by enzyme immunoassay. 55 patients were examined, divided according to age, gender, and diagnosis.

Our study showed that in newly born patients with dacryocystitis, NO, Ni+ Na, Nit indicators are objectively higher than in healthy children. The course of pathology does not depend on the sex of the child. Patients with higher rates of NO, Ni+ Na, Nit, namely at the age of 7-12 months, give a better response to therapeutic treatment and are more likely to avoid surgery. Determination of NO, Ni+Na, Nit in the blood of newborn patients with dacryocystitis may be recommended to assess the prognosis of the course of the disease.

This study allowed us to determine that in relatively healthy somatically children by the year, the process, as a rule, resolves itself, or surgical intervention is performed. At the age of over a year, the problem persists relatively in weak children, whose protective functions are initially weakened.

Keywords: nitric oxide, dacryocystitis of newborns, inflammation.

MINIMIZE CEMENT EXCESS IN DENTISTRY

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Abstract

Background: The most used types of retention of implant-supported prostheses are screw-retained or cement-retained restorations. The advantages and disadvantages of both have been identified by various authors over the years. However, cement-retained implant crowns and fixed partial dentures are among the most used types of restorations in implant prostheses, due to their aesthetic and clinical advantages. When cemented prostheses are made on implants, the problem of cement residues is important and often associated with biological implant pathologies. The

objective of this research was to establish to what extent the techniques to reduce excess cement really affect the volume of cement residues.

Materials and Methods: This review was written following the PRISMA statement; a detailed search was carried out in three different electronic databases— PubMed, Scopus, and Cochrane Library. The inclusion criteria were prospective clinical studies, with at least 10 participants per group, and with at least 6 months of the follow-up period. **Results:** There have been many proposals for techniques supposed to reduce the amount of excess cement in the peri-implant sulcus and on the prosthetic components, but of these, which are exceptional in their in vitro capabilities, very few have been clinically validated, and this represents the real limitation and a great lack of knowledge regarding this topic. Three articles met the inclusion criteria, which were analyzed and compared, to obtain the information necessary for the purposes of the systematic review.

Discussion: Extraoral cementation can reduce the excess cement, which, after a normal excess removal procedure, is, nevertheless, of such size that it does not affect the possibility of peri-implant pathologies developing. All these studies concluded that a small amount of cement residue is found in the gingival sulcus, and using eugenol-free oxide cements, the residues were only deposited on the metal surfaces, with a better peri-implant tissues health.

Conclusion: Despite the limitations of this study, it was possible to carefully analyze these characteristics and obtain valuable suggestions for daily clinical practice. Resinous cements are considered, due to the free monomers present in them, toxic for the soft tissues. The provisional zinc-oxide cements, also eugenol-free, represent the ideal choice. The different grades of retentive forces provided by these cements do not seem to have clinical effects on the decementation of restorations.

Keywords: cementation technique; cement excess; peri-implantitis; shoulder; chamfer

THE IMPACT OF COVID 19 PANDEMIC ON MENTAL HEALTH

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Abstract

Depression is a disease, just like hypertension or diabetes, and can affect anyone. According to World Health Organisation estimates, depression will be the most common illness in the world by 2030. A study was conducted to examine the impact of the Coronavirus pandemic on the development of depression worldwide. The report notes that even before the COVID- 19 outbreak, statistics on mental health problems in the world were already dramatic.

According to the UN, prior to the pandemic, 264 million people worldwide suffered from depression and the second most common cause of death in people aged 15-29 was suicide. In addition, 20 per cent of people living in regions of armed conflict suffered from mental disorders. According to the report, people with severe mental disorders live 10-20 years less than the general population. Despite this, less than half of the world's governments say they have mental health policies that comply with human rights conventions. Human rights violations against people with severe mental disorders are widespread. In low- and middle-income countries, 76 to 85% of people with mental disorders are not receiving adequate psychological and pharmacological treatment for their needs. There is less than one mental health professional for every 10 000 people and, on average, countries spend 2% of their budget on improving the mental health of their citizens.

Keywords: COVID 19; depression; WHO; Health Systems, psychology

COVID19 VACCINATION: ACCESSIBILITY OR LITERACY? ISRAEL AS A CASE
STUDY

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Abstract

Israel is ranked as the leading country in terms of prevalence of vaccination against SARS-COV-2 virus (persons vaccinated divided by total population). Based on updated data as of January 19, 2021, the objective of the current study is to assess the relationship between the prevalence of vaccination and population density. A-priori, given the better infrastructure of health services (more physicians and nurses per 1,000 persons), one would anticipate a *higher* level of vaccination in denser cities. Surprisingly, the outcomes demonstrate an opposite relationship: a lower level in the per capita level of vaccination with higher population densities from 0.2144 for 2 persons per sq. km. to a minimum of 0.007191 for 16,642 persons per sq. km. Given the relatively good accessibility to vaccination centers and high spread of clinics and health centers in Israel, research findings thus stress the major importance of promoting the benefits of vaccination (vaccination literacy) to diversified populations.

Key Words: COVID-19; Population Density; Socio-Economic Ranking; Gini Index

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THE DEVELOPMENT OF THE SNAIL FARMING SECTOR IN MOROCCO BY
DETERMINING THE OPTIMAL CONDITIONS FOR ENDEMIC SNAILS

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Abstract

Morocco is one of the countries that export a significant amount of snails each year, mainly due to the great diversity and abundance of snails in Morocco. A significant amount of this exported species is collected only from forests and fields, which poses a threat to the ecological diversity of the region, and it does not always provide the required quality in food products.

With regard to this, Morocco, in recent years, has taken some measures and has attempted to develop the snail breeding sector with the aim of providing the required quantity and quality. Accordingly, *Alabastrina tingitana* is a Moroccan edible terrestrial snail, widely distributed in Morocco, but, until now this species remains poorly studied. Moreover, no previous studies have investigated its lifecycle or attempted to establish the optimal controlled conditions for its farming.

In this context, we tested eight different combinations of temperature, humidity and photoperiod under controlled conditions; the optimal-conditions for the reproduction and growth of the *Alabastrina tingitana* snail have also been identified.

We further demonstrated that using the combination of (20°C, 80% relative humidity 16 hours light - 8 hours dark) in the reproduction phase and (20°C, 80% relative humidity 8 hours light- 16 hours dark) in the growth phase; we are able to achieve two lifecycles per year, which can contribute significantly to increase the production and can have implication in farming and breeding of this species.

Keywords: *Alabastrina tingitana*, snail, life cycle, temperature, humidity, photoperiod

THE CATALEPSY PHENOMENON IN ALZHEIMER'S DISEASE EXPERIMENTAL
MODEL

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Abstract

Alzheimer's disease (AD) is a neurodegenerative disease that is rapidly spreading throughout the world, mainly among elderly and senile people. We studied the natural antioxidant Curcuma Longa (Cu) rehabilitation possibilities in conditions of sharply reduced cognitive functions in albino rats using an AD model. The goal of the study was to create and treat an AD in old rats. The influence of Cu in the process of Basolateral Amygdala (BLA) neurogenesis, as well as the recovery of cognitive processes after a total memory impairment, were studied. The surgical bilateral bullectomy in rats with cognitive impairment were observed *per os* with a Cu solution for 10 days. The Cu administration was accompanied by the restoration of spatial memory and all cognitive processes. The restoration of visually controlled behavior was not unambiguous in all animals. It should be noted that in some individuals the process of swimming was characterized by certain features. In the process of searching for an invisible platform, they experienced an attack catalepsy attack. It is well known that in humans, catalepsy is predominantly observed in schizophrenia (Sh) and Parkinson disease (PD) after haloperidol administration. In patients with AD, catalepsy has not been described before our studies. Paradoxical results have been found: under the influence of Cu in catalepsy, the escape latency of reaching the platform was reduced compared to the duration of the search in animals without catalepsy. The exposure to Cu combined with the animals' frozen posture enhanced neurogenesis in the BLA and stimulated the neuronal network in the "amygdala-vision tandem" cluster. It is also concluded that in the animal analogue of AD, the phenomenon of catalepsy was first recorded, which was previously described only for Sh and PD patients

Keywords: Alzheimer's disease, catalepsy, curcuma, amygdala

**UNDERSTANDING THE PHENOTYPIC SPECTRUM OF DYSTONIA 24 (DYT24)
CAUSED BY ANOCTAMIN 3 GENE (ANO3) MUTATION AND DISTINGUISHING
FEATURES FROM OTHER PRIMARY DYSTONIAS IN ADULT POPULATIONS.**

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Abstract

We aimed to determine the prevalence of ANO3 mutation in patients with clinically diagnosed dystonia (DYT-ANO3), evaluate its phenotypic spectrum, and compare it to other primary dystonias. 64 patients from First university clinic of Tbilisi State Medical University and Republic Hospital named after acad. N. Kipshidze have been selected. All of the patients were diagnosed with primary dystonia. Genetic testing was performed to identify the presence of anoctamin 3 gene (ANO3) mutation. 54.7 % of selected patients were male (n=35), 45.3% (n=29) female. Age of symptom onset ranged from 17 to 38 years, mean 33.4 (+/- Standard Deviation 5.6 years). The presence of a mutation in 2 patients from 64 (3.12%). The age at symptom onset was 27 years in one patient and 25 in the other, both patients were female Caucasians. Both patients demonstrated segmental dystonia, in contrast to the majority of remaining ones, in whom focal or generalized distribution was evident. In 1 patient cervical dystonia was the initial presentation while in another one upper limb involvement predominated. Of utmost importance is the presence of tremor, 4-6 Hz in frequency which demonstrated an increase in amplitude during the action. Interestingly both patients showed signs of myoclonus, which, based on studies, can be an important clinical feature of ANO3 associated dystonia. In both patients, missense mutations in the ANO3 gene were identified. ANO3 gene mutation is a rare but important contributor to the development of primary dystonia, which shares lots of clinical features with other genotypic variants, but the presence of tremor, myoclonus, segmental distribution, and predominant involvement of upper limb/cervical region may be characteristic for DYT-ANO3.

Keywords: Primary Dystonia, Dystonia 24, Craniocervical dystonia, ANO3, Next-generation sequencing.

**DERIVATIZATION OF DRUG WITH TRANSITION METALS AND ITS EFFECT
ON BIOLOGICAL EVALUATION**

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Abstract

The derivitization of drug was done by the condensation of sulpha drug with aldehyde at specific conditions to form Schiff base ligand. This Schiff base was further used to prepare a series of copper (II), cobalt (II), zinc (II), nickel (II), manganese (II), iron (II) complexes. The ligand and metal complexes were the characterized by using different instruments like FT-IR, ^1H NMR, ^{13}C NMR, Mass, Atomic absorption spectroscopy, Elemental analyzer, UV-visible Spectrophotometer, Evans balance and Conductivity meter. The synthesized ligand and transition metal complexes were tested against various bacteria and fungi. According to research, the biological studies demonstrated the enhanced activity of metal complexes against reported microbes when compared with free Schiff base ligand.

Keywords: Schiff base, metal complex, sulph drug, aldehyde, Biological

**COMPUTER VISION SYNDROME AMONG MEDICAL STUDENTS DURING THE
COVID-19 PANDEMIC**

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Abstract

Computer Vision Syndrome (CVS) refers to ocular symptoms which occur as a result of prolonged use of digital devices. The main objective was to understand the effects of continuous online classes due to the COVID19 pandemic on the ocular health of medical students. This quantitative study used data gathered from a survey questionnaire administered to 200 medical students at Tbilisi State Medical University in Georgia. The questions mainly comprised of symptoms related to CVS and digital device use patterns. As a part of the research, 200 students between the age groups of 18 and 26 were surveyed. After the pandemic, 33.8% students recorded a 3 to 5 hour increase in their screen time while 29.4% reported an increase by 1 to 2 hours. Eye strain and dry eyes as a result of the pandemic saw a significant increase in affected individuals from 69 to 84 and 47 to 60 respectively. Among other non-visual ailments there was an increase in symptoms like headaches (from 90 to 100 students), back aches (from 50 to 78) and neck pains (from 37 to 75 students). It was concluded that the prevalence of symptoms related to Computer Vision Syndrome in medical students had seen a rise resulting from the online classes due to the pandemic. Awareness of CVS and the prevention of symptoms is necessary especially among students.

Keywords: Computer Vision Syndrome, CVS, Eye Health, Pandemic, Dry eye

POSTCOLONIAL REPRESENTATION OF MIMICRY, HYBRIDITY AND
UNHOMELINESS IN ABDULRAZAK GURNAH'S *THE LAST GIFT*

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Abstract

The British Empire, which is known as “*the sun never sets*” subdued Third World citizens during the colonial period by imposing cultural values. Due to the independence of colonies from Britain, it became a multicultural nation with the migration of people from colonized lands. Third-World people who were stuck between their own culture and Western culture experienced problems of cultural identity, and they unconsciously underwent a transformation that spanned a long process. Writers who had connections with colonized countries addressed Third-World nations’ suffering and oppressions through literature, and the concept of culture was an initial theme in their works. Among these critics, Homi Bhabha is one of the most influential in the postcolonial period. Homi Bhabha’s *The Location of Culture* (1994) introduced new terms to the postcolonial literature about colonized people's lifestyles in the colonial era. Similarly, the Zanzibar-born British writer Abdulrazak Gurnah has created valuable works in postcolonial literature that deal with the lives of colonized people who try to settle into their new living space after migration. In *The Last Gift* (2011), Gurnah focuses on various themes like silence, identity, exile, and guilt, but the effects of immigrant experiences on cultural identity will be the main point of this article. In this respect, this article aims to analyze Homi Bhabha’s critical terms such as *hybridity*, *mimicry*, and *unhomeliness* that are depicted in the characters in *The Last Gift* by Abdulrazak Gurnah.

Keywords: postcolonialism, cultural identity, hybridity, mimicry, unhomeliness

THE ANALYSIS OF EXCLAMATIONS IN GAGAUZ TURKISH IN A
SEMANTICAL CONTEXT

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Abstract

In the study, exclamations in Gagauz Turkish are examined in the context of the text and the meaning they attributed to the text in terms of functionality was discussed. It has been determined that the exclamations, which exhibit an unstable formation in the semantic plane, have a polysemous layer. The exclamation, which is an emotional modality that brings the speaker's request into focus, has been in the position of a modality marker that reveals the potential of the hidden or apparent feeling. For this reason, in order to better understand the meaning and discourse value, the examination in the orbit of linguistic integrity is based. The texts are expressed with the power of interpretation by analyzing in terms of meaning and function.

In the study, it is aimed to make sense of the emotional spectrum of the exclamations and to convey the most accurate information to the communication environment. Exclamations, which can be understood with emphasis, intonation, gestures and mimics during speech, presented an irregular and irregular appearance in written texts. Therefore, it continued to be a controversial issue in terms of their positions and roles.

In this study, it is noted that exclamations contain many functions such as sadness, joy, fear, which provide emotional transfer through other language elements in the text. It has been determined that the exclamations that strengthen the expression capacity of the sentence undertake the same task in Gagauz Turkish. In line with the analyzed texts, it has been seen that Gagauz Turkish has a wide range of exclamations. Exclamations, which appear as grammatical structures that bring enthusiasm and harmony to the narrative mechanism, have undergone a functional transformation.

Keywords: Gagauz Turkish, Exclamations, Semantic, Function

Özet

Çalışmada Gagauz Türkçesindeki ünlemlerin metin bağlamında incelenip işlevsel açıdan metne yüklediği anlam ele alınmıştır. Semantik düzlemde kararsız bir oluşum sergileyen ünlemlerin çokanlamlı katmana sahip olduğu tespit edilmiştir. Konuşucunun isteğini odağa taşıyan bir duygu kipliği olan ünlem, gizil ya da görünürdeki his potansiyelini açığa çıkaran bir kiplik işaretleyicisi konumunda yer almıştır. Bu sebeple anlam ve söylem değerinin daha iyi anlaşılması adına dil bütünlüğü yörüngesindeki inceleme esas alınmıştır. Metinler anlam ve işlev ekseninde çözümlenerek yorum gücüyle ifade edilmiştir.

Çalışmada ünlemlerin duygu yelpazesini anlamlandırmak ve iletişim ortamına en doğru bilgiyi iletme amaç edinilmiştir. Konuşma esnasında vurgu, tonlama, jest ve mimiklerle

anlaşılabilen ünlemler, yazılı metinlerde kuralsız ve düzensiz bir görünüm arz etmiştir. Bu nedenle konuları ve üstlendikleri roller bakımından tartışmalı bir konu olmayı sürdürmüştür.

Bu çalışmada ünlemlerin metinde bulunan diğer dil öğeleri aracılığıyla duygusal aktarımı sağlayan üzüntü, sevinç, korku gibi birçok işlev barındırdığı dikkati çekmiştir. Cümlelerin ifade sığasını güçlendiren ünlemlerin, Gagauz Türkçesinde de aynı görevi üstlendiği tespit edilmiştir. İncelenen metinler doğrultusunda Gagauz Türkçesinin, ünlemlerin varlığı konusunda geniş bir alana sahip olduğu görülmüştür. Anlatım mekanizmasına coşku ve âhenk kazandıran gramatikal yapı olarak beliren ünlemler işlevsel dönüşüm arz etmiştir.

Anahtar kelimeler: Gagauz Türkçesi, Ünlemler, Semantik, İşlev

GİRİŞ

Çalışmada ünlem cümlelerinin metin bağlamında incelenerek, cümlelerde geçen ünlem ifadesinin anlam sınırlarını işlevsel açıdan çizebilmek amaç edinilmiştir. Bu amaç doğrultusunda işleve ad verme işlemi gerçekleştirilmiş ve anlambilimden yardım alınmıştır. Anlamsal boyutun gizil yapısının analiz basamağında ise noktalama işaretleri ve yorum gücünden yararlanılmıştır. Böylece derin yapıda saklı olan ünlem ifadesi tespit edilerek yüzey yapıya taşınmıştır. Bu basamak işlevin anlamlandırma sürecine olumlu yönde katkı sağlamıştır.

Gagauz Türkçesinde ünlem ifadesi “şaşma¹”, ünlem işareti ise “şaşma nişanı²” terimi ile karşılanmaktadır. Yazılı ve sözlü kültürün canlı ifadeleri olan ünlemler, Türkiye Türkçesinde olduğu gibi, Gagauz Türkçesinde de oldukça önem arz etmektedir.

Duyguyu, heyecanı, sevinci en yalın ve keskin bir şekilde aktarmaya yardımcı olan ünlemlerin, anlatımda özel bir yeri ve işlevi vardır. Çünkü çoğu zaman birkaç cümle ile anlatılabilecek durumlar bir ünlem ile ifade edilebilir (Akalm, 2011: 588). Ünlemlerin diğer bir özelliği de dillerin doğuşu ile ilgili teorilere kaynaklık etmeleridir. Bazı bilim insanları dilin doğuşunu ünlemlere dayamıştır. Şöyle ki, insanların türlü olaylar karşısında ruh ve bedenle ilgili duyguların etkisiyle açığa çıkardıkları ünlemlerin, sonradan sözcüklere dönüştüğünü, çeşitli kavramları karşıladığını ileri sürmüşlerdir (Aksan, 1987: 96 – 97). Ünlem bir duyusu, bir dileği canlı bir şekilde ve kimi zaman yalnız başına anlatan ve bir kimseye seslenmeye yarayan kelime (Banguoğlu, 2011: 396) olarak tanımlanmaktadır. Ünlemler genellikle cümle dışı öğelerdir, fakat konuya anlambilim açısından bakıldığında aynı şeyi söylemek, yani cümle dışı unsur olduğunu kabul etmek olanaksızdır. Çünkü, anlam ve anlatım bakımından ünlem ve onu takip eden cümle öğeleri iç içedir. Cümledeki ünlemin cümleye kattığı anlatım etkisinin daha iyi anlaşılması için çoğu kez önemli cümlelerin yetersiz olması ve söz konusu ünlemden önce ya da sonra gelen cümlelerin de gözden geçirilmesi ihtiyacı, ünlemin anlam bilim açısından ilgili cümle veya cümleler ile bağlantılı olmasından kaynaklanmaktadır. Bu bakımdan ünlemler, cümlelere anlam derinliği katan ve onları süsleyen öğeler olarak kabul edilebilir (Korkmaz, 2019: 963).

AMAÇ

Ünlem cümlelerinin incelenerek, işlevsel açıdan ne tür anlamlara sahip olduğunu belirlemek, belirlenen ünlem cümlelerinin anlatım mekanizmasına çokanlamlı bir yapı yüklediğini ve bu yapının çeşitli metinlerden derlenen örneklerle anlam kazandığını tespit etmek çalışmanın esas amacıdır.

1 şaşma: Bu terim N. İ. Baboğlu, İ. İ. Baboğlu'nun “Gagauzçanın Gramatikasi (Fonetika, leksika, morfoloğya, sintaksis)” adlı çalışmasının 346. sayfasında geçmektedir.

2 şaşma nişanı: Bu terim N. İ. Baboğlu, İ. İ. Baboğlu'nun “Gagauzçanın Gramatikasi (Fonetika, leksika, morfoloğya, sintaksis)” adlı çalışmasının 346. sayfasında geçmektedir.

YÖNTEM

Derleme modeli kapsamında ele alınan çalışmada, yöntem olarak izlenen yol şu aşamalardan meydana gelmektedir:

- Ünlem cümlelerini işlevsel kategoride incelemek ve böylece ünlem ifadesinin cümle dışı unsur olmadığını göstermek,
- Gagauz Türkçesine ait metinlerden derlenen örnekleri anlam dağarcığına göre bir sınıflandırmaya tâbi tutmak,
- İşlevsel çalışmanın odak noktası olan anlambilimden kopmadan, metni doğrudan bağlam , koşulları ve yorum gücüyle anlamlandırmaktır.

BULGULAR

Taranan Gagauz Türkçesine ait metinlerde ünlemlerin yüklendikleri işlevlerin anlamsal çözümlemesi şu şekilde yansımıştır:

1. Dua İşlevi

Pipiruda gezeriz, gezeriz!
Allaha duva ederiz, ederiz!
Ver Allahım yaamurcuk, yaamurcuk!
Tarlada çamurcuk, çamurcuk!
Teknedä hamurcuk, hamurcuk!
Fırında somuncuk, somuncuk!
Uşaklara kolaççık, kolaççık!

(Akt. Zanet, 2017: 30)

Şiirde konuşucunun Tanrı'dan kuvvetli bir istekte bulunduğu görülmektedir. Bu istek şiirin tamamında hissedilmekte ve ünlem unsuru ile birleşerek anlamsal boyutta dua işlevine karşılık gelmektedir. Konuşucunun alması gereken iletiye katkı sağlamak, dinleyicinin hislerini aktarmak olan ünlem, anlatıma estetiksel ve coşkusal bir değer yüklemektedir. Konuşucu yağmurun yağmasını, bolluğu ve bereketi dilemektedir. Söylemdeki üslup ve yinelenen sözcükler, dileğin istem derecesini arttırarak pekiştireç görevi üstlenmektedir. Eksiz emir çekiminin bulunduğu “ver” sözcüğünde yer alan vurgu, bünyesinde ünlemi barındırarak ifadeye canlılık ve âhenk katmaktadır.

2. Teklif Etme İşlevi

Yaşarmış bir dâduylan babu. Yaşarmışlar pek fikaara. Allaa onnara vermemiş evlat. Bir günü dâdu dârmış: “Git, mari, getir biraz un. Biz da yapalım bir pita mı, nel!”

Gider babu, gider ambara – birazçık un süpürecek. Süpürükana, “vıh!” görer bir sıçancık. Alêr o sıçanı, kaçarak gelir dâduya: “Dâdo, hele bak, - dârmış, - tuttum bir sıçancık!” Dâdu dârmış: “Pı-ı-ıh, nâbalım şindi?” “Hadi o olsun bizim kızçaazımız!” – teklif etmiş babu. “Hadi, ozman, olsun! Olsun bizim kızçaazımız!” – kayıl olmuş dâdu.

(Zanet, 2017: 22)

Metinde kocasının isteği üzerine, ambara un almaya giden yaşlı kadının, ambarda tesadüfen görüp yakaladığı bir sıçanı, evlat olarak benimseme isteği konu edilmiştir. Konuşucu (babu), “Hadi o olsun bizim kızçaazımız!” diyerek dinleyiciye (dâdu) teklifte bulunmaktadır. Cümlede konuşucunun kendi fikrini bildirmesi ve kendini de sunduğu şeye dahil etmesi teklif etme işlevini görünür kılmıştır. Israrlı bir istemin bulunduğu ünlem cümlesinde teklif etme işlevinin ağır bastığı, bu işlevin emir kipi ve “Hadi” ibaresindeki vurgu aracılığıyla tespit edildiği görülmüştür.

3. Kabul Etme İşlevi

Nastradin Hoca lafeder küçük oolunnan.

-Boba, - sorêr oolu. – Biz islää insannar mı?

-Belliki, oolum!

-E, neçin bu zorluklar gitmeerlär bizdän kötü insannara?

-Neçin zerä, zorluklar da sevmeerlär kötü insannarda yaşamaa. Biz islääyiz, bunun için da onnar bizdän gitmeerlär. (Akt. Zanet, 2010: 196)

Diyalogta konuşucunun göndermiş olduğu ileti, dinleyici tarafından “belliki” sözcüğü ile onaylanmıştır. Konuşucunun sorduğu soru karşısında dinleyicinin vermiş olduğu tepki ünlem cümlesine kabul etme anlamını yüklemiştir.

4. Alay Etme İşlevi

Hele bak sän, hele bak!

Bostanda bir boş susak.

Benim yarım balaban –

Sade kemik hem gırtlak.

(Akt. Zanet, 2010: 336)

Konuşucu dinleyici ile görüntüsünden dolayı dalga geçmekte ve bu durumu dikkati çekme işlemi ile ifade etmektedir. Dörtlükte ciddi bir tarz ya da iğnelemeden ziyade, var olan durumun mizahi bir dil ve îma etme yöntemi ile dışavurumu görülmektedir. Ansızın beliren duyguları güçlendiren ünlem ifadesi, emir kipinin olumlu eksiz çekimi ve bağlam yardımıyla çözüme kavuşmaktadır. Baskın işlevin alay etme olduğu görülmektedir.

5. Güven Verme İşlevi

Gagauziya – gözäl bir er Dünnedä!

Gagauziya, seni koruycez yıllarda!

Salt seninnän dolu üreklär,

Geeri dönmesin geçmişlär,

Gagauziya, o bir can –

Daymalarda kalacan!

Yaşasın Gagauziyamız!!!

(Zanet, 2012: 111)

Şiirde konuşucu vatanını koruyacağına dair teminat vermekte ve bu söylemi ünlem ifadesinin derin yapısını meydana getiren coşku ve sevinç birimleri aracılığıyla dile getirmektedir. Şiirin bütününde hissedilen duygusal yoğunluk, doğrudan ünlem pekiştireci ile işaretlenmektedir. Konuşucu verdiği söz ile güven vermenin yanı sıra, dinleyiciye, inanma duygusunu da yansıtmaktadır.

6. Emir İşlevi

Maana Kağanlığın tarafından etfalitlere cenk açmağa vardı, hem büyük maana. İstemi onu kullandıydı: açan İstemi – kağanın yollanmış adamnarı Persia merkezine, geri doğru bir kaçış geçirdiler etfalit topraklarından, İsteminin masus izinine göre; etfalit askerleri tutmuştu onnarı da getirmiştiler kendi hanın, Gatfarın önüne.

-A-ha-a, türk hainnarı, Hosroydan gelersiniz, bize karşı düşmannık annaşması düzdünüz? – dişler arasından süzdüydü üfkeli Gatfar – han! – Hepisini parça – parça kıyın! – baardıydı han askercilere. – Salt te bunu, ani taa zabun brakın gitsin, haberi götürsün o “pek akıllı” saabisine!

(Tanasoğlu, 2009: 30)

Metinde yer alan emir ekli fiil ve bu fiilin cümleye kattığı ünlem unsuru metin bağlamında açığa çıkmıştır. Han'ın sözleri emir ekleri vasıtasıyla yansıtılmış ve yansıtılan sözler

emretmeyi belirtmiştir. Sosyal statü üstünlüğünün odakta olduğu bu işlevde yapılması istenen eylemin güçlü bir isteğe konuşlandığı görülmüştür. Emir ifadesinin anlam alanında bulunan azarlama, öfke, kızgınlık gibi duygular ünlem aracılığıyla harmanlanmış olsa da öncül işlev emir işlevidir.

7. Çıkarım İşlevi

Kanatlı gördüm örümcä,
Ürü-ürü örüyer,
Bän sandım onu karımca,
Bir bakêrim – o uçêr!

O uçêr hem şafk verer.
Ne o içindä saklı?
Sansın yıldızcık şilêêr!
Şafk böcää o, olmalı!

(Bujilova, 2020: 273)

Varsayımsal analiz sonucunda kişisel bir anlam perspektifi oluşturma çabasına giren konuşucu, kendi dayanağını da ortaya koymuştur. Böylece akıl yürütme ve tümevarım metodunu kullanarak bir gerçeklikten somut verilere ulaşmıştır. Anlamı yapılandırmak adına kullanılan bilişsel bir süreç olan çıkarım işlevi, ünlem unsuru ile birleşerek şiirin derin yapısına yönelik olasılıkları değerlendirmeyi sağlamıştır. “Şafk böcää o, olmalı!” cümlesi, konuşucunun belli veriler ışığında varmış olduğu neticeyi göstermiştir. “olmalı” sözcesindeki –mAll eki çıkarımı işaretleyen ek konumundadır. Şiirde tahmin, kuşku, olasılık gibi bilgi kiplikleri iç içe geçmiş ve çokanlamlılık (polisemi) arz etmiştir. Fakat baskın işlev çıkarım işlevidir.

8. Şaşkınlık İşlevi

Bir vakit insannar prostmuş. Varmış bir adam içlerindä, çok gezmiş, üç kerä dermenä gitmiş, çok bilirmiş.

Bir da büyük yaamur yaamış da sel getirmiş bir araba uzaktan. Da onnarın küüyündä o araba dayanmış, durgunmuş.

Kalkmışlar insannar sabaalän, baksalar: ‘Var bişey!’ Hepsi demişlär: ‘Naş – şşşş- ey bu?’

Kimsey tanıyamazmış, da demişlär:

-Çaarın Stuyanı. Lääzım bilsin, zerä o gezmiş adamdır – üç kerä dermenä varmış gittii.

Çaarılmışlar Stuyanı. Gelmiş. Sormuşlar:

-Naşey bu, ba Stuyan?

Stuyan demiş:

-Bu bişeymiş ne zamansa. Ama nesä imiş onu – da kalmış salt kemikleri.

Hepsi, şaşıp, baarmış:

-Bildi, bey, bildi bunu da! Gezmiş adam!

(Gaydarcı, 2018: 179)

Metinde konuşucuların önceden bilgi sahibi olmadıkları bir olaya şahitlik etmeleri sonucunda, yaşadıkları muamma ve şaşkınlık söz konusu olmuştur. Konuşucular beklenmeyen durum karşısında tepkisel belirsizlik yaşamıştır. Ansızın beliren bu duygu potansiyeli ünlem unsuru yardımıyla daha etkin bir şekilde ifade imkânı bulmuştur.

9. Korku İşlevi

Peti boyda Ganidän çok taa balabandı, zabundu hem zararcıydı. O girdi hayada da gösterdi Ganiyâ patlangacı. Gani baktı oyuncaa çez-çevirä da sordu nasıl patlatmaa. Peti gösterdi da dedi:

- Na patlat!

Gani seftä bilmezine oynardı bölä şeylän da dooruttu onu pençereyâ, çekincä silgici kavaldan atak urdu pençereyâ da tuz-buz yaptı gözü.

Uşak pek korktu.

- Şinçik mali gelecek!, dedi o Peticää.

- Bän kaçacam evä, ama sän sölä, ani bän kırdım da babu seni düümeyecek.

- Ölä, söyleyim yalan da büümeyim mi? Sän ya koca paardıysın bän sa küçüküm...

- Kim sana söledi, ani büümeyecän ba ahmak?

-Mamu hem mali.

- Yalan! İnanma onnarı, ba maymun! – dedi Peti da tıdı evä, sansın onu inek dilinän yalamıştı.

(Baboglu, 1998: 17 - 18)

Metinde gerçekleşen olumsuz bir durumdan ötürü duyulan korku ve endişe yer almaktadır. Konuşucu evde arkadaşıyla oyun oynadığı sırada kazara pencereyi kırmış ve annesinin kendisine kızmasından duyduğu korkuyu yansıtmıştır. Konuşucunun yaşamış olduğu gerginlik ve huzursuz ruh hâli korku işlevini gün yüzüne çıkarmış, bu durum ifade edilirken ünlem unsuru kullanılmıştır.

10. Üzüntü İşlevi

Küçüklük çekeder sallangaçtan, ani evel asılıymış dört iplen içerdä kirıştä, kimi gagauz küüylerindä bu uşaklık sallangaçına taa deerlär beşik, taa başka erlerdä da bu sallangaçın erinä tekneyi kullanêrlar... Ne meraklı ekmeklen sonsuzluun başlantsı – bir erdä.

Ama büünkü günümüzde sallangacımızın adı da başka oldu, diişildi. Ah hem aman! En eskiliimizi en çeketmemizin da öz döşeciimizin da adını kaybettik, battı! Yazık!!!

(Baboglu, 1998: 50)

Metinde birtakım değerlerin zaman olgusu karşısındaki durumu ele alınmıştır. Söz konusu değerlerin değişime uğradığı veya yok olma tehlikesi geçirdiği vurgulanmıştır. Konuşucu var olan durumdan ötürü derin üzüntü duymuştur. Konuşucunun yaşamış olduğu duygusal yakınma ünlem ifadesi aracılığıyla görünür kılınmıştır.

11. Pişmanlık İşlevi

- Olaydık öküzlâren, - dârdim bän, - şindiyâdan bir desyatına süreceydik ne zamandan düüneriz bu demir tepesinnen. Ne bu iş mi, o hiç yok niedi da çeketsin.

Lişku saydı üfkedän tükürärdi her tarafa hem baarardı:

-Vazgeçtin artık hepsindän traktordan da, hayırız, onmadık! Keşki dâ vermeydim rulü senin elinä! Bozdun güzelim maşınayı da şindi geri çekersin a? Dur, çocuum, kurtulmaycan ölä kolay, ilkin ödeycän gosudarstvanın traktorunu, da sora öküzlerä!

(Baboglu, 1974: 9 – 10)

Metinde yaşanan durum karşısında konuşucunun duyduğu pişmanlık ve hayıflanma hissi dikkati çekmektedir. Konuşucunun dinleyiciye olan güveninin sarsılması ve bu güvenin hayal kırıklığına dönüşmesi pişmanlık duygusunu ortaya çıkarmaktadır. “ Keşki” sözcüsünün ünlem ifadesiyle perçinlenmesi sonucu beliren pişmanlık işlevi, bünyesinde azarlama, öfke, kızgınlık ve üzüntü anlamlarını da barındırarak polisemi yapıya dönüşmektedir. Öncül işlev pişmanlık işlevidir.

12. Beddua İşlevi

KATİ (bir çala sustuktan sora): Manol batö, acaba, kim o kolhozun ambarlarını tutuşturdu, yaktı? Hiç mi şüpän yok?

MANOL: Kim? Hiç diil zor annamaa. Eski partorg hem zavgar, kıskançlıktan hem üfkelerindän, ani onnarı bän iştan uurattım deyni.

DİMU: Bän sanêrım, ki diil bu adamnar kabaatlı, neçinki onnarı ilkin gördüm, gelmiştilär yangını süündürmää.

MANOL: Dimu, yınanma, bu gözboyacılık. Çıktılar ilkin süündürmää kendilerindän kabaatı sapıtmaa deyni. Bununnan sandılar kapandan kurtulaceklar.

KATİ: E, onnar kendi ellerinnän yapmadısalar da sarfoşçunun birini yolladılar...

MANOL: Artık biliner, ki aalemsiz, kendi ellerinnän yakmışlar, kendileri da sölemişlär.

GİNA: O – o-o, göklerde olan padişahımız! Allahımız, cezala bölä zulumnarı da onnarın elleri bilektän kurusunnar!

(Baboglu, 1999: 46)

Söz konusu diyalogta konuşucunun yaşanan olay karşısında Tanrı'ya yöneldiği ve kuvvetli bir kötü dilekte bulunduğu görülmektedir. Konuşucu, öfkelenip kızdığı kimseler için kötü duada bulunmaktadır. Dilediği şeyin gerçekleşmesi adına, isteğini Tanrı'ya havale ederek âdeta bir yakarıшта bulunmaktadır. “O – o-o, göklerde olan padişahımız!” cümlesinde konuşucu Tanrı'ya seslenerek haykırıшта bulunmakta ve ruh hâlini rahatlatmaktadır. İfadeye güç katan nidanın kullanılması ve çekimli emir kipinin varlığı önem arz etmektedir. Metin bağlamında anlam bulan bu yapılar beddua anlamını işaretlemektedir.

13. Yemin Etme İşlevi

-Üsek Allahlıklar seni iyi sözlesinnär, baş – bey. Oğuz – hanın kılıcı, angısını eldän elä taşıdı İstemi – kağan, Oldan – Batır, Araslan – bey, senin dä elindä titirämesin! Emin et!

-Emin ederim! – diz çöküp, büyük inannan değer Vasil – bey. – Hem emin ederim, yaşamamı acımayım yurtluğumuz için! Emin ederim rahmetli Büyük dedäma Araslan - beyä! Hepisinä Büyük Oğuz – göktürk dedelerimizä! Allahlıkların önündä emin ederim!

(Tanasoğlu, 2009: 176)

Konuşucu vatanını koruyacağına , devraldığı liderlik vasfını gereken şekilde yerine getireceğine dair kutsal kabul edilen değerler ve varlıklar üzerine söz vermektedir. Dinleyiciyi inandırma çabası içinde olan konuşucu, emir ekleri ve ünlem ifadesi yardımıyla yemin etme işlemini gerçekleştirmektedir.

14. Tehdit İşlevi

Daa içindän işidildi bir sıklık, fidannar arasından tüfek kavalları göründü, bir ses baardı:

-Kostaki Negrunun adamnarı! Sıbıdın erä tüfekleri, brakın dokunmadık bıçakları! Savaşmayın düüşmää, zerä hepsiniz keezdäysiniz, özenmeyin kaçmaa – ansızdan tutulacınız! Bir adım bir tarafa yaparsanız, kurşun annınıza kabledeceniz!

Aaçların arasından çıktı Pidoş – tüfek elindä, bıçak belindä, rubaları gözäl, sansın hiç diilmiş fukaara. Bir tarafında onun Taşka kılıçlan, öbür tarafında Tukuli, komuşu oolu. Sokuldu onnar yakına, ama taliga yanına sokulamadılar. Kostaki Negru kavradı belindän bıçaanı, sıbıttı Pidoşa dooru.

(Kuroglu, 2011: 187)

Konuşucu dinleyicilerin kendisini dinlememeleri ya da söylediklerini yerine getirmemeleri hâlinde onları ölümle tehdit etmektedir. Konuşucunun amacı dinleyicilere verdiği emirlerin yerine getirilmesini sağlamak, gözdağı vermek ve tehlikeli bir durum yaratmaktır. Bu durumu, emir ekleriyle bütünleşen ünlem ifadesiyle dile getirmektedir.

15. İyi Temenni İşlevi

Pek paalı okuyucularımız hem saygılı can dostlarımız, kutlêêrız sizi Koladaylan hem hepsi Yıl Başı yortularınnan!

Allaa versin hepsimizä saalık hem uzun ömür! Cannarımız mutluluklan dolu olsun! Evlerimizä kısmet hem selemetlän bereket, raatlık hem annaşmak! Ko kahırlar, hepsi zorluklar hem belalar arda kalsınnar.

Saalık Allaa versin!!!

(Anasözü Gazetesi, 2022: 1)

Konuşucular yeni yılın dinleyicilere saalık, mutluluk, uzun ömür, kısmet, bereket ve huzur getirmesini dilemiştir. Söylemin daha canlı ve vurgulu şekilde ifade edilmesi adına ünlem unsuru kullanılmıştır. “Pek paalı okuyucularımız hem saygılı can dostlarımız...” şeklindeki ifade kibarca yapılan bir seslenişi yansıtmıştır. Nida ile gerçekleştirilen anlam yapısının esas gayesini dikkati çekme oluşturmuştur. Metnin bütünsel işleyişinde iyi temenni işlevine vurgu yapılmıştır.

16. Abartma İşlevi

Doyamêêrım bän adını
Gecä – gündüz yalpak anmaa
Hem o kara kaşlarını
Gözlerimdä dinmüz tutmaa.

Salt nasıl da dayanacam,
Açan sensiz az kalacam? –
Sanêrım ki tutuşacam,
Bir mum gibi bän yanacam!..

(Köse, 2001: 132)

Şiirde konuşucunun dinleyiciye olan hayranlığını ifade etmesi söz konusudur. Bir insanın diğer kimsenin yokluğuna dayanamaması nedeniyle tutuşup bir mum gibi yanması mümkün olmadığı için dile getirilen söylemde imkânsızlığa bağlı bir abartma vardır. Bu abartma işlemi ünlem ile birleşerek anlatıma canlılık ve inanma duygusu katmaktadır.

17. Sevinç- Coşku İşlevi

Eski hun adetine göre, Bumini yabgu ayırdıydı asker başları demir kalkan üstünde kaldırıp:

- Nekadar saabi bize olacak? – sordular.

-Nekadar kuvedim olacak duşmannarı tepelemeğe hem nekadar sizin kayıllığınız olacak.

-Nice saabilik edecen?

-Nice Aşına babamız nasaat braktı saabilik edecem hem nice siz dorudacanız.

-U-ra-a! U-ra-a! Yabgumuz yaşasın! Bumin yabgu yaşasın! Tangri onu tutsun! Biz ona yardımımız!

(Tanasoğlu, 2009: 18)

Konuşucular yaşamış oldukları mutluluk karşısında duygularını beklenmedik veya sıradışı şekilde göstererek sevinçlerini dışa vurmaktadır. Coşkulu kişiler (konuşucular) hissettikleri mutluluğu, çılglık atarak ortaya koymaktadır. Sevinç ve heyecanın en üst düzeyi olan coşku, bedenen ve ruhen hissedilen duyguyu aktarmaktadır. Bu aktarma işlemi ünlem pekiştireci ile sağlanmaktadır.

18. Yalvarma – Yakarma İşlevi

Bir vakit varmış, bir vakit yokmuş. Bän saat olmadım, ama, dooru olmayaymış, söylenmeyceymiş. Küüyün kenarında yaşarmış bir babu. Varmış onun bir saamal inää. Babu saayarmış inää, satarmış südü da bununnan yaşarmış.

Bir kerä babu saamış inää, brakmış çelää aul içindä da gitmiş başka işinnän. Döndüynän evä, baksa: çelek boş – kimseydi içmiş südü. Bu günü babu aaç kalmış. Bir gün ölä olêr, iki, üç – annayamêêr babu, neyâ sataşmış. Kararlamış kollamaa.

Bir sabaası genä tölä saamış inää, braamış çelää kapu önündä, kendisi da saklanmış. Baksa: tilki sürüner südä dooru. Tilki sokêr kafasını çelek içinä, içer süt. Babu, kavrayıp satırı, ayırdêêr tilkinin kuyruunu.

Tilki çeketmiş yalvarmaa:

-Babo – oooo! Ver kuyruumu! Zeedä zarar yapmaycam sana. Ver kuyruumu! Zerä yok üzüm daada peedalanmaa kuyruksuz: aalemdän ayıp.

-Vermeycäm! Sän, sündük, neçin içtin südümü? Bän artık üç gün oldu bayılêrim aaçlıktan. Çevir südümü – çevirecäm kuyruunu, - demiş babu. (Gaydarcı, 2018: 111)

Metinde geçen olayda yaşlı bir kadının tek geçim kaynağı olan sütün ,bir tilki tarafından gizlice içilmesi, bu nedenle suçüstü yakalanan tilkinin cezalandırılması ve tilkinin, işlemiş olduğu suçtan ötürü pişmanlık duyarak yalvarması konu edilmiştir.

Konuşucu (tilki) yaptığı hatanın farkına varıp dinleyicinin (babu) kendisine merhamet etmesini isteyerek dinleyiciye yalvarmaktadır. Oysa konuşucunun çaresizliği de hissedilen bir diğer yan işlevdir. Korku, endişe, pişmanlık ve yalvarma işlevlerinin konuşlandığı cümlede, ünlem unsuru metindeki anlamı yansıtmada etkin rol oynamaktadır. Cümlede “-Babo-oooo! Ver kuyruumu!” ifadesinin ve ünlem işaretinin varlığı yalvarma işlevini merkeze taşımaktadır. Polisemi yapının yer aldığı bu metinde dikkat çekici bir diğer husus, yalvarma semantiğinin morfolojik kodlayıcısı olan emir kipinin, teklik 2. kişi ekiyle kurulan “ver” ibaresi aracılığıyla kendi anlamı dışına çıkararak yeni bir anlam kazanmasıdır.

SONUÇ

Konuşucunun tinsel dünyasındaki anlık sezgilerini, coşkularını açığa çıkaran, doğadaki devinim olgusunu öykünme yoluyla ileten birimler ünlem ögesini gramatikal yönden işaretlemektedir. Ünlemler, anlatımın duygusal ve bildirişimsel yörüngedeki söz varlığının ve gizil anlamın belirginleşmesine önemli katkı sağlamaktadır.

Çalışma ünlem ifadesinin cümleye yüklediği baskın işlevin aktif ve anlaşılır olması adına semantik düzlemde işlem gören işlevsel yaklaşım modeli üzerine inşa edilmiştir. Gagauz Türkçesindeki ünlemlerin metin bağlamında incelenip işlevsel açıdan metne kattığı anlamın incelenmesi neticesinde dua, teklif etme, kabul etme, alay etme, güven verme, emir, çıkarım, şaşkınlık, korku, üzüntü, pişmanlık, beddua, yemin etme, tehdit, iyi temenni, abartma, sevinç-coşku, yalvarma-yakarma gibi birçok işlevi barındırdığı görülmüştür. Böylece anlam sınırları kesin çizgilerle çizilemeyen ünlemlerin Gagauz Türkçesi metinlerinde de aynı görevi üstlendiği dikkate sunulmuştur.

Çalışmada ünlemin yoğunluk ve özlülük temalarıyla harmanlanan özel bir mekanizmaya sahip olduğu, cümle dışı unsur faktörünün dışında yer aldığı tespit edilmiştir. Söylem yeteneğini, karşıladığı sözcüklerin ses yapısından alması, ünlemin dilin diğer sözcüklerinden farklı ve özel bir konuma taşınmasını gerekli kılmıştır. Kullanıldığı bağlam çerçevesinde çokanlamlı görünüm sergileyerek, kategorize edilme sürecinde metindeki öncül işlevin odağa taşınmasını sağlamıştır. Emir kipinin eksiz çekiminin varlığı, bu bağlamda önem arz eden bir gramer yapısı olarak belirlemiştir. Dolayısıyla çok katmanlı bir anlam spektrumuna sahip olan ünlem vurgu ve tonlama vasıtasıyla anlam yörüngesine betimsel güç ve âhenk kazandırmıştır.

KAYNAKÇA

- Akalın, H. Ş. (2011). Türk Gramerinin Sorunları, Ankara: TDK Yayınları. s. 588.
- Aksan, D. (1987). Her Yönüyle Dil I. Ankara: TDK Yayınları. s. 96-97.
- https://anasozu.com/wp-content/uploads/2022/01/Ana_Sozu_03_04_2022.
- Baboglu, N. (1974). Legendanın İzi, Chişinău: M. Maruneviç Adına Bilim Araştırmaları Genel Üretim Müdürlüğü. s. 9-10.
- Baboglu, N. (1998). Gani, Chişinău: M. Maruneviç Adına Bilim Araştırmaları Genel Üretim Müdürlüğü. s. 18-50.
- Baboglu, N. İ. ve Baboglu, İ. İ. (1999). Gagauzçanın Gramatikasi 'Fonetika, leksika, morfolojiya, sintaksis', Chişinău: M. Maruneviç Adına Bilim Araştırmaları Genel Üretim Müdürlüğü. s. 346.
- Baboglu, N. (1999). Mumnar Saalık İçin, Chişinău: M. Maruneviç Adına Bilim Araştırmaları Genel Üretim Müdürlüğü. s. 46.
- Banguoğlu, T. (2011). Türkçenin Grameri, Ankara: TDK Yayınları. s. 396.
- Bujilova Hacıoglu, V. (2020). Sonsuza Uçan Kuşlar (Haz. Bülent Hünerli), İstanbul: Paradigma Akademi. s. 273.
- Gaydarci, G. (2018). Gagauzologya XIX – XXI Asirlerdä 'Gagauzların Halk Yaratmaları', Chişinău: M. Maruneviç Adına Bilim Araştırmaları Genel Üretim Müdürlüğü. s. 111.
- Korkmaz, Z. (2019). Türkiye Türkçesi Grameri 'Şekil Bilgisi', Ankara: TDK Yayınları. s. 963.
- Köse, M. (2001). Vakitın Soluması, Ankara: Kültür Bakanlığı Yayınları. s. 132.
- Kuroglu, S. (2011). Canımı Baaşlarım, Chişinău: M. Maruneviç Adına Bilim Araştırmaları Genel Üretim Müdürlüğü. s. 187.
- Tanasoğlu, D. (2009). Uzun Kervan, Ankara: Gündüz Yayınları. s. 18-30-176.
- Zanet, T. (2010). Gagauzluk: Kultura, Ruh, Adetlär, Chişinău: Pontos Yayınları. s. 196-336.
- Zanet, T. (2012). Böcecik, Ankara: Moldova Replikasının Üretilik Ministerliin. s. 111.
- Zanet, T. (2017). Gagauz Halk Masalları '1-ci kiyat', Chişinău: Pontos Yayınları. s. 22.
- Zanet, T. (2017). Gagauz Yortuları, Adetler, Sıraları '3-ci kiyat', Chişinău Yayınları. s. 30.

STUDENTS' PARENTS' EXPECTATIONS OF THE STAKEHOLDERS IN THE
SCHOOLS ABOUT THE PREVENTION OF CLIMATE CHANGE

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Abstract

The purpose of the study was to determine the students' parents' expectations of the stakeholders in the schools about the prevention of climate change. The case study was used in this study. The study group was determined by the homogeneous sampling technique. The study group consisted of 38 parents whose students studied at high schools in the central districts of Mersin Province in 2020-2021 academic years. The data obtained from the interview forms were analysed according to the method of descriptive analysis. The findings were presented in the form of themes and subthemes. According to the research results, the participants' expectations of the school administrators about the prevention of climate change were generally as follows; the school administrators should use renewable energy at school, use more eco-friendly products at school, organize activities in which students plant trees every year, and want teachers to include the topics of protecting environment in their yearly lesson plans. The participants' expectations of the teachers about the prevention of climate change were generally as follows; the teachers should be role models for the students in terms of protecting environment, make students aware of the reasons and results of the climate change, reward students exhibiting eco-friendly behaviours. The participants' expectations of the parents about the prevention of climate change were generally as follows; they should provide exemplary behaviours for their children in terms of protecting the environment and not wasting the natural resources, cooperate with the teachers for their children to understand the importance of natural resources and climate change. The participants' expectations of the students about the prevention of climate change were generally as follows; they should read books on climate change, and form clubs for the prevention of climate change. It is suggested that more importance should be attached to climate change in education.

Keywords: Climate change, students' parents, stakeholders in the schools, expectations

**CHALLENGES OF ONLINE LEARNING: THE REASONS STUDENTS BEING
UNCOOPERATIVE IN ONLINE EDUCATION CONCEPTS IN PREPARATORY
SCHOOLS**

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Abstract

In the last two years, the inevitable development of technology in education has come a long way especially with the intervention of a worldwide pandemic. Furthermore, increasing student motivation for technology-assisted language learning has recently become one of the most researched subjects. The purpose of this research is to find out why students in higher education are unwilling to use online learning resources. To investigate the reasons behind students being uncooperative a questionnaire was administered, which provided deeper and richer data to assist and explain the analyses' conclusions. A total of 20 people (10 women and 10 men) gave their informed consent and filled out the survey. As a basis, semi-controlled questions were created to serve as a framework for the interview's discussion. Using content analysis, the results indicated that only thirty percent of the students think online education might be useful in terms of having social distance and not having to go to the campus and having the chance to avoid problems related to transportation. Seventy percent of the students, on the other hand, do not believe that online education provides any benefits.

Keywords: Student motivation, online education, challenges and benefits

MEVLEVISM IN TURKISH CULTURAL HISTORY AND ON HIS CONTRIBUTION TO WORLD CIVILIZATION

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Abstract

The Mevlevi Order or Mawlawiyya (Turkish: *Mevlevilik or Mevleviyye*; Persian: *طریقت مولویه*) is a Sufi order that originated in Konya (a city now in Turkey; formerly capital of the Anatolian Seljuk Sultanate) and which was founded by the followers of Jalaluddin Muhammad Balkhi Rumi, a 13th-century Persian poet, Sufi mystic, and Islamic theologian. The Mevlevis are also known as the "*whirling dervishes*" due to their famous practice of whirling as a form of *dhikr* (remembrance of God). Dervish is a common term for an initiate of the Sufi path; whirling is part of the formal sema ceremony and the participants are properly known as *semazens*. Approximately 750 years old, the Mevlevi Order is a living tradition based on the teachings of Rumi, also known as Mevlana, who is perhaps Turkey's most celebrated poet and in Iran, second only to Hafiz. He is also venerated as a divine mystic within Sufi Islam. Rumi's friend and spiritual mentor, Shams of Tabriz, is also revered within the order and within Sufism more widely. Rumi said, "As long as I have life, I am the slave of the Quran. I am dust at the door of Muhammad the Chosen", and the Mevlevi path is based firmly on Islamic principles. Kabir Helminski, a Mevlevi shaikh, writes 'It is a rigorous path of initiation and service continually adapting itself to changing circumstances and times. Mevlevis have always been progressive and liberal in spirit while at the same time conserving the best of tradition.' The Mevlevis insist that love is at the centre of Islam. Mevlevi shaikh Şefik Can writes, 'Rumi tells us to take the love of God to the forefront, to abstain from being attached to the letter of the law rather than the spirit of it, to find the essence of the faith, and to raise our faith from the level of imitation to the level of realization.' The main purpose of this study is to give information about Mevlevi in Turkish culture and to explain its contributions to world civilization.

Keywords: Mevlevizm, Spiritual Values, Turkish Culture.

Giriş

Orta çağ Anadolu Selçuklu Sultanlığı'nın başkenti olan Konya'da ortaya çıkan ve Celaleddin Rumi Muhammed'in takipçileri tarafından sufi bir tarikat olarak kurulan Mevlevilik ister kendi dönemine ister sonraki dönemlere ışık tutarak insanların manevi aydınlığa çıkmalarını sağlamıştır. Nitekim Kuran'ın evrensel hükümlerinden yola çıkan Mevleviliğin temelinde din ve ırk ayırımı yapmaksızın tüm dünyaya hitap etmektir. Bu bağlamda Mevlevilik felsefesini evrensel ilkeler olarak değerlendirilebilir.

Mevleviler, Allah'ı anma zikrini şekli olarak semazen meşhur uygulamalarından dolayı "semazen" olarak da bilinirler. Derviş, sufi yolunun sembollerinden biri olup için ortak bir terimdir; sema, resmî sema töreninin bir parçasıdır ve katılanlar tam anlamıyla semazen olarak bilinirler. Yaklaşık 750 yıllık Mevlevilik, belki de Türkiye'nin en ünlü şairi ve İran'da Hafız'dan sonra ikinci olan Mevlana olarak da bilinen Mevlana'nın öğretilerine dayanan

yaşayan bir gelenek. Ayrıca Sufi İslam'da ilahi bir mistik olarak saygı görüyor. Mevlana'nın arkadaşı ve manevi akıl hocası Tebrizli Şems de tarikat içinde ve tasavvufta daha geniş çapta saygı görmektedir. Mevlevi, "Hayatım olduğu müddetçe Kuran'ın kuluyum. Seçilmiş Muhammed'in kapısının toprağıyım" demiş ve Mevlevi yolu, İslami esaslara sıkı sıkıya dayanmaktadır. Bir Mevlevi şeyhi olan Gabir Helmski "Değişen şartlara ve zamana kendini sürekli olarak adapte eden zorlu bir durum ve hizmet yoludur. Mevleviler, geleneklerin en iyilerini korurken aynı zamanda ruhta her zaman ilerici ve liberal olmuştur." Mevleviler, sevginin İslam'ın merkezinde olduğu konusunda ısrar ederler. Mevlevi şeyhi Şefik Can," Mevlana, Allah sevgisini ön plana çıkarmamızı, kanunun ruhundan çok lafzına bağlı kalmaktan kaçınmamızı, inancın özünü bulmamızı, imanımızı yükseltmemizi söylüyor. Taklit düzeyinden gerçekleştirme aşamasına kadar inanç." Bu çalışmanın temel amacı, Türk kültüründe Mevlevilik hakkında bilgi vermek ve dünya medeniyetine katkılarını açıklamaktır.

Mevleviliğin Dünya Medeniyet Tarihine Katkıları

Garaudy, Doğu ve Batı artık birbirinden ayrılamaz, diyen Goethe'nin tespitini günümüzün trajik problemlerine en güzel çare olarak değerlendiriyor. Garaudy'ye göre bugün Faust tipli insanın fonksiyonu bitmek üzeredir, bugünkü hayatımızın sorunları ne teknik ne ekonomi ne siyasettir, fakat Mevlana'nın ve Goethe'nin de cevaplamaya çalıştığı gibi hayatın yüce anlamını ve amacını izlemeye çağıran din sorunudur. Mevlana'nın 'yeni doğuş', Goethe'nin 'yeni buluş' dediği uyanış, insanların birbirinde dirilişidir. 'Evrensel ben'in 'hakiki ben' olduğunu bilen insanın 'kâmil insan' haline gelişidir. Kâmil insan, bütün tabiatın tekâmülünü ve kendinde şuurlaşan insanlığın ortak tarihini tekrar yaşamayı bilir, kâmil insan tabiat ve beşeriyet ile bir bütün oluşturur. Garaudy'nin tavsiyesi, dünya gemisi batmadan kültürel bir değişimi, "birbirimizde dirilmeyi" bir an önce gerçekleştirmemizdir.¹ Bu da Mevlana ve Goethe'nin fikirlerinin birleştirilmesi ve Doğu ile Batının yeni bir diyalogu ile. Schimmel diyor ki, Hollanda'da, Almanya'da, Fransa'da, İtalya'da Mevlana'yı seven, onun sözlerinden kuvvet alan insanlar çoğalıyor, ona dair kitaplar, tercümelemler elden ele geçmektedir.²

İslam dünyasında Cüneyd, Hallac, İbni Arabî, İbni Farid gibi birçok büyük mutasavvıflar var, pek güzel mistik şiir yazan şairler de yaşamışlardır. Fakat kimse Mevlana'nın garpta kazandığı şöhret ve sevgiyi kazanamamıştır. Mevlana'nın Batı'daki Etkisi Hristiyan ve İslam dünyaları arasında ilk resmi münasebetler Haçlı Seferlerinin sonuçsuz kalmasından sonra, on ikinci yüzyıldan itibaren başlamış. Papa Aleksander III'ün (öl. 1181) devrinden itibaren taraflar mektuplaşmış, rahipler Müslümanlarla dini görüşmelerde bulunmak için Halep'e, Şam'a ve Mısır'a gönderilmişler. 1233'de Fransiskan rahipler Konya'da gelip Alâeddin Keykubat ile temas etmiş. Müslümanların her çeşit ilim ve fende ileri olduğu bu dönemde Arapçadan Avrupa dillerine taşınmış olan fen bilimlerinin yanında edebiyat da bulunmuş. İspanyol şiiri hem konu hem şekil bakımından etkilenmiş. Orta ve Uzak Şark, bilhassa Hindistan'dan İran yolu ile gelen efsaneler, masallar ve sufilik aracılığı ile Avrupa'ya taşınmış. Buna rağmen 17. yüzyıla kadar İslam hakkındaki eserler, özellikle Kuran tercümeleri aleyhte bir reddiye ilave edilmeden yayınlanamamış, dolayısıyla İslam hakkında doğru kanaat oluşmamış. 17. yüzyılın sonunda yapılan iki yeni Kuran tercümesi, Alman Protestan Papaz Hinckelmann ile bir İtalyan Cizvit Papaz Jesuiti Maracci'nin tercümeleri, eski tercümelerin kaba yanlışlarının önemli bir kısmını ortadan kaldırmış. Schimmel,³ Hristiyanların Orta Çağda İslam dünyasına karşı gösterdikleri düşmanlığın biri manevi, diğeri maddi iki önemli sebebini zikreder ki, bunların günümüze kadar uzanan tesirleri vardır.

¹ O Roger Garaudy, "Mevlana ve Goethe'de İnsan", çev. Abdullah Öztürk, 6. Milli Mevlana Kongresi 2 4 - 2 5 Mayıs, içinde, s. 55, 1992 Konya.

² Annemarie Schimmel, Aşk Mevlana ve Mistisizm, (haz. Senail Özkan), Kırkambar Kitaplığı, s 117, 2002.

³ Annemarie Schimmel, Aşk Mevlana ve Mistisizm, (haz. Senail Özkan), Kırkambar Kitaplığı, s 122, 2002.

Sebeplerden manevi olanı, Hristiyanların Hz. İsa'nın kurduğu dinden sonra başka bir dinin meydana çıkmasına ihtimal vermemiş olmalarıdır, yeni dini şeytan işi bir sapkınlık olarak peşinen dışlamışlardı. Asırlar boyunca Hristiyan din adamları ve onların tesiri altındaki cemaatler, İslam'ı ya yolunu şaşırılmış bir Hristiyan mezhebi ya da Hristiyan dünyasını tehdit eden, gayri ilahi bir fırka saydılar. Sebeplerden diğeri ise Batının hem İspanya yolu ile Fransa sınırlarına kadar gelen Arap-Müslüman ordularından hem de birkaç asır sonra Doğudan Viyana'ya kadar ilerleyen Türk-Müslüman kuvvetlerinden son derecede korkması ve bu korkudan dolayı İslam dini hakkında yanlış mütalaa ve kin duyguları hissetmesidir. Orta Çağ edebiyatı bunlarla doludur. Buna rağmen Orta Çağda Avrupa'da Arap-Müslüman tesirleri o kadar kuvvetlidir ki, hayatın hemen her safhasında Müslüman sanat ve ilminden izler görülmüştür. 200 sene süren Haçlı Seferleri esnasında şövalyeler pek çok değerli şeyleri alıp vatanlarına getirmişlerdir ve Avrupalılar savaflara rağmen Müslümanların din ve ahlakları hakkındaki kanaatlerini biraz olsun değiştirecek yeni fikirlere sahip olmuşlardır. Schimmel diyor ki, böylece İslam ve Batı dünyası arasında belki de dünyanın en enteresan mülakatı vuku bulmuştur. Müslüman filozofların eserleri Hristiyanları, kendi telakki ve fikirlerini tenkit ve tasfiye etmeye icbar etmiş, bu suretle Hristiyan felsefe ve teoloji çalışmalarının terakkisine yol açmıştır.⁴ Mevlana üzerine, Batıda yapılan çalışmaların başlamıştır. Müslüman olmuş bir İngiliz ise şöyle söylüyor: "Hristiyanlığın bazı unsurlarının İslam ile bir arada bulunması şüphesiz mümkün değildir. Ama bu kültürün oluşmasında yardımcı olan bazı unsurlar İslam'a hayli yakındır. Avrupa kültürü ile İslam'ın genelde bir arada bulunabilmesi gerekir. İngiliz kültürüne sahip olarak aynı zamanda Müslüman olmak bir çatışmaya sebep olmamalıdır. Ben İngiliz olmaktan gurur duyuyorum. Pakistanlı veya başka bir ülkeden da olmak beni Allah'a daha fazla yaklaştırmaz."⁴ Şimdi Mevlana'nı dünya kültürüne etkisini sağlayan Mevlana'nı dünya kültürüne etkisini sağlayan motiflerden birkaçını küçük başlıklarla vermek istiyorum: Mevlana ve Dinler Meliha Anbarcıoğlu diyor ki, Mevlana bütün dinleri öz gayeleri bakımından bir görmekte, ancak bu dünyada dinlerin birleşemeyeceklerini, çünkü her dinin ayrı bir dileği olduğunu söylemektedir.⁵ Mevlana çeşitli milletlerden oluşan çevresine hitap ederken, Kuran'ın bir ayetinde anlatılmış olan "elestü meclisi" ⁶örneğini vermiştir. Allah yaratmış olduğu insanların ruhlarına, onların birbirlerinden ayrılmalarından önce topluca hitap etmiş, " Ben sizin Rabbiniz değil miyim" demişti; ruhlar hep birlikte cevap vermişlerdi, 'Elbette Rabbinizdir'. Mevlana şöyle yorumluyordu ayeti: "Elestü sesini Türk, zenci, Acem ve Arap, kulağa ve dudağa muhtaç olmadan anlamışlardı, hatta Türk, Acem ve zenci şöyle dursun, o sesi dağlar taşlar bile işitmişti"⁷ Mevlana onların hepsine birden "Rum ülkesi halkı" diyordu. Onun 72 milletten olanlar bana gelsin, sözünü kullanmasına kızan bir mutaassıp kişi bir gün öfke ile ziyaretine gelmiş, açmış ağzını yummuş gözünü, hakaret etmiş Mevlana'ya. Mevlana sözleriniz bitti mi, diye sormuş, bitti, cevabını alınca, artık sizinle de dostum, demiş, siz de gelin! Ona göre nasıl koruğun şeker gibi tatlanması için güneşe ihtiyacı varsa, dünyayı salkım salkım dolduran acılı ve hoşnutsuz insan kitlelerinin de kıvama ve kemale gelmeleri için ısıtıcı ve hayat verici bir manevi güneşe ihtiyaçları vardır. Adamın içi ısınmış, o da gelir gider olmuş. Mevlana oğluna şöyle nasihatte bulunuyor: "Bahaeddin, eğer cennette olmak istersen herkesle dost ol, kimseye kin besleme, herkese tevazu göster. Başkalarının önüne geçmek isteme. Mum ve merhem gibi yumuşak tabiatlı ol, iğne gibi batıcı olma. Sana kimseden kötülük gelmemesini istersen kötü şeyler düşünme, kötü şeyler öğrenme."⁸ O sadece insanların değil bütün varlıkların maneviyata ihtiyacı olduğu hakikatini işliyordu gönüllere. Sevgili müridi Çelebi Hüsameddin hastalandığında talebeleri ve dostları ile birlikte ona geçmiş olsuna giderken dar yerde bir

⁴ Ali Köse, "Neden İslam'ı Seçiyorlar", II. Uluslararası Mevlana Kongresi, 5-6 Mayıs 2003, s.65, Konya 2004.

⁵ Meliha Ülker Anbarcıoğlu, Fihi Mafih Tercümesi ve Önsözü, M.E. B. İstanbul 1990.

⁶ Araf 7/172.

⁷ Mesnevi VI, 4709; Mesnevi I, 2108-2109

⁸ Hüseyin Ayan'ın yorumundan, Mevlana'nın 700. Ölüm Yıldönümü Dolayısıyla Uluslararası Mevlana Semineri, s. 78, 1973, Ankara.

köpek çıkmış önlerine. Talebelerinden biri köpeğe vurup kovmuş onu. Mevlana ayıplamış o talebeyi. Ey bihaber, Çelebi'nin mahallesine mensup olan köpeği mi dövüyorsun, demiş.⁹ Mevlana'nın her dinden, her milletten, her tabakadan insanlardan çok geniş bir muhiti olduğu Fihi Mafih kitabında görülür. O, Moğollar hakkında da şöyle söylüyor: "Moğollar buraya geldiğinde çıplaktı binek hayvanları öküzdü, silahları ağaçtandı, Harzemlilerin zulmüne uğramışlardı, gönülleri kırıktı. Tanrı dualarını kabul etti, karınları doydu, en güzel Arap atları ve silahlar şimdi ellerindedir. Fakat şimdi kendileri de zulme başladıkları için Tanrı onları yok edecektir." Nitekim Moğollar güçlerini kaybettiler ve zaman içinde Müslüman oldular. Nitekim Moğollar güçlerini kaybettiler ve zaman içinde Müslüman oldular. Bizans'tan onu görmeye gelen rahiplerle sohbet ediyorken şöyle söylüyor: "Ben bir pergelim ki, bir ayağım şeriatıta, diğeri bütün dinlerdedir." Tebrizli bir tacir iflas edecekken gelmiş Mevlana'ya başvurmuş, ne yapayım diye. Mevlana ona demişti ki, sen Frengistan'da ticaret için bulunurken, bir Hristiyan azizin gönlünü kırmışsın, git onun hatırını al, düzelirsin. Mevlevi Şefik Can'a göre,¹⁰ Mevlana'nın bütün dinlere saygı göstermesi, onun bütün dinleri bir ve eşit gördüğü anlamında değil, bütün dinlerin hakikatinin bir görülmesi anlamındadır. O, Mesnevide şöyle der: "Dinler arasındaki ihtilaf ve ayrılık gidiş tarzındadır, ibadet ediş şeklindedir, yoksa yolun hakikatinde değil. Bir ayeti delil gösterir: "De ki: İman edenler de etmeyenler de kendilerine uygun düşen bir yolda hareket ederler"¹¹ve onu şöyle yorumlar: "Cihanda basamak basamakta göklere kadar yükselen gizli merdivenler vardır. Her topluluğun ayrı bir merdiveni, her gidişin başka bir göğü vardır, Her biri öbürünün halinden habersizdir. Gökler geniş, çok geniş bir ülkedir. Öyle geniş öyle sonsuz ki, ne başı vardır ne sonu". İslam'dan başka dinler Hak din değildir ama Hakkın irade ve takdiri dâhilindedirler. Bu da saygıyı gerektiren bu durumdur Mevlana'ya göre: Sır gözü ile gönül gözü ile mümine de bak, kâfire de bak. Bunların her birinin kendi inançlarıncı Ya Hay, Ya Rabbi feryadından başka bir şey yoktur.¹² Canlar padişahının kulağı gözü pencerededir. Erkek olsun kadın olsun, kimin canı ne istiyor, onu gözetleyip durmaktadır.¹³

Sonuç

İslam kültür tarihinde önemli yere sahip olan Mevlevilik tarihten günümüze kadar insanlığı aydınlatarak manevi yaşama rehberlik etmiştir. Mesnevi'nin bu kadar mühim kılan özelliği din ve ırk farkı gözetmeksizin her yaş grubuna hitap etmesi olmuştur. Bu bağlamda ahlaki öğretileri tarih boyu etkili olmuştur. Ahlaki manevi değerler genel anlamda evrensel ilkeleri içerdiği için dünya çapında ün kazanmıştır. Böylece Mevlevilik taşıdığı evrensel değerler ile dünya medeniyetine katkılar sunduğu görülmektedir.

References

- Ahmet Eflaki, *Legends of the Arifs I*, p.94, trans. Tahsin Yazıcı, M.E. B. Istanbul 1964.
Hüseyin Ayan'ın yorumundan, *Mevlana'nın 700. Ölüm Yıldönümü Dolayısıyla Uluslararası Mevlana Semineri*, s.173, 1973, Ankara.

⁹ Hüseyin Ayan'ın yorumundan, *Mevlana'nın 700. Ölüm Yıldönümü Dolayısıyla Uluslararası Mevlana Semineri*, s.173, 1973, Ankara.

¹⁰ Yaşayan son Mevlevi han Şefik Can ile Mülakat, Mevlana, "Mesnevi ve Mevlevilik", Tasavvuf Dergisi Mevlana Özel Sayısı, s. 823, Ankara 2005.

¹¹ İsra, 17/84.

¹² Divan-ı Kebir 5-2578.

¹³ Mesnevi I, 1824.

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EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

Yaşayan son Mevlevî han Şefik Can ile Mülakat, Mevlana, "Mesnevi ve Mevlevîlik", Tasavvuf Dergisi Mevlana Özel Sayısı, s. 823, Ankara 2005.

Kuran-ı Kerim Meali, DİB, Ankara, 2011.

Mevlana, Divan-ı Kebir, Abdülbaki Gölpınarlı, İstanbul, 1957.

Mesnevi I, 1824, Konya

Köse, Ali, "Neden İslam'ı Seçiyorlar", II. Uluslararası Mevlana Kongresi, 5-6 Mayıs 2003, s.65, Konya 2004.

Köprülü, Fuat, İlk Sufiler, s.21 et al. DİB yay. Ankara 1991. Köse, Ali,

Önder, Mehmet, Mevlana Tekkesi Arşivi ve Mevlevihaneler, IX. Kuruluş Haftası Kitabı, Ankara 1992.

Öngören, Reşat, "Mevlânâ", DİA, XXIX. Schimmel, Annemarie, ben rüzgarım, sen ateşsin (Schimmel, Annemarie, ben rüzgarım, sen ateşsin (tr. Senail Özkan), İst. 1999.

Tanman, Baha, "Mesnevihane Tekkesi", DİA, XXIX. Tanrıkorur, Barihuda, Türkiye Mevlevihaneler, SÜSBE, Yayımlanmamış Doktora Tezi, Konya 2001.

Meliha Ülker Anbarcıoğlu, Fihi Mafih Tercümesi ve Önsözü, M.E. B. İstanbul 1990.

Mesnevi VI, 4709; Mesnevi I, 2108-2109

Annemarie Schimmel, Aşk Mevlana ve Mistisizm, (haz. Senail Özkan), Kırkambar Kitaplığı, s 122, 2002.

Roger Garaudy, "Mevlana ve Goethe'de İnsan", çev. Abdullah Öztürk, 6. Milli Mevlana Kongresi 24- 25 Mayıs, içinde, s. 55, 1992 Konya.

DISCOURSE ANALYSIS OF GERMAN-SOVIET NONAGGRESSION PACT IN
FINLAND PRESS: EXAMPLE OF TURKEY

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Abstract

This study discusses the course of discourse about Turkey in Finnish press. German-Soviet nonaggression pact (August 23, 1939) is the expression of a process which can be described as a pragmatist step of two others that see each other as a threat or counter-revolutionary element ideologically and which resulted with Soviets turning to a more aggressive foreign policy. With the signing of the pact, Finland and Turkey's transition to a precautionary policy accelerated and Turkey discourse in Finnish press was reconstructed with reference to common problems. During the period until the signing of nonaggression pact, Finnish press emphasized that Soviets had normal relations with Finland and perfect relations with Turkey. The news can mainly be emphasized within the framework of thematic-military measures, foreign policy elements and diplomatic expectations as in the examples of Helsingin Sanomat, Aamulehti, Savo, Kansan Työ, Uudenmaan Sanomat, Ylä-Vuoksi and Uusi Aura. The data obtained from the newspapers of the period show that the greatest factor in emotional dynamic change was similar geopolitical concern. Russia is confined in the Baltic by Finland and in the Black Sea by Turkey. When geographical location and conditions are considered, it is obvious that strategy options are limited to one-way with known effect. The treaty between Moscow and Berlin increased this limited situation further. When the similarity of political attitudes and military reflexes are evaluated with geopolitical concerns, the common grounds of Turkey and Finland can be seen clearly: the actor of the imperialist oppression both countries were subjected to was the Soviet Union and the phases of the methods of opposing this oppression are negotiation, followed by rejection of demands of land and military base in both countries. When the stakeholdership analysis of Finland and Turkey is carried out through discourses that can be diversified such as "Finland has shown the same strength as Turkey", "Turkey has fought against Russian imperialism for centuries and will continue to fight in case of need", the result is the concept of sympathy rather than emotional empathy.

Key words: Finland, Soviet Union, Turkey, press, discourse analysis.

Abstract

This study discusses the course of discourse about Turkey in Finnish press. German-Soviet nonaggression pact (August 23, 1939) is the expression of a process which can be described as a pragmatist step of two others that see each other as a threat or counter-revolutionary element ideologically and which resulted with Soviets turning to a more aggressive foreign policy. With the signing of the pact, Finland and Turkey's transition to a precautionary policy accelerated and Turkey discourse in Finnish press was reconstructed with reference to common problems. During the period until the signing of nonaggression pact, Finnish press

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Key words: Finland, Soviet Union, Turkey, press, discourse analysis.

Özet

Bu çalışma Finlandiya basınında Türkiye hakkında oluşturulmuş söylemlerin seyrini konu edinmektedir. Alman-Sovyet Saldırmazlık Paktı (23 Ağustos 1939), ideolojik açıdan birbirlerini tehdit veya karşı devrim unsuru olarak gören iki ötekinin pragmatist adımı olarak nitelendirilebilecek; Sovyetlerin daha saldırgan bir dış politikaya yönelmesiyle sonuçlanmış bir sürecin ifadesidir. Paktın imzalanması ile birlikte Finlandiya ve Türkiye'nin ihtiyat politikasına geçişi hızlanmış, Fin basınındaki Türkiye söylemi müşterek problemler referans alınarak yeniden inşa edilmiştir. Saldırmazlık paktının imzalanmasına kadar geçen sürede Fin basını, Sovyetler'in Finlandiya ile normal, Türkiye ile ise mükemmel bir ilişkisi olduğunu vurgulamaktadır. Ağırlıklı olarak haberler Helsingin Sanomat, Aamulehti, Savo, Kansan Työ, Uudenmaan Sanomat, Ylä-Vuoksi ve Uusi Aura örneklerinde olduğu gibi tematik -askeri tedbirler, dış politika unsurları ve diplomatik beklentiler- çerçevede değerlendirilmektedir. Dönemin gazetelerinden elde edilen veriler, duygusal dinamik değişimindeki en büyük etkenin benzer jeopolitik kaygılar olduğunu göstermektedir. Rusya'yı Finlandiya Baltık'ta, Türkiye ise Karadeniz'de tutmaktadır. Coğrafi konum ve şartlar göz önünde bulundurulduğunda strateji seçeneklerinin, bilinen etkiyle tek yönlü olacak biçimde sınırlandırıldığı aşikârdır. Moskova ve Berlin arasında yapılan anlaşma bu sınırlı hâli daha da artırmıştır. Politik tutumların ve askeri reflekslerin benzerliği, jeopolitik kaygılarla birlikte değerlendirildiğinde Türkiye ve Finlandiya'nın ortaklaştığı paydalar açıkça görülmektedir: İki ülkenin de maruz kaldığı emperyalist baskının aktörü Sovyetler Birliği'dir ve ona karşı gelme yöntemlerinin safhaları her iki ülkede de müzakere, akabinde ise -toprak ve askeri üs-taleplerin reddedilmesi şeklindedir. Finlandiya ve Türkiye'nin paydaşlık analizi, "Finlandiya, Türkiye ile aynı gücü göstermiştir", "Türkiye yüzyıllardır Rus emperyalizmine karşı savaşmıştır ve ihtiyaç duyulursa savaşmaya devam edecektir" gibi çeşitlendirilebilir söylemler üzerinden yapıldığında elde edilecek sonuç, duygusal empatiden ziyade sempati kavramıdır.

Anahtar Kelimeler: Finlandiya, Sovyetler Birliği, Türkiye, basın, söylem analizi.

GİRİŞ

Finlandiya'nın ve Türkiye'nin İkinci Dünya Savaşındaki kaderi Sovyetler Birliği temelinde tipik ve birbirine benzerdir. Bu jeopolitik seçeneksizliğin Finlandiya basınındaki etkisi çalışmanın temel problematığıdır. Literatürde bu konuda birbirinden bağımsız olarak "*Finnish Russophobia*¹ ve *Russophobic Neutrality*"² şeklinde iki tanımlama bulunmaktadır. Lakin bu çalışma özelinde, ana soruya benzerlikler ilkesi (psikoloji) üzerinden ulaşılmış, kurgu Rusofobi ile sınırlandırılmamıştır. Çalışmanın ana kaynağı Finlandiya Milli Kütüphanesi tarafından dijital hâle dönüştürülen gazeteler, yöntemi ise söylem analizidir. Dipnotlar biçim ve içerik bütünlüğü açısından İngilizce gösterilmiştir. Çalışmada metot hatasından kaçınmak adına metinler konteksiyle birlikte değerlendirilmiş, metin bütünlüğüyle uyumsuz söylemler bilakis tasnif dışı bırakılmıştır. Söylemler bağlamdan koparılıp izole bir boşluk içerisinde değerlendirilmemiştir. Çünkü söylem analizi yorumlayıcı bir araştırma metodolojisidir³ ve belirli verilerin belirli bir temayı veya noktayı (hipotez) desteklediğini iddia eder.⁴ Herhangi bir analizde seçici davranmak zorunluluktur; metinler hakkında belirli sorular sormayı seçeriz, diğer olası soruları değil. Çünkü söylemlerin kesin sınırları yoktur, insanlar tarihte her zaman yeni söylemler yaratır, yahut eskileri değiştirir.⁵ Her farklı söylem yanı sıra farklı örnek demektir.⁶ Bu sebeple kurulan yahut kurulduğu düşünülen benzerlik bağlantısı söylem analizinin teorik çerçevesini oluşturur.⁷

¹ Heikki Luostarinen, "Finnish Russophobia: The Story of an Enemy Image", *Journal of Peace Research*, vol. 26/2, 1989, pp. 123-137.

² Onur İsci, "*Russophobic Neutrality: Turkish Diplomacy, 1936–1945*" (Thesis, Georgetown University), 2014.

³ Paul Baker-Sibonile Ellece, *Key Terms Key Terms in Discourse Analysis*, Continuum International Publishing Group 2011, p. 32.

⁴ James Paul Gee, *An Introduction to Discourse Analysis Theory and Method*, London: Routledge, 1999, p. 96.

⁵ Norman Fairclough, *Analysing Discourse*, London: Routledge, 2003, p. 14. ; Gee, *An Introduction to Discourse Analysis Theory and Method*, p. 21.

⁶ Des Gasper-Raymond Apthorpe, "Discourse Analysis and Policy Discourse", *The European Journal of Development Research*, vol. 8, is. 1, June 1996, p. 5.

⁷ Marianne Jørgensen-Louise Phillips, *Discourse Analysis as Theory and Method*, London: SAGE Publications, 2002, p. 73-78.

Tablo 1. Muhtelif Finlandiya Gazeteleri (1939)

Gazete	Konum	Başlangıç	Yayımcı ve Yıllık Abone (markka)
Aamulehti	Tampere	03.12.1881	Aamulehti Yhtymä Oy ⁸ 150
Länsi-Suomi	Rauma	22.12.1905	Oy Länsi Suomi ⁹ 105
Maan Sana	Teuva	25.08.1934	Maan Sanan Oy ¹⁰ 100
Pohjolan Työ	Oulu	27.11.1937	Pohjois-Suomen S. Oy ¹¹ 100
Kansan Lehti	Tampere	02.01.1920	Tampereen T.S. Oy ¹² 132
Maakansa	Vyborg	04.12.1908	Karjalan Maakunta Oy ¹³ 125
Savo	Kuopio	01.11.1909	Kirjapaino Oy Savo ¹⁴ 120
Vaasa	Vaasa	30.01.1902	Vaasa Oy ¹⁵ 145
Sosialisti	Turku	02.01.1920	Sosialistin Kirjapaino Oy ¹⁶ 110

Toplanan materyallerin çoğu bağımsızlık, direniş, tarafsızlık gibi ortak anahtar kelimelere sahiptir. Sık kullanılan sözcükler doğrultusunda çatı kavram olarak milliyetçiliği belirlemek yanlış olmayacaktır. Nitekim ülkelerin dış ilişkilerinde sergilediği meydan okumalar ve ulusal iradelerin bu meydan okumalara karşı cevaben ortaya koyduğu tepkiler, bilhassa küçük ülkelerde milliyetçiliğin bir bileşenidir. Finlandiya özelinde düşünüldüğünde, savaş tehditleri, deneyimler ve bu deneyimlerin sonuçları bileşen teorisini destekler niteliktedir.¹⁷ Yerel gazetelerde yer alan çoğu haber ana akım gazetelerin haberleriyle aynı olsa da daha fazla veriyi dolaşıma sokabilmek adına kaynak taraması boyunca elde edilen tüm gazetelere çalışmada değinilmiştir.

1. Sovyetler Birliği Kendi Oyununu Oynuyor!

"Reich Dışişleri Bakanı von Ribbentrop, Führer'in görüşlerini Stalin'e iletmek için Moskova'ya kısa bir ziyaret yapmaya hazır" bilgisi¹⁸ diplomasinin en ünlü belgelerinden

⁸ "Tilaushinnat", *Aamulehti*, no. 225, 23 August 1939, p. 10.

⁹ "Tilaushinnat", *Länsi-Suomi*, no. 193, 23 August 1939, p. 1.

¹⁰ "Tilaushinnat", *Maan Sana*, no. 190, 23 August 1939, p. 4.

¹¹ "Tilaushinnat", *Pohjolan Työ*, no. 191, 23 August 1939, p. 4.

¹² "Tilaushinnat", *Kansan Lehti*, no. 194, 24 August 1939, p. 6.

¹³ "Tilaushinnat", *Maakansa*, no. 194, 25 August 1939, p. 6.

¹⁴ "Tilaushinnat", *Savo*, no. 194, 25 August 1939, p. 1.

¹⁵ "Tilaushinnat", *Vaasa*, no. 228, 26 August 1939, p. 1.

¹⁶ "Tilaushinnat", *Sosialisti*, no. 196, 26 August 1939, p. 2.

¹⁷ Pauli Kettunen, "Wars, Nation, and the Welfare State in Finland", *Warfare and Welfare Military Conflict and Welfare State Development in Western Countries*, (edp. Herbert Obinger, etc.), Oxford University Press, 2018, p. 260. ; Olli Vehviläinen, *Finland in the Second World War- Between Germany and Russia*, (translated by Gerard McAlester), Basingstoke: Palgrave, 2002, p. 39. ; Craig Gerrard, *The Foreign Office and Finland (1938-1940)*, New York: Frank Cass, 2005, p. 70.

¹⁸ Mark Davis Kuss, "Collective security or world domination: the Soviet Union and Germany, 1917-1939", (Thesis, Louisiana State University), 2012, p. 191.

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birisinin mihenk taşıdır.¹⁹ Ribbentrop 23 Ağustos'ta Moskova'ya gelmiş ve Stalin ile bir görüşme gerçekleştirmiştir.²⁰ Sovyet askeri stratejisi, Fin topraklarının şu ya da bu şekilde Alman askeri güçleri tarafından Leningrad'a ve diğer kuzeybatı krallıklarına karşı bir saldırıda kullanılacağı varsayımına dayandırılmıştır. Batılı güçlerin 1939 yazındaki ittifak müzakereleri sırasında Baltık bölgesindeki Sovyet güvenlik taleplerine karşı isteksizlikleri bu şüpheyi daha da beslemiştir. Stalin, batılı güçlerin bir Sovyet-Alman savaşı sırasında karşı kuvvet olarak ortaya koyabilecekleri hiçbir şeyleri olmadığına daha da ikna olmuş ve 23 Ağustos 1939'da Sovyet hükümeti Hitler ile bir saldırmazlık paktı imzalamıştır.²¹ Anlaşmanın gizli protokolüyle Polonya ve Baltık Devletleri etki alanı adıyla Almanya ve Sovyetler Birliği alanları arasında bölünmüştür. Almanya ayrıca, Finlandiya'da ve Romanya'nın bazı bölgelerinde bir takım Sovyet "çıkarlarını" resmi anlamda tanımıştır. Bu anlaşmayla Almanya, iki cepheli bir savaştan kaçınarak doğudaki sınırlarının revizyonunu tamamlamıştır. Benzer şekilde Sovyetler, Bolşevizmi Avrupa'dan uzak tutmayı amaçlayan kordonu ortadan kaldırmış,²² hem de bu sayede Alman etkisini Baltık'ta sınırlandırmıştır.²³

Tablo 2. Anlaşma Sonrasında Sovyetler Birliği ve Almanya'nın Söylemleri

Taraflar	Söylem
Berlin	Anlaşma Baltık ve İskandinav ülkeleri için bir tehdit oluşturmuyor. ²⁴
Moskova	Komşu küçük devletlerdeki korkular yersiz. ²⁵
Berlin	Alman-Sovyet ilişkilerindeki geri dönüş Türkiye'yi de olumlu yönde etkileyecek. ²⁶
Moskova	Sovyetler Birliği, Almanya'ya anlaşmak için küçük devletleri feda etmeye niyetli değil. ²⁷

Nazi Almanyası ile yapılan saldırmazlık paktı, Sovyet dış politikası için yeni ve tarafsız bir yol demektir.²⁸ Olası bir Avrupa savaşında tarafsızlık Sovyet Hükümeti için hayati öneme sahiptir ve Alman-Sovyet tarafsızlık anlaşmasının temel motivasyonları arasında yer almaktadır. Stalin için esas olan Sovyetler Birliği'nin acil endişelerini güvence altına almaktır. Stalin Avrupa'nın Almanya egemenliğine girmesini arzulamasa da özgün şartlar diplomasiden

¹⁹ Geoffrey Roberts, "The Soviet Decision for a Pact with Nazi Germany", *Soviet Studies*, vol. 44, no. 1, 1992, p. 70.

²⁰ Geoffrey Roberts, *Molotov: Stalin's Cold Warrior*, (edited by Melvyn P. Leffler), Washington: Potomac Books, 2012, p. 30.

²¹ Henrik Meinander, "Interpretations of Finland in the Second World War", *Nordic Narratives of the Second World War: National Historiographies Revisited*, (eds. Henrik Stenius etc.), Nordic Academic Press, 2011, p. 57.

²² Michael Joseph Deets, "German-Soviet Relations and the International System", (Thesis, College of William & Mary), 1994, p. 47.

²³ Geoffrey Roberts, *The Soviet Union and the Origins of the Second World War (Russo-German Relations and the Road to War, 1933-1941)*, New York: Macmillan Education, 1995, p. 96.

²⁴ "Berliini: Sopimus ei merkitse uhkaa Baltian ja Skandinavian valtioille", *Työn Suunta*, no. 85, 24 August 1939, p. 1.

²⁵ "Muut Lehdet", *Aamulehti*, no. 227, 25 August 1939, p. 3.

²⁶ "Ei Mitään Uhkaa", *Aamulehti*, no. 226, 24 August 1939, p. 1.

²⁷ "Moskova Selittää", *Hämeen Kansa*, no. 103, 24 August 1939, p. 5.

²⁸ Roberts, *Molotov: Stalin's Cold Warrior*, p. 31.

yanadır. Sovyetler Birliği'nin ihtiyaç duyduğu şey, Alman-Sovyet Paktı'nın kazandırmış olduğu zamandır.²⁹ Anlaşmanın hem Almanya hem de Sovyetler birliği için geçici ve taktiksel olduğunu söylemek gerekir.³⁰ Bu yüzden siyasi ve ideolojik düşmanlıklar bir kenara atılmıştır, tıpkı 1918'de olduğu gibi.³¹ Sahiden de Sovyet dış politikasının, bu temelden hareketle, ortaya koymuş olduğu yeniden yöneliminin biraz aceleci ve geçici bir karar verme sürecinin sonucu olduğu açıktır. Batılı güçlerle pek de tatmin edici niteliği bulunmayan üçlü ittifaka Sovyet katılımının sonuçlarından emin olmayan Stalin ve Molotov'un, son anda Sovyetler Birliği için kısa vadede en iyi güvenlik ve savunma avantajlarını sunuyor gibi görünen şeyi seçtiği açıklıkla görülmektedir.³²

2. Finlandiya Basınında Saldırmazlık Paktına Yönelik İlk Tepkiler

Finlandiya basınında Alman-Sovyet Saldırmazlık Paktı'nın imzalanmasına dair ilk haberler, *Reuter, Evening Standart, Times, Daily Express* yahut *Manchester Guardian* gibi ajanslar referansıyla yayınlanmıştır. Fin gazeteciler Nasyonal Sosyalist Almanya ile komünist Sovyetler Birliği arasındaki ilişkilerin yeni hüviyeti hususunda şaşkınlıklarını gizleyememiştir. Gazeteler haberleri manşetlere taşıyıp, spot girerken, bilhassa kendi yorumlarını yapmaktan çekinmiştir.³³ Sürecin duygu dolu aksi, *Kajaani* tarafından "Dünya siyasetinde mükemmel bir darbe",³⁴ *Iisalmen Sanomat* tarafından ise "İtalya'da büyük memnuniyet, Japonya'da şaşkınlık ve öfke"³⁵ manşetleriyle kamuoyuna duyuruldu. *Helsingin Sanomat* ise "Polonya'yı Almanya'nın doğu cephesinde yalnız bırakmak artık Sovyetler Birliği'nin yeni misyonudur" diyerek Sovyet politikasında Alman etkisine işaret etmiştir.³⁶

Tablo 3. Finlandiya Gazeteleri Saldırmazlık Paktı Söylem Takibi

Gazete	Söylem
Sisä-Suomi	Londra ve Paris'teki bazı kesimler, Almanya ile Sovyetler Birliği arasında planlanan saldırmazlık paktını önemsiz göstermeye çalışıyor. ³⁷
Savon Sanomat	Anlaşma Avrupa'daki durumu daha da kötüleştirdi. ³⁸
Etelä-Suomi	Komünizme karşı mücadele sona eriyor. ³⁹
Heinolan Sanomat	Alman çıkarları Doğu ile yaklaşmayı gerektirdi. ⁴⁰

²⁹ Jacqueline Helen Dooley, "The Northern Department of the British Foreign Office and the Soviet Union, 1939-1942", (Thesis, The University of Leeds), 2014, p. 52.

³⁰ А.Н.Сорокин, "Пакт Молотова-Риббентропа: основные направления изучения в современной историографии ФРГ", *Вестник СПбГУ*, Серия 2, 2015, p. 50.

³¹ Deets, "German-Soviet Relations and the International System", p. 47.

³² Geoffrey Roberts, "Ideology, calculation, and improvisation: spheres of influence and Soviet foreign policy 1939-1945", *Review of International Studies*, is. 25, 1999, p. 658.

³³ "Saksalaisia joukkoja marssii kohti Puolan rajaa", *Räisälän Sanomat*, no. 34, 25 August 1939, p. 3.

³⁴ "Saksa ja Neuvostoliitto solmivat hgökkäämättömngssopimuksenukoministeri von Ribbentrop Moskovassa", *Kajaani*, no. 96, 24 August 1939, p. 1.

³⁵ "Maailma on lyöty hämmästyksellä", *Iisalmen Sanomat*, no. 95, 24 August 1939, p. 1.

³⁶ "Helsingin Sanomat lausuu duel: Saksa ja Neuvostoliitto", *Itä-Häme*, no. 94, 25 August 1939, p. 3.

³⁷ "Tilanne äärimmäisen vakava", *Sisä-Suomi*, no. 192, 24 August 1939, p. 1.

³⁸ "Hyökkäämättömyyssopimus Saksan ja Neuvostoliiton kesken", *Savon Sanomat*, no. 96, 24 August 1939, p. 1.

³⁹ "Stalin ja Hitler", *Etelä-Suomi*, no. 93, 24 August 1939, p. 3.

⁴⁰ "Pikku-Uutisia", *Heinolan Sanomat*, no. 93, 24 August 1939, p. 2.

Paktın imzalanmasına kadarki hâkim atmosfer Alman-Sovyet ideolojik karşıtlığının anlaşmaya izin vermeyeceği yönündedir. Bu sebeple, gazeteler öncelikli olarak bu karşıtlığı izah etmeye başlamıştır. *Räisälän Sanomat* 1936'da Hitler'in, Nürnberg parti günlerini Sovyetler Birliği'ne karşı düzenlendiğini⁴¹ -hatta *Karjala-Inkeri* yalnızca Hitler'in değil Nasyonal Sosyalizmin önde gelen bütün temsilcilerinin komünizm karşıtlığında bulunduğunu-okuyucu kitlesine hatırlatır nitelikte haberler yayınlamıştır.⁴² Molotov, politik düzlemde ortaya çıkan bu çatışmaya şerh düşme ihtiyacı duymuş olacak ki, 1 Kasım 1939 tarihli konuşmasında; İngiltere ve Fransa'yı saldırgan olarak nitelendirmiş, faşizm kelimesini Hitlerizm ile değiştirmiştir: "*Hitler'in ideolojisi kabul edilebilir veya reddedilebilir, bu siyasi görüş meselesidir. Ama... bir ideoloji zorla yok edilemez...*"⁴³ Stalin'in tavrı ise daha nettir. Anlaşma Sovyet menfaatleri için emperyalistler arasındaki çekişmelerin kullanılmasından ibarettir ve eleştiriye kapalıdır.⁴⁴ Lakin Sovyetler'in konuya yaklaşımının Finlandiya gazetelerinde herhangi bir karşılık bulduğu söylenemez. Beklenenin aksine baskı en fazla Sovyet kamuoyunda hissedilmiştir. Sovyetler Birliği, siyasetini eleştiren vatandaşlarına yönelik İçişleri Halk Komiserliği "söylem analiz raporları" düzenlemeye başlamıştır. Moskova Tıp Enstitüsü 4. sınıf öğrencisi Andreev "*Sovyet Hükümeti tipik bir saldırgan... Finlandiya'nın yarısını aldı ve şimdi Türkiye'yi almayı düşünüyor*"; Moskova Konservatuvarı öğrencisi Safronov ise "*Sadece küçük Finlandiya ile savaştılar ve halk her yerde etsiz, yağsız, ekmezsiz kaldı. Yakında pantolonsuz kalacaklar*" şeklindeki söylemleri sebebiyle raporlananlar arasında yer almıştır.⁴⁵ *Keski-Suomen Suunta* gazetesi şüphesiz ki yanılmıştı, Rusya artık seyirci değildi.⁴⁶

3. Her Şeye Rağmen Müzakere

Polonya'nın Ekim 1939'da Almanya ve Sovyetler Birliği tarafından parçalanmasının ardından Moskova, Finlandiya'ya yönelik diplomasisinin yumuşak tonunu daha sert, daha talepkâr bir üslupla değiştirmiştir.⁴⁷ 5 Ekim 1939'da Sovyetler Birliği Finlandiya hükümetini Moskova'da müzakerelere davet etmiştir.⁴⁸ Aynı gün Letonya'nın topraklarında Sovyet deniz üsleri kurulmasına izin verilmesi sebebiyle düzenlenen resepsiyonda Stalin, Sovyetler'in Letonya'nın içişlerine müdahil olmayacağına dair "Bolşevik olarak şeref sözü" vermiştir.⁴⁹ Lakin Letonya örneği propagandadan ibarettir. Müzakereler başlamadan Hitler Finlandiya'yı Almanya'nın dost ülkeler listesinden çıkardığını duyurmuş,⁵⁰ Almanya Hava Kuvvetleri Komutanı Hermann Göring Finlandiya'ya Sovyetler'in talep ettiği deniz üslerinin verilmesi gerektiği yönünde telkinde bulunmuştur.⁵¹ Bahse konu telkin, Sovyet müzakerelerinin sonucunun Finlandiya-Almanya ilişkilerinin seyrini belirleyeceğinin ifadesidir. Finlandiya ise baskılar karşısında Sovyet yönetimine Finlandiya işçi sınıfının hükümetin arkasında

⁴¹ "Saksalaisia joukkoja marssii kohti Puolan rajaa", *Räisälän Sanomat*, no. 34, 25 August 1939, p. 3.

⁴² "Hyökkäämättömyyssopimus Saksan ja Neuvostoliiton välillä", *Karjala-Inkeri*, no. 34, 24 August 1939, p. 1.

⁴³ Ewa M. Thompson, "Nationalist Propaganda in the Soviet Russian Press, 1939-1941", *Slavic Review*, vol. 50, no. 2, Summer 1991, p. 390.

⁴⁴ Донгаров Александр Герасимович, "Пакт Молотова-Риббентропа: Запланированный Экспромт", *Международная Жизнь*, Номер: 6, 2016, p. 321.

⁴⁵ *Зимняя война 1939-1940 гг. в рассекреченных документах Центрального архива ФСБ России и архивов Финляндии: Исслед., док., коммент*, Москва: Академкнига, 2009, p. 512.

⁴⁶ "Moskovansopi muksen seuraukset", *Keski-Suomen Suunta*, no. 102, 29 August 1939, p. 3.

⁴⁷ Dan Reiter, *How Wars End*, New Jersey: Princeton University Press, 2009, p. 123.

⁴⁸ Meinander, "Interpretations of Finland in the Second World War", p. 57.

⁴⁹ Vehviläinen, *Finland in the Second World War Between Germany and Russia*, p. 33.

⁵⁰ Gerrard, *The Foreign Office and Finland (1938-1940)*, p. 71.

⁵¹ Vesa Nenye, Peter Munter and Toni Wirtanen, *Finland at War: the Winter War 1939-40*, Oxford: Osprey Publishing, 2015, p. 49.

durduğunu göstermek için Sosyal Demokrat Partide de baskın bir figür olarak öne çıkan Maliye Bakanı Vainö Tanner'i delegasyona dâhil etmiştir.⁵²

Finlandiya delegasyonu Moskova'ya yaptığı ilk ziyarette iki görüşme gerçekleştirmiştir. 12 Ekim tarihli ilk görüşmede Stalin ve Molotov, Sovyetler Birliği'nin Finlandiya'dan ne beklediğini sözlü olarak açıklamıştır. İki gün sonra, deniz üssü kurmak için Hanko limanının otuz yıllığına kiralanması, Fin-Sovyet sınırının Leningrad'ın yaklaşık 100 mil batısına taşınması, Lappohja körfezinin demirleme mevkiî olarak Sovyet tasarrufuna bırakılması taleplerini ortaya koyan resmi bir muhtıra sunulmuştur. Taleplere karşılık olarak Sovyetler Birliği Karelya ve Petsamo (Pechenga) bölgelerinden eski Fin topraklarını geri vermeyi teklif etmiştir.⁵³ Finler, Sovyet taleplerine verdikleri yanıt konusunda ikiye bölünmüştür. Ulusal Savunma Konseyi Başkanı Mannerheim'in, uzlaşmacı bir tutum sergilenmesinden yana olduğu görülmektedir. Savunma Bakanı Juho Niukkanen ve Dışişleri Bakanı Eljas Erkkö ise tavizlere karşıdır. Neticede Sovyet talepleri Finlandiya Hükümeti tarafından reddedilmiştir.⁵⁴

Tablo 4. Finlandiya ve Sovyetler Birliği'nin Öteki Kavramlarını Açımlayıcı Söylemleri⁵⁵

Taraflar	Söylem
Moskova	Finlandiya Lenin'e doğrultulmuş potansiyel bir hançer!
Helsinki	Sovyetler Birliği Finlandiya'nın demokratik sistemi ve [liberal ve ılımlı] kapitalist ekonomik biçimi için sürekli bir tehdit!

Müzakerelerden arzu ettiği sonuçları elde edemeyen Stalin, meseleyi zor kullanarak çözmeye karar vermiştir. Kasım 1939'un sonlarında Sovyetler Birliği bir sınır köyünün ateş altına alındığı gerekçesiyle Finlandiya'yı suçlamış, Finlandiya güçlerinin Karelya Kıstağı sınırından 20-25 kilometre uzağa konuşlandırılmasını bir ultimatomla talep etmiştir. Yaklaşan saldırı tehdidi karşısında Finler seferberlik ilan etmiştir. 28 Kasım 1939'da Sovyetler Birliği, Fin-Sovyet Saldırmazlık Paktını tek taraflı reddetmiş, 30 Kasım'da hiçbir resmi açıklama yapmadan Finlandiya'ya saldırarak Kıs Savaşını başlatmıştır.⁵⁶ Sovyetler'in beklentisi hızlı ve kesin zaferdur, ancak Finlandiya tüm dünyayı şaşkırtan bir direniş sergilemiştir.⁵⁷

4. Kendi Savaşımızı Veriyoruz!⁵⁸

Finlandiya basınında Türkiye söylemi Alman-Sovyet Saldırmazlık Paktının imzalanmasına kadar belirgin görünlere ve iç motivasyonlara sahip değildir. Finlandiya için Türkiye

⁵² Jason Lavery, *The History of Finland*, Westport: Greenwood Press, 2006, p. 115.

⁵³ *Stalin and the Soviet-Finnish War, 1939-1940*, (ed. Chubaryan & Shukman), (translated by Tatyana Sokokina), New York: Routledge, 2013, pp. xx-xxi. ; Hans Peter Krosby, "Finland's Relations with the Soviet Union, 1940-1952", (Thesis, University of British Columbia), 1955, p. 38.

⁵⁴ Fred Singleton, *A Short History of Finland*, Cambridge University Press, 1998, p. 124.

⁵⁵ Leland Stowe, "Peril of Armed Action By Soviet in Finland Believed Averled", *Evening Star* (USA), no. 34874, 24 October 1939, p. 5.

⁵⁶ *Stalin and the Soviet-Finnish War, 1939-1940*, pp. xx-xxi.

⁵⁷ Markku Ruotsila, *Churchill and Finland: A Study in Anticommunism and Geopolitics*, New York: Routledge, 2005, p. 68.

⁵⁸ "We Are Fighting Our Own War!" başlık seçiminde belki de en isabetli tercih Henrik Meinander'e aittir. Ben de Meinander'in başlığının kullanılmasının daha doğru olacağı düşüncesindeyim. Bkz. Henrik Meinander, "Interpretations of Finland in the Second World War", *Nordic Narratives of the Second World War: National Histories Revisited*, (ed. Henrik Stenius etc.), Nordic Academic Press, 2011, p. 56.

çeşitli makineler, kâğıt, plastik ürünleri, kauçuk, çini, demir, çelik, pamuk ipliği gibi ürünler ihraç ettiği ticari bir partner niteliğindedir⁵⁹ ve Türkiye haberleri daha çok *Helsingin Sanomat*,⁶⁰ *Uusi Aura*,⁶¹ *Aamulehti*,⁶² *Uudenmaan Sanomat*,⁶³ *Uusi Aika*,⁶⁴ *Suomen Sosialidemokraatti*,⁶⁵ *Pohjolan Työ*⁶⁶ örneklerinde olduğu gibi tematik -askeri tedbirler, dış politika unsurları ve diplomatik beklentiler- alanda değerlendirilmektedir. Paktın imzalanması Finlandiya basınında Türkiye söylemine yeni bir hüviyet kazandırdığı gibi Türkiye'nin Sovyetler Birliği ile mükemmel ilişkileri olduğu yönündeki söylemlerin gerçeği yansıtmadığını,⁶⁷ hatta Türk-Sovyet ilişkilerinin normal şartlarda ilerleyen bir süreç dahi sayılamayacağını göstermiştir. Alan J.P. Taylor'dan uyarılama bir tespitle: *Pakt Finlandiya ve Türkiye için ne bir ittifak ne de bir anlaşmadır. Yalnızca ortak motivasyonn temsilidir*.⁶⁸ Rus

⁵⁹ *Harici Ticaret Yıllık İstatistik (1939), Kısım: 2 (Hususi Ticaret Memleketler ve Maddeler İtibariyle İthalat ve İhracat)*, Başvekâlet İstatistik Umum Müdürlüğü, Ankara: Yeni Cezaevi Matbaası, 1940, pp. 80-85.

⁶⁰ Bakınız. "Mustanmeren sopimus tekeillä", *Helsingin Sanomat*, no. 36, 7 February 1939, p. 12. ; "Moskovalainen tieto Turkin kautta", *Helsingin Sanomat*, no. 43, 14 February 1939, p. 12. ; "Suuri kansainvälinen konferenssi koolle", *Helsingin Sanomat*, no. 78, 21 March 1939, p. 5. ; "Samanlaisia neuvotteluja Turkinkin kanssa", *Helsingin Sanomat*, no. 103, 18 April 1939, p. 5. ; "Mäiski taipumaton", *Helsingin Sanomat*, no. 138, 25 May 1939, p. 5. ; "Turkki ja Balkanin entente", *Helsingin Sanomat*, no. 153, 10 June 1939, p. 12. ; "Turkin Asenne Sodan Syttyessä", *Helsingin Sanomat*, no. 228, 26 August 1939, p. 17.

⁶¹ Bakınız. "Aikovatko turkkilaiset miehittää Alexandretten ja Aleppon?", *Uusi Aura*, no. 92, 5 April 1939, p. 1. ; "Ranskan lehdistö varoittaa tekemästä myönnytyksiä Turkille", *Uusi Aura*, no. 94, 7 April 1939, p. 5. ; "Balkanin entente hajoamassa", *Uusi Aura*, no. 130, 16 May 1939, p. 1. ; "Itä-Aasian olosuhteet antavat Englannille aihetta vakavaan huolestumiseen", *Uusi Aura*, no. 152, 9 June 1939, p. 1. ; "Ranskan ja Turkin satilasliitto", *Uusi Aura*, no. 207, 5 August 1939, p. 1. ; "Turkki pysyy Englannin ja Ranskan Rinnalla", *Uusi Aura*, no. 236, 3 September 1939, p. 5.

⁶² Bakınız. "Vaaditaan, että Turkille ei saa tehdä myönnytyksiä", *Aamulehti*, no. 94, 7 April 1939, p. 1. ; "Turkki noudattaa puolueettomuutta", *Aamulehti*, no. 97, 12 April 1939, p. 1. ; "Turkki länsivaltain liittolaiseksi", *Aamulehti*, no. 128, 14 May 1939, p. 3. ; "Turkki pyrkii säilyttämään normaalit suhteet myöskin Saksaan ja Italiaan", *Aamulehti*, no. 181, 10 July 1939, p. 1.

⁶³ Bakınız. "Venäjällä ja Turkilla", *Uudenmaan Sanomat*, no. 45, 25 April 1939, p. 1. ; "Eristäytykö Neuvostoliitto kokonaan Euroopan politiikasta?", *Uudenmaan Sanomat*, no. 49, 6 May 1939, p. 1. ; "Suomen, Viron ja Latvian kieltäytyminen hyväksymästä rauhaarakastavien maiden tarjoamaa apua ei miellytä Pravdaa", *Uudenmaan Sanomat*, no. 64, 15 June 1939, p. 1. ; "Suuri sotilasvaltuuskunta matkustaa tänään Moskovaan", *Uudenmaan Sanomat*, no. 85, 5 August 1939, p. 1.

⁶⁴ Bakınız. "Balkanin valtiot ja Turkki liittyvät länsivaltajien rintamaan", *Uusi Aika*, no. 40, 4 April 1939, p. 1. ; "Paine Balkanilla", *Uusi Aika*, no. 44, 15 April 1939, p. 2. ; "Neuvostoliitto tyytyväinen Englannin-Turkin sopimukseen", *Uusi Aika*, no. 57, 16 May 1939, p. 1. ; "Turkki liittynyt länsivaltajien", *Uusi Aika*, no. 57, 16 May 1939, p. 2. ; "Englannin ja Neuvostoliiton sotilasliitto toteutuu", *Uusi Aika*, no. 60, 23 May 1939, p. 1.

⁶⁵ Bakınız. "Turkin Suhteet Hyvät Myös Neuvostoliittoon", *Suomen Sosialidemokraatti*, no. 122, 7 May 1939, p. 1. ; "Turkki ja Englanti Solmineet Laajan Sopimuksen", *Suomen Sosialidemokraatti*, no. 123, 8 May 1939, p. 1. ; "Ranskan ja Turkin sotilasneuvottelut", *Suomen Sosialidemokraatti*, no. 189, 17 July 1939, p. 2. ; "Suuret sotaharjoitukset käynnissä Turkissa", *Suomen Sosialidemokraatti*, no. 219, 16 August 1939, p. 4.

⁶⁶ Bakınız. "Englannin, Ranskan ja Venäjän suunnittelema saksalaisvastaisesta liittosta", *Pohjolan Työ*, no. 79, 6 April 1939, p. 1. ; "Turkki on tyytyväinen Englannin ja Ranskan potitilkkään", *Pohjolan Työ*, no. 85, 15 April 1939, p. 4. ; "Turkki ja Englanti", *Pohjolan Työ*, no. 104, 9 May 1939, p. 1. ; "Turkki asettuu Ranskan ja Englannin puolelle Välimeren kysymyksessä", *Pohjolan Työ*, no. 109, 14 May 1939, p. 1. ; "Sotilasliitto Englannin, Ranskan ja Turkin Välille", *Pohjolan Työ*, no. 176, 5 August 1939, p. 1. ; "Hyökkäyskohdeet Välimerellä", *Pohjolan Työ*, no. 179, 9 August 1939, p. 4.

⁶⁷ "Turkki tarjoutuu välittäjäksi Neuvostoliiton ja Romanian välillä", *Satakunnan Kansa*, no. 173, 1 August 1939, p. 1.

⁶⁸ Roberts, *The Soviet Union and the Origins of the Second World War (Russo-German Relations and the Road to War, 1933-1941)*, p. 92.

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genişlemesine (ve taleplerine) tarafsızlık, dostluk, barış, bağımsızlık gibi ortak kavramlar kullanarak karşı durmak.⁶⁹

Tablo 5.	Sovyet Müzakerelerinin Başlaması Üzerine Finlandiya Başbakanı Aimo Cajander ve Türkiye Dışişleri Bakanı Şükrü Saraçoğlu'nun Beyanları	
	Şükrü Saraçoğlu	Aimo Cajander
	Memleketlerimiz arasında dostluk ve emniyet hissi arzu edildiği kadar sağlamdır... Size Sovyet memleketinden iyi havadisler getireceğimi ümit ediyorum... Son zamanların beynelmil karışık hadiseleri emniyet ve menfaat birliği vaziyetini sarsmak şöyle dursun takviye etmiştir... Türk milletinden Sovyet milletlerine dostluk hisleri götüreceğim. ⁷⁰	Barış içinde yaşayabileceğimize yürekten inanıyorum... Hiçbir komşumuzun huzurunu bozmayacağız... Fin halkının soldan sağa, sağdan sola tüm kesimleri, ne olursa olsun her türlü saldırıya karşı tarafsızlığımızı şaşmadan savunacağımız konusunda hemfikirdir... Makul olmayan taleplere katılmayacağız. Kimseyi tehdit etmiyoruz... Bugün bile geleceğimizin aydınlık ve mutlu olacağına inanıyoruz. Ama teyakkuzdayız. ⁷¹
Tablo 6.	Sovyet Müzakerelerinin Sonlanması Üzerine Finlandiya Dışişleri Bakanlığı ve Türkiye Dışişleri Bakanı Şükrü Saraçoğlu'nun Beyanları	
	Şükrü Saraçoğlu	Finlandiya Dışişleri Bakanlığı
	[Moskova] bu ziyaretimin her iki millet arasında eskiden beri mevcut olan dostluğun bir kat daha artmasına vesile olduğunu sizlere söyleyebilirim. ⁷²	Finlandiya Hükümeti, Moskova'nın [Fin-Sovyet]dostluk ve saldırmazlık anlaşmasına sadık kalacağını ve bu anlaşmanın ruhu çerçevesinde hareket edeceğini ümit eder. ⁷³

Sovyetler'in Finlandiya'ya saldırmasının akabinde -Kış Savaşı- Fin basınında Sovyetler Birliği başlangıçtan bu yana *zora başvuran "öteki"*,⁷⁴ Finlandiya dünyanın en barışçıl ve dostane ülkesi,⁷⁵ Türkiye ise aynı politik tehdit ve kaygıları paylaşmasının kurduğu paydaşlık zeminiyle Finlandiya'nın yanında konumlandırılmıştır.

⁶⁹ "Foreign Ministers To Attend Talks In Stockholm", *Evening Star*, no. 34863, 13 October 1939, p. 1.

⁷⁰ "Hariciye Vekili", *Akşam*, no. 7515, 22 September 1939, p. 1.

⁷¹ "Pääministeri Cajander", *Kansan Työ*, no. 236, 13 October 1939, p. 2.

⁷² "Türk-Sovyet Dostluğu", *Akşam*, no. 7544, 21 October 1939, p. 10.

⁷³ "Finlandiya Molotofun Nutkuna Cevap Verdi", *Son Posta*, no. 3327, 1 November 1939, p. 6.

⁷⁴ "Levotonta kaakkois Euroopassa", *Ylä-Vuoksi*, no. 139, 9 December 1939, p. 4.

⁷⁵ "Muut lehde", *Vaasa*, no. 335, 12 December 1939, p. 6.

Tablo 7. Finlandiya Gazetelerinde Türkiye Söylemi

Gazete	Söylem
Ylä-Vuoksi	...(küçük) Finlandiya, Türkiye ile aynı gücü göstermiş-tir. ⁷⁶
Aamulehti	Türkiye yüzyıllardır Rus emperyalizmine karşı savaşmıştır ve ihtiyaç duyulursa savaşmaya devam edecektir. ⁷⁷
Turun Sanomat	Türkiye Moskova'nın taleplerini cesurca reddetti. ⁷⁸
Helsingin Sanomat ⁷⁹	Türk gazetelerinde Finlandiya ile Rusya arasındaki savaşa ilişkin çok az açıklama yayınlansa da, Türkiye'nin mücadeleyi büyük bir ilgiyle izlediği şüphesiz.
	...Fin halkının ezici düşmana karşı cesur direnişi, Finlere sempati duyan Türkler arasında hemen hayranlık uyandırdı.
Eteenpäin	Türkiye'nin Batılı demokrasilere verdiği taahhütler var. ⁸⁰
Vaasa	Türk Hükümeti kesinlikle çok dostane bir tavırla Moskova'ya temsilci gönderdi. ⁸¹

Türk gazetelerinde Finlandiya haberlerinin çok az olduğu yönündeki *Helsingin Sanomat*'ın söyleminin aksine, Türkiye'de gazetelerin Fin-Sovyet Savaşını yakından takip ettikleri görülmektedir.⁸² Nitekim Sovyet saldırılarına karşı gösterdiği direnç sebebiyle Finlandiya, Türkiye'de daha önce hiç olmadığı kadar popülerdir ve Türk gazetelerinde yapılan Finlandiya tanıtımları "iki devletin yeniden tanışması" olarak lanse edilmektedir.⁸³ Ne 1935⁸⁴ ne de 1945

⁷⁶ "Pieni Suomi on osoittanut samaa lujuutta kuin Turkki", *Ylä-Vuoksi*, no. 129, 16 November 1939, p. 1.

⁷⁷ "Poimintoja mielialoista ia kättöisistä ulkomailla", *Aamulehti*, no. 354, 31 December 1939, p. 7.

⁷⁸ *Turun Sanomat*, no. 353, 31 December 1939, p. 9.

⁷⁹ "Tämä taistelu voi vaikuttaa ratkaisevasti turkkilaisvenäläisiin suhteisiin", *Helsingin Sanomat*, no. 351, 30 December 1939, p. 4.

⁸⁰ "Tärkeä viikko", *Eteenpäin*, no. 116, 17 October 1939, p. 4.

⁸¹ *Vaasa*, no. 265, 2 October 1939, p. 4.

⁸² Bakınız. "Rus-Finlandiya Müzakereleri", *Son Posta*, no. 3320, 25 October 1939, p. 1. ; "Fin-Sovyet Müzakereleri Kesildi", *Haber*, no. 2796, 3 November 1939, p. 3. ; "Sovyet-Finlandiya Konuşmalarının İçyüzü", *Son Posta*, no. 3338, 12 November 1939, p. 7. ; "Fin-Sovyet Gerginliği", *Yeni Asır*, no. 10311, 28 November 1939, p. 3. ; "Sovyet-Finlandiya İhtilafı Şiddetleniyor", *Son Posta*, no. 3353, 29 November 1939, p. 5. ; "Finler Mukavemet Ediyorlar", *Cumhuriyet*, no. 5588, 2 December 1939, p. 1. ; "Finlandiya'nın Mukavemet Noktası", *Son Posta*, no. 3356, 2 December 1939, p. 5. ; "Bu Harb Finlandiya İçin Bir Hayat Memat Meselesidir", *Son Posta*, no. 3357, 3 December 1939, p. 5. ; "Sovyetler Ağır Zayıt Veriyorlar", *Haber*, no. 2807, 6 December 1939, p. 3. ; "Finler Yeni Bir Rus Taarruzunu Püskürttüler", *Son Posta*, no. 3361, 7 December 1939, p. 3. ; "Fin-Sovyet Harbi", *Haber*, no. 2810, 9 December 1939, p. 4. ; "Finler Baskın Yaptılar", *Yeni Asır*, no. 10323, 10 December 1939, p. 3.

⁸³ Bakınız. "Tarihte Finlandiyalılar", *Servetifunun (Uyanış)*, no. 2252, 19 October 1939, p. 8. ; "Finlandiya ve Finlandiyalı", *Son Posta*, no. 3320, 25 October 1939, p. 7. ; "Finlandiya ve Uygur Finleri", *Cumhuriyet*, no. 5590, 4 December 1939, p. 3. ; "Fin Edebiyatı ve Nobel Mükafatı", *Servetifunun (Uyanış)*, no. 2259, 7 December 1939, p. 8. ; "Fin Kültürü ve Fin Edebiyatı", *Son Posta*, no. 3369, 15 December 1939, p. 6. ; "Fin Zaferinin Yakın ve Uzak Tesirleri", *Son Posta*, no. 3383, 29 December 1939, p. 6. ; "Finlerin Muvaffakiyetlerinin Sırrı", *Akşam*, no. 7634, 24 January 1940, p. 8. ; "Fince ve Türkçe'nin Yakınlığı Meselesi", *Cumhuriyet*, no. 5668, 23 February 1940, p. 3. ; "Finlandiya'da Film Sanayii", *Akşam*, no. 7667, 26 February 1940, p. 7.

nüfus sayımında⁸⁵ Türkiye'de nüfusun ana dilleri ve konuşulan ikinci dil itibariyle ayrılışında kategori olarak Fince bulunmamasına karşın, Türk basınında "Küçük Finlandiya muazzam Rus ordusunu uzun süre uğraştırabilir",⁸⁶ "şimalin centilmenleri",⁸⁷ "Fin müdafaası her millet için örnektir",⁸⁸ "Finlandiya istila edilebilir fakat fethedilemez",⁸⁹ "Kahraman Finlandiya!"⁹⁰ gibi Finlandiya ile ortaya çıkmış olan ortaklıklar -benzer duygular- üzerine inşa edilen söylemlerle Türk Basınında -tıpkı Fin basınında olduğu gibi- karşılaşmak mümkündür.

SONUÇ

1. Alman-Sovyet Saldırmazlık Paktı iç politikalarında kitlelerini birbirlerinin karşısında konsolide eden ve sınırları dahilinde taraftarlarına ağır cezalar uygulayan iki ülkenin/ideolojinin pragmatist dış politika örneğidir.
2. Finlandiya basınında Türk söyleminin pekiştireci Türkiye'nin Sovyet taleplerini kabul etmemesidir ve bu ortaya konmuş red tavır, Finlandiya gazetelerinde "sempati" şeklinde adlandırılmaktadır. Lakin bütün gazetelerin ortak bir söylemde olduğunu söylemek mümkün değildir. Finlandiya'da yayımlanan Sosyalist gazetesi bunun önemli bir örneğidir. Kış Savaşı sürecinde Türkiye'de ise "Almanya, Türk-Sovyet dostluğunu bozamaz!"⁹¹ gibi Rus dostluğu söylemleriyle karşılaşmak mümkündür. İlaveten idealler ve uygulamalar açısından Finlandiya ile Türkiye arasında ciddi farklılıklar bulunmaktadır. Finlandiya halkı kendilerini ileri karakolu olarak görürken, Türkiye, Rusya ile sınırlarını aidiyetler üzerinden ayırmamaktadır.
3. Hükümetler nezdinde söylemler, politik yanıtma amaçlı bir dış politika aracı olarak kullanılabilmiştir. Buradaki boşluk karşılaştırmalı bir tarih çalışması olmayı beklemektedir.
4. Onur İşçi'nin kullandığı "Rusofobik tarafsızlık" kavramını oldukça beğendiğimi söylemeliyim. Fakat incelenen Finlandiya ve Türkiye gazetelerinde söylemlerin çoğunun "mücadele" üzerine kurulduğu görülmektedir. Aslında tarihi sürecin bende uyandırdığı ilk çağrışım da mücadeledir. Fakat "peki ya korku ile mücadele ise?" sorusu Türkiye-Sovyet/Finlandiya-Sovyet ilişkilerinin temel motivasyonu konusunda tereddüde düşmeme yol açtı. Daha çatı bir kavramın bu sorunu çözeceği kanaatindeyim. Öteki sanırım en uygunu. Bu kavram özelinde, Türkiye perspektifinde Sovyetler, "ilanı ertelenen/ beklenen, adı koyulmamış" şeklinde çeşitlendirilebilir yahut sınırlandırılabilir.

⁸⁴ *Genel Nüfus Sayımı (20 İktisrin 1935): Türkiye Nüfusu Kat'i Tasnif Neticeleri*, Başbakanlık İstatistik Genel Direktörlüğü, no. 75, vol. 60, İstanbul: Hüsnütabiat Basımevi, 1939, pp. 107-112.

⁸⁵ *Genel Nüfus Sayımı (21 Ekim 1945)*, Başbakanlık İstatistik Genel Müdürlüğü, no. 268, vol. 65, Ankara 1950, pp. 106-148.

⁸⁶ "Küçük Finlandiya", *Haber*, no. 2805, 4 December 1939, p. 5.

⁸⁷ "Şimalin Centilmenleri: Finlandalılar", *Tan*, no. 1591, 4 January 1940, p. 5.

⁸⁸ "Fin Müdafaası", *Son Posta*, no. 3379, 25 December 1939, p. 5.

⁸⁹ "Finlere Hitabe", *Cumhuriyet*, no. 5670, 25 February 1940, p. 3.

⁹⁰ "Kahraman Finlandiya", *Servetifünun (Uyanış)*, no. 2271, 29 February 1940, p. 11.

⁹¹ "Alman Hezeyanı Devam Ediyor", *İkdam*, no. 116, 9 December 1939, p. 1.

KAYNAKÇA

1. Gazeteler

Finlandiya: *Aamulehti, Etelä-Suomi, Hämeen Kansa, Heinolan Sanomat, Helsingin Sanomat, Iisalmen Sanomat, Ilta-Sanomat, Itä-Häme, Kajaani, Kansan Lehti, Kansan Työ, Karjala-Inkeri, Keski-Suomen Suunta, Länsi-Suomi, Maakansa, Maan Sana, Pohjolan Työ, Rääsälän Sanomat, Satakunnan Kansa, Savo, Savon Sanomat, Sisä-Suomi, Sosialisti, Suomen Sosialidemokraatti, Turun Sanomat, Työn Suunta, Uudenmaan Sanomat, Uusi Aika, Uusi Aura, Uusi Suomi, Vaasa, Ylä-Vuoksi.*

Türkiye: *Akşam, Cumhuriyet, Haber, Servetifunun (Uyanış), Son Posta, Tan, Yeni Asır.*

ABD: *Evening Star.*

2. Referans Eserler

Baker, Paul-Ellece, Sibonile; *Key Terms Key Terms in Discourse Analysis*, Continuum International Publishing Group 2011.

Deets, Michael Joseph; "*German-Soviet Relations and the International System*", (Thesis, College of William & Mary), 1994.

Dooley, Jacqueline Helen; "*The Northern Department of the British Foreign Office and the Soviet Union, 1939-1942*", (Thesis, The University of Leeds), 2014.

Fairclough, Norman; *Analysing Discourse*, London: Routledge, 2003.

Gasper, Des-Apthorpe, Raymond; "Discourse Analysis and Policy Discourse", *The European Journal of Development Research*, vol. 8, is. 1, June 1996, pp. 1-15.

Gee, James Paul; *An Introduction to Discourse Analysis Theory and Method*, London: Routledge, 1999.

Genel Nüfus Sayımı (20 İkteşrin 1935): Türkiye Nüfusu Kat'i Tasnif Neticeleri, Başbakanlık İstatistik Genel Direktörlüğü, no. 75, vol. 60, İstanbul: Hüsnütabiat Basımevi, 1939.

Genel Nüfus Sayımı (21 Ekim 1945), Başbakanlık İstatistik Genel Müdürlüğü, no. 268, vol. 65, Ankara 1950.

Gerrard, Craig; *The Foreign Office and Finland (1938-1940)*, New York: Frank Cass, 2005.

Harici Ticaret Yıllık İstatistik (1939), Kısım: 2 (Hususi Ticaret Memleketler ve Maddeler İtibariyle İthalat ve İhracat), Başvekâlet İstatistik Umum Müdürlüğü, Ankara: Yeni Cezaevi Matbaası, 1940.

Isci, Onur; "*Russophobic Neutrality: Turkish Diplomacy, 1936-1945*" (Thesis, Georgetown University), 2014.

Jørgensen, Marianne-Phillips, Louise; *Discourse Analysis as Theory and Method*, London: SAGE Publications, 2002.

Krosby, Hans Peter; "*Finland's Relations with the Soviet Union, 1940-1952*", (Thesis, University of British Columbia), 1955.

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EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

- Kuss, Mark Davis; "*Collective security or world domination: the Soviet Union and Germany, 1917-1939*", (Thesis, Louisiana State University), 2012.
- Lavery, Jason; *The History of Finland*, Westport: Greenwood Press, 2006.
- Luostarinen, Heikki; "Finnish Russophobia: The Story of an Enemy Image", *Journal of Peace Research*, vol. 26/2, 1989, pp. 123-137.
- Meinander, Henrik; "Interpretations of Finland in the Second World War", *Nordic Narratives of the Second World War: National Historiographies Revisited*, (eds. Henrik Stenius etc.), Nordic Academic Press, 2011, pp. 55-78.
- Nenye, Vesa- Munter, Peter and Wirtanen, Toni; *Finland at War: the Winter War 1939-40*, Oxford: Osprey Publishing, 2015.
- Pauli Kettunen, "Wars, Nation, and the Welfare State in Finland", *Warfare and Welfare Military Conflict and Welfare State Development in Western Countries*, (edp. Herbert Obinger, etc.), Oxford University Press, 2018, pp. 260-289.
- Reiter, Dan; *How Wars End*, New Jersey: Princeton University Press, 2009.
- Roberts, Geoffrey; "Ideology, calculation, and improvisation: spheres of influence and Soviet foreign policy 1939-1945", *Review of International Studies*, is. 25, 1999, pp. 655-673.
- Roberts, Geoffrey; "The Soviet Decision for a Pact with Nazi Germany", *Soviet Studies*, vol. 44, no. 1, 1992, pp. 57-78.
- Roberts, Geoffrey; *Molotov: Stalin's Cold Warrior*, (edited by Melvyn P. Leffler), Washington: Potomac Books, 2012.
- Roberts, Geoffrey; *The Soviet Union and the Origins of the Second World War (Russo-German Relations and the Road to War, 1933-1941)*, New York: Macmillan Education, 1995.
- Ruotsila, Markku; *Churchill and Finland: A Study in Anticommunism and Geopolitics*, New York: Routledge, 2005.
- Singleton, Fred; *A Short History of Finland*, Cambridge University Press, 1998.
- Stalin and the Soviet-Finnish War, 1939-1940*, (ed. Chubaryan&Shukman), (translated by Tatyana Sokokina), New York: Routledge, 2013.
- Thompson, Ewa M.; "Nationalist Propaganda in the Soviet Russian Press, 1939-1941", *Slavic Review*, vol. 50, no. 2, Summer 1991, pp. 385-399.
- Vehviläinen, Olli; *Finland in the Second World War Between Germany and Russia*, (translated by Gerard McAlester), New York: Palgrave Publishers, 2002.
- Герасимович, Донгаров Александр; "Пакт Молотова-Риббентропа: Запланированный Экспромт", *Международная Жизнь*, Номер: 6, 2016, pp. 320-352.
- Зимняя война 1939-1940 гг. в рассекреченных документах Центрального архива ФСБ России и архивов Финляндии: Исслед., док., коммент*, Москва: Академкнига, 2009.
- Сорокин, А.Н.; "Пакт Молотова-Риббентропа: основные направления изучения в современной историографии ФРГ", *Вестник СПбГУ*, Серия 2, 2015, pp. 44-56.

AAMULEHTI

N:o 226 - 1939

24. elokuuta 1939

Torstaina elokuun 24. päivä

PAATUMITTAJA JAAKKO TUOMIKOSKI

Torstaina elokuun 24. päivä

MOLOTOV NEUVOTTELI EILEN

sekä von Ribbentropin että Englannin ja Ranskan lähettiläiden kanssa.

Henderson vei eilen Hitlerille Englannin hallituksen tiedonannon.

Onko Puola valmis vastaanottamaan apua Neuvostoliitolta?

Reunavaltioiden ja Skandinavian puolueettomuus ei ole uhattu, sanotaan Berliinissä.

Saksalaisia joukkoja

saapunut Puolan rajalle.

Kuumeisesti jatketaan varuste-luja Puolassa.

Lontoo, 23. 8. (STT) Saksalaiset joukot, jotka on lähtenyt Puolan rajalle, ovat saaneet varusteita ja koulutusta. Saksalaiset joukot ovat saaneet varusteita ja koulutusta. Saksalaiset joukot ovat saaneet varusteita ja koulutusta.

Kahakka Pradon ja Saksan rajalla.

Pradon, 23. 8. (STT) Saksalaiset joukot ovat saaneet varusteita ja koulutusta. Saksalaiset joukot ovat saaneet varusteita ja koulutusta.

„EI MITÄÄN UHKAA,

vaan päinvastoin turvallisuuden lisääntymistä

merkitsee sopimus Baltian ja Skandinavian valtioille.”

Berliini, 23. 8. (STT) Ulkoministeri Ribbentropin lausuma on saanut suurimman osan Saksan ja Neuvostoliiton välisestä suhteesta. Ribbentropin lausuma on saanut suurimman osan Saksan ja Neuvostoliiton välisestä suhteesta.

Useita tunteja kesti

von Ribbentropin ja Molotovin ensimmäinen neuvottelu.

Lyhyen välilajan jälkeen alkoi toinen illalla.

Berliini, 23. 8. (STT) Molotovin ja Ribbentropin neuvottelut alkoivat tänään. Molotovin ja Ribbentropin neuvottelut alkoivat tänään.

Berliini, 23. 8. (STT) Molotovin ja Ribbentropin neuvottelut alkoivat tänään. Molotovin ja Ribbentropin neuvottelut alkoivat tänään.

Optimismi levisi

tiistai-iltana Lontoon poliittisiin piireihin.

Valtuuslaki hyväksyttiin todennäköisesti jo tänään.

Lontoo, 23. 8. (STT) Lontoon poliittiset piirit ovat optimistisia. Lontoon poliittiset piirit ovat optimistisia.

Lontoo, 23. 8. (STT) Lontoon poliittiset piirit ovat optimistisia. Lontoon poliittiset piirit ovat optimistisia.

Puolalaiset patterit

kohdistivat tulen saksalaisia lentokoneita vastaan.

Ammukset räjähtivät lentokoneen molemmissa puolissa.

Varsova, 23. 8. (STT) Puolalaiset patterit kohdistivat tulen saksalaisia lentokoneita vastaan. Puolalaiset patterit kohdistivat tulen saksalaisia lentokoneita vastaan.

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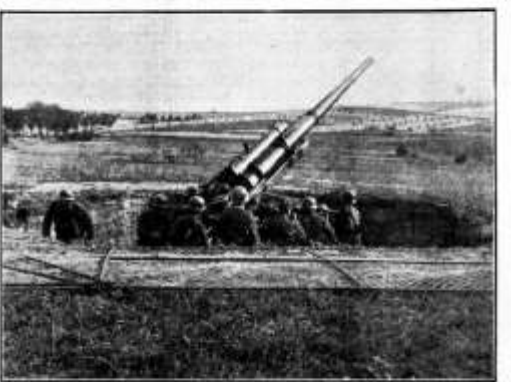
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Saksalaisten Sigrifrid-tyypin ilmatorjuntakoneistoja. Nämä ovat saksalaiset ilmatorjuntakoneistot.

„Ihmiskuntaa uhkaavan

murhenäytelmän estämiseksi

toivomme niiden miesten,

joista riippuu tällä hetkellä tapahtumain kulku,

suostuvan alistamaan erimielisyytensä ja vaatimuksensa avoimiin neuvotteluihin.”

Belgian kuningas luki eilen Oslo-valtioiden päämiesten nimissä julistuksen.

Puola nyt valmis

vastaanottamaan

apua Neuvostoliitolta?

Ranska ja Englanti tehneet ilmoituksen Molotoville.

Lontoo, 23. 8. (STT) Ranska ja Englanti ovat tehneet ilmoituksen Molotoville. Ranska ja Englanti ovat tehneet ilmoituksen Molotoville.

SAKSA EI LIOUVU

PUOLUSTAMASTA KANSALLISIA ETUJAA.

Henderson eilen Hitlerin luona.

Hän jäi Englannin hallituksen tiedonannon.

Berliini, 23. 8. (STT) Saksalaiset joukot ovat saaneet varusteita ja koulutusta. Saksalaiset joukot ovat saaneet varusteita ja koulutusta.



Chamberlainin kokouksen jälkeen ja jolloin viikkokokous Lontoon. Kuvassa Chamberlainin kokouksen jälkeen.

PHILOSOPHY FOUNDATIONS OF LIFE PRACTICE IN STOACIANS

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Summary

The history of philosophy is a history of humanity, and it is a discipline that deals with what people do and aims at what is good for people. Stoic philosophy, which is included in the history of philosophy, is a field that focuses on what is good for people and what is beneficial for people and focuses on practical life. Stoics, who developed a practical philosophical system in the field of ethics, see physics and logic as a step in reaching ethics. Stoics see what is good and useful for man as living in accordance with one's nature. This is the most important thing for the people of this period. And they see living in accordance with nature as the source of happiness. The predictions established by this system are fed by a deep-rooted theory. In other words, the stoics, who aim to guide the practical life, feed on a philosophical background. In this study, we will try to reveal the philosophical foundations of the stoics who developed a practical philosophical system.

Keywords: morality, life, virtue, nature

GENOCIDE COMMITTED BY ARMENIA AGAINST AZERBAIJAN

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Summary

The goal of the Armenian nationalists in occupying the rich wealth and territories of the people by committing serious crimes against Azerbaijan was to realize the myth of “greater Armenia from sea to sea”. Armenians committed mass terror against the people for the dream of a “greater Armenia”. Armenia subjected the Azerbaijani people to genocide on March 31, 1918 and February 26, 1992. During the tragedies committed by Armenians, Azerbaijanis were killed with unprecedented and unimaginable torture. During the March genocide, 30,000 people were killed by Armenian terrorists in Baku, 8,000 in Shamakhi, 10,068 in Zangazur and 135,000 in Yerevan province. Also, 58 villages in Shamakhi, 122 in Guba, 150 in the mountainous part of Karabakh, 115 in Zangazur, 211 in Iravan province and 92 in Kars province were completely destroyed, 3257 men, 2276 women and 2196 children were killed. Among the 613 people killed during the March genocide committed by Armenia on February 26, 1992, 63 were children, 106 were women and 70 were elderly. In addition, 8 families were destroyed during the Khojaly tragedy, 56 people were tortured to death, only 1 out of 27 families remained, 25 children lost both parents, 130 children lost one of their parents, 230 families lost their heads, 487 people were injured, 1275 people captured and 1,165 people released from captivity.

Keywords: Armenia, 1918, 1992, March 31, Khojaly, genocide

ГЕНОЦИД, СОВЕРШЕННЫЙ АРМЕНИЕЙ ПРОТИВ АЗЕРБАЙДЖАНА

Резюме

В статье исследуются геноциды, совершенные Арменией против Азербайджана. Армения на протяжении всей истории проводила оккупационную политику, не только оккупируя земли соседних народов, но и присваивая их богатую культуру, богатства, совершая против азербайджанцев небывалые преступления, подвергая их геноциду. Целью армянских националистов в захвате богатств и территорий народа, совершая тяжкие преступления против Азербайджана, была реализация мифа о “Великой Армении от моря до моря”. Армяне совершили массовый террор против народа во имя мечты о “великой Армении”. Армения подвергла азербайджанский народ геноциду 31 марта 1918 года и 26 февраля 1992 года. Во время трагедий, совершенных армянами, азербайджанцы были убиты невиданными, немыслимыми пытками. Во время мартовского геноцида армянскими террористами было убито 30 тысяч человек в Баку, 8 тысяч в Шамахе, 10 тысяч в Зангезуре, 135 тысяч в Иреванской губернии. Также были полностью разрушены 58 сел в Шамахе, 122 в Губе, 150 в горной части Карабаха, 115 в Зангезуре, 211 в Иреванской губернии, 92 села в Карсской губернии, убиты 3257 мужчин, 2276 женщин и 2196 детей. Из 613 человек, убитых во время мартовского

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геноцида, совершенного Арменией 26 февраля 1992 года, 63 были детьми, 106-женщинами, 70-стариками. Кроме того, во время Ходжалинской трагедии было уничтожено 8 семей, 56 человек были убиты пытками, из 27 семей осталась только 1, 25 детей потеряли обоих родителей, 130 детей потеряли одного из родителей, 230 семей потеряли главу, 487 человек получили ранения, 1275 человек были взяты в плен, 1165 человек были освобождены из плена.

Ключевые слова: Армения, 1918, 1992, 31 марта, Ходжалы, геноцид

Throughout history, Armenia has occupied the ancient lands of Azerbaijan and subjected our people to genocide to carry out its insidious intentions. Unfounded hatred against Azerbaijanis and Turks has always been instilled in Armenia, and such a case has been instilled in their minds through fictitious Armenian literature. In this regard, some Armenian authors can be cited as examples. For example, Nalbandian wrote in his will to the Armenian youth: “O Armenian, if you did not see a poisonous snake in the street and kill it, it is all right, it is a snake ... But if you did not see and kill a Turk, you are a traitor, dishonest, an enemy of your people”. The image of Ashot in the novel “Iron Ashot” has this idea: “When Turkish blood is spilled from my sword and I trampled that blood, I will be comfortable”. Silva Kaputikian, another of those who played an important role in the deterioration of the education of Armenian youth, said in his will to the Armenians “Sons of Hayk”. At the same time, Zori Balayan shamelessly portrays the Turks as the greatest enemy of the Armenians in his work “Ocac” [1].

Armenian media use untrue misinformation and misinformation to hide all the crimes committed by Armenia from the world community. In this regard, the Armenians try to falsify history by denying the crimes committed in Khojaly and thus try to present to the public the events of 1915 as a fictitious “Armenian genocide” [2]. However, it should be noted that unfounded Armenian claims are not confirmed anywhere today.

Researchers expose Armenian lies in their works. Georgian author Tatyana Chaladze exposes the fake “Armenian genocide” in her book “Karabakh Genocide: Convicted Khojaly”. It turns out that after the arrival of A.Mikoyan, who was the chairman of the Presidium of the Supreme Soviet of the USSR in 1963, with his support, the Armenians decided to carry out a fake “Armenian genocide” in Armenia called the “1915 genocide”. The Georgian author Chaladze notes that Armenian authors have repeatedly described the same fabrications with different interpretations, referring to each other's lies [3]. The American historian Stanford Shaw writes, “The Russian Caucasian army, consisting of a large number of Armenian volunteers, advanced on Van, reached Van on May 14, and for the next two days carried out massacres against the local Muslim population. The victims of the savage Armenian volunteers were the peaceful unarmed population - the elderly, women, and children. There was one goal: to get a territory suitable for “greater Armenia””.

Explaining the essence of the fake “genocide” of Armenians, the Armenian historian Wali writes: “In May 1915, the Armenian revolutionaries captured the city of Van. There, two leaders of the Armenian revolutionaries, under the command of Aram and Varelu, established the Armenian headquarters, the Dashnak party. At the end of May, after clearing the area of Muslims, the Armenians opened the city of Van to the Russian army. On May 18, 1915, the Russian tsar officially thanked the Armenian people of Van for their “loyalty”. Aram Marukyan, one of the leaders of the Armenian revolutionaries, was appointed Russian governor of Turkey” [3].

The American historian Stanford Shaw notes that “in mid-July, at least 250,000 armed Armenians gathered near the city of Van. In late July, the Ottoman army forced the Russian

army to retreat. The retreating Russians were accompanied by thousands of Armenians. At the time, they feared they would be punished for the killings”.

Hovanesian, an Armenian author who is biased against the Turks, misinterprets the historical event in favor of the Armenians. According to him, the Armenians who retreated with the Russian army in the Caucasus allegedly lost their blessings at that time. Hovanesian also hypocritically claims that 40,000 Armenians were killed during those events [3].

On the night of February 25-26, 1992, it was the Armenian armed forces that committed genocide against the civilian population in the Karabakh region of Azerbaijan. This genocide has engraved in the memory of history the serious blow inflicted by Armenia on humanity. The whole world saw how Armenia is an aggressor state. The goal of the Armenians was to implement the “greater Armenia” plan. According to this plan, Armenians occupied 20% of Azerbaijani lands during the First Karabakh War. Of the 613 people killed during the genocide, 63 were children, 106 were women and 70 were elderly. During this genocide, 8 families were destroyed, 56 people were tortured to death, only 1 member of 27 families survived, 25 children lost both parents, 130 children lost one of their parents, 230 families lost their heads, 487 people were injured, 1275 people were taken, prisoner. Taken, 1165 people were released from captivity [4].

Commander-in-chief, President Ilham Aliyev, a worthy successor of the national leader Heydar Aliyev road, stressed the importance of being not in defense against the enemy, but attack. In his address to the Azerbaijani people on the occasion of the 20th anniversary of the Khojaly tragedy, the president said: “The enemy's aim in committing the Khojaly genocide was to shake the Azerbaijani people, to refrain from fighting for sovereignty and territorial integrity and to seize our lands by force, but this grave tragedy made our people stronger and mobilized our On this national day of mourning, I once again respectfully commemorate the innocent victims of the Khojaly tragedy, and wish Allah's mercy to all our martyrs. I want to assure you that those who committed the Khojaly genocide will sooner or later respond before the court of justice and will receive their deserved punishment, and the blood of our martyrs will not remain on earth” [5].

In 1917-1918, Armenian nationalists committed massacres in Kars, Western Azerbaijan (now Armenia), Karabakh, Nakhchivan, and South Azerbaijan, brutally killing thousands of Azerbaijanis, burning their homes, looting their property, and destroying historical monuments. Little is known about these massacres in Soviet-era writings. Beginning in 1991, after Azerbaijan gained its independence, scientific research on these events began to acquire special importance [6]. Based on the documents, it was proved that the Armenian nationalists, with the help of Russian weapons, committed terrible massacres from the beginning of 1917 to the end of 1918 in Kars, Karabakh, Yerevan, Zangazur, South Azerbaijan, and other places. These massacres were continued in different regions - Baku, Shamakhi, Guba, Goychay, Kurdamir, Salyan, Lankaran, and others.

The grave crimes committed by Armenians against the Azerbaijani people are also reflected in historical documents. Documents of the Extraordinary Commission of Inquiry established by the Government of the Azerbaijan Democratic Republic state that [7] 3632 men, 1771 women, and 956 children were brutally killed during the Armenian attack on 58 Azerbaijani villages in Shamakhi district in March-April 1918. However, according to experts' calculations based on other archival documents, 8,027 Azerbaijanis were killed in 53 villages of the Shamakhi district. 4190 of them were men, 2560 were women and 1277 were children. Another source says that 7,000 Armenians, including 1,653 women and 965 children, were killed in 72 villages of Shamakhi. The Emergency Investigation Commission confirmed that 86 out of 120 villages in the Shamakhi district were subjected to Armenian aggression during

that period. It was not possible to collect information on the other 34 villages as the commission suspended its work.

Based on memories and information collected by researchers from about a hundred witnesses in connection with those killed in March-April 1918, it was determined that the Armenian criminals - S.Shaumyan, S.Lalayev, Z.Arestisyan, T. Amirov, and A.Amiryan brothers About 14-16 thousand people were killed in Shamakhi, 6-8 thousand in 40 villages and hamlets. The number of people displaced from the Shamakhi district was more than 18,000 [7].

During the March genocide, Armenians set fire to the leading printing houses of Azerbaijan at that time – “Kaspi” printing house, “Achik Soz” newspaper, “Ismailiyya” (now the building of the Presidium of the National Academy of Sciences), and damaged the minarets of “Tazapir” mosque. Thus, after Baku, Dashnak-Bolshevik military units committed genocides against the Azerbaijani people in the regions of Karabakh, as well as in Eastern Anatolia and Southern Azerbaijan [8].

To better inform the international community about the crimes against humanity committed by Armenian Dashnak-Bolshevik armed groups and terrorist organizations at the beginning of the last century, president of the Republic of Azerbaijan Ilham Aliyev signed an order “on the 100th anniversary of the genocide of Azerbaijanis in 1918” on January 18, 2018. As a result of the offensive diplomacy carried out under the leadership of President Ilham Aliyev, Armenia's constant policy of terrorism, military aggression, and armed separatism at the state level has been exposed [9]. Thanks to the unparalleled services of the Supreme Commander-in-Chief, President Ilham Aliyev, First Vice-President Mehriban Aliyeva, and Vice-President of the Heydar Aliyev Foundation Leyla Aliyeva, Armenian forgery and lies were exposed, and Azerbaijan was proved right in the struggle for justice. “Justice for Khojaly!” Implemented with the support of the Heydar Aliyev Foundation. Important work has been done to promote the Khojaly genocide within the campaign.

It should be noted that throughout history, the aggressor Armenia has purposefully pursued a policy of aggression against its neighbors. According to Russian Caucasian scholars of the early 19th and 20th centuries, Armenians were not indigenous people in the South Caucasus or Karabakh, the ancient land of Azerbaijan. According to Velichko's opinion about Caucasian Albania, in fact, people of non-Armenian origin lived here [10]. According to Russian public figure Velichko, “Armenians are a people of unknown origin, consisting of a large mixture of Gypsies”.

It is clear from the magazine “Murch” published in Armenia that Armenians have the ability to assimilate other nations. From this point of view, it was noted that in the late 50s there was a large percentage of Gypsies assimilated among Armenians. It is clear from Murch magazine's article “Armenians from the Gypsies” that some Gypsy-Armenians gained a reputation in society. In this regard, the names of Professor of St. Petersburg University Kerobe Patkanyan and monk-poet Alamdaryan can be cited as examples [10].

Researchers know that Armenians falsify real history and misappropriate cultural monuments of their neighboring peoples. When we look at history, it becomes clear to us that after the Albanian Church was subordinated to the Armenian-Gregorian Church in 1836, the Gregorian Church began to Armenianize the monuments of neighboring nations and tried to seize the lands where they were located. Armenians used their own method for this purpose. By erasing the original inscriptions on the historical monuments, the Armenians wrote the Armenian inscriptions on these monuments, and thus purposefully named the historical monuments in their names. Fake Armenian “scientists” wrote fake histories about the historical monuments of neighboring nations and published fake articles and books, referring to each other's lies without any basis. From this point of view, for example, Muradyan published a book in France, making an unfounded claim that the Georgian Jvari Monastery in Mtskheta was

allegedly built by Armenians [11]. Georgian author B.Arveladze informs about this in his work. In addition, the publication of Samvel Karapetyan's book "Armenian Churches in Georgia" in 1995 with the help of an Armenian organization is an example of Armenian forgery. Armenians also falsified toponyms for their own purposes. From this point of view, it is possible to point out Muradyan's provocative article published in the April 1971 issue of the Journal of Social Sciences of the Academy of Sciences of the Armenian SSR. In his article, Muradyan unjustifiably claimed that the names Tbilisi, Bolnisi, Krtsanisi, Manglisi, and Dmanisi were also of Armenian origin [12].

It should be noted that according to G.Geybullayev, who provided valuable information about the ethnic composition of Karabakh, the process of formation and formation of the Azerbaijani people was completed in the first millennium, and the tribes living in that millennium formed the ancestral roots of the Azerbaijani people. In addition, the works of ancient authors provide preliminary historical information about the tribes living south of the Kura River. According to these data, only Albanian, Sak, Gargar, Sode, and Uti tribes lived in the area south of the Kura [13].

Armenians are trying to falsify place names and toponyms belonging to Azerbaijan. However, it should be noted that the existence of toponyms in Nagorno-Karabakh reflects the Albanian ethnic group, including the indigenous population of Karabakh - Gargars, Huns, Goros, Pechenegs, Kipchaks, and Khazars - proves that the local population of Karabakh is Caucasian-speaking tribes. Thus, the ancestors of Azerbaijanis have always lived here.

Today, the international community is already witnessing the grave crimes committed by Armenia against Azerbaijan - genocide. It is gratifying that historical justice has finally found its place in the struggle for justice, and thus Azerbaijan has won over Armenia. This great victory was the result of the wise policy of the Supreme Commander-in-Chief, President Ilham Aliyev. The strong people of Azerbaijan united around President Ilham Aliyev like an iron fist and crushed the head of the enemy.

Resources

1. Yusif Qazıyev. Erməni məsələsi: Yalanlar və gerçəklər / "Nurlar" Nəşriyyat-Poliqrafiya Mərkəzi, Bakı. 2009. 309 s.
2. Vefalı Enserov. Anar Qaffarov. Xocalı soyqırımı xarici ölkələrin mətbuatında / İksad Yayın Evi. Ankara. 2021. 103 s.
3. Татьяна Чаладзе. Карабахский геноцид: обреченный Ходжалы. Документальная хроника. Баку. 2009. 207 s.
4. Xocalı soyqırımı ermənilərin xalqımıza qarşı həyata keçirdiyi ən ağır cinayətdir /25.02.2020/
https://azertag.az/xeber/Xocali_soyqirimi_ermenilerin_xalqimiza_qarsi_heyata_kechirdiyi_en_agir_cinayetdir-1423865
5. Xocalı soyqırımının tanınması /20.02.2022/
<https://files.preslib.az/projects/khojali/azkhojali/gl5.pdf>
6. Abışov V.Ş. Azərbaycanlıların soyqırımı (1917-1918-ci illər). Bakı, Nurlan, 2007, 163 s.
7. 31 mart - tarixi yaddaşımızdan silinməyən soyqırımı /31.03.2020/
https://azertag.az/xeber/31_mart___tarixi_yaddasimizdan_silinmeyen_soyqirimi-1450613
8. 1918-ci il mart soyqırımı / <https://bakucity.preslib.az/az/page/cBJE2tj800>
9. 31 Mart – Azərbaycanlıların Soyqırımı Günüdür /31.03.2020/
<https://www.dtx.gov.az/az/news/31-mart-azerbaycanlilarin-soyqirimi-gunudur.html>

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

10. Величко В.Л. Кавказ. Русское дело и междуплеменные вопросы. Полное собрание публицистических сочинений. Том первый СПб., 1904 стр.11, 65-66. 264 с.
11. Арвеладзе Б. Армянские или грузинские церкви в Грузии?! Тбилиси. ГПУ. 1996. с.4-6, 10, 16, 17, 69-70, 83-88, 97
12. Глава II. Разрушение фальсификаций. Арменизация топонимов. /18.02.2022/
https://nofalsify.com/sitat/1417_Александр-Лаврентьевич-Ониани,-Зураб-Александрович-Сарджвеладзе.html
13. Hüseyinov Y. Qarabağ tarixi mənbələrdə. Bakı: Şuşa” nəşriyyatı, 2012. 248 s.

**INVESTIGATION OF PERSONALITY DISORDERS IN DSM-5 IN TERMS OF
PSYCHOLOGICAL RESILIENCE, SELF-CONTROL, AND LOCUS OF CONTROL**

Ecenur PEKÇETİN

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Abstract

This study, it is aimed to examine the relationship between personality disorders, psychological resilience, locus of control, self-control variables, and the predictive levels of these variables for personality disorders statistically. The sample of the study consisted of a total of 301 participants between the ages of 18 and 68, 160 (53.2%) women and 141 (46.8%) men. "Informed Consent and Demographic Information Form", "Coolidge Axis II Inventory Plus Turkish-Short Form (CATI+TR-SF)", "Brief Self-Control Scale (BSCS)" "Locus of Control Scale (LCS)", and "Brief Resilience Scale (BRS)" by participants filled in. As a result of the correlation analysis, it was found that as personality disorders scores increased, psychological resilience and self-control scores decreased, while locus of control scores increased. A high score on the locus of control scale corresponds to an external locus of control. As a result of the regression analysis, it was found that personality disorders were significantly predicted by locus of control, self-control, and psychological resilience. Based on the research findings, it can be said that high levels of self-control and psychological resilience against the development of personality disorders, as well as being the internal locus of control, are protective factors. Finally, it is thought that the study will contribute to the literature by explaining personality disorders in terms of locus of control, self-control, and psychological resilience and emphasizing the importance given to related concepts in the treatment of personality disorders.

Keywords: Personality Disorders, Psychological Resilience, Self-Control, Locus of Control

'DEMOCRACY AND PARTICIPATION' AN IMAGINATION OF THE LOCAL

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Abstract

When a meaning is attributed to local governments in historicity, values such as democracy and participation are emphasized first. Undoubtedly, this emphasis expresses a value in the formal sense by causing a shift in meaning and content in the process. The discourse that democracy and participation are primarily built locally, nationalized and the system strongly establishes democratization and political participation does not seriously coincide with the results that emerge in practice. In particular, phenomena such as neoliberalism and globalization create a different imagination by separating the issue of local democracy and participation from its own reality and world of meaning. In this imagination, a lot of emphasis is placed on the democracy and participation discourses and the importance of a democratic and participatory local in the local. While trying to create opportunities and conditions that will make democracy and participation possible at the local level, it is possible to see that these conditions do not correspond to democracy and participation in concrete terms from the point of view of democracy and participation. However, problem areas such as the existence and functionality of management mechanisms that will make democracy and participation possible and the content of citizenship identity show that these two phenomena are far behind what is desired at the local level. Therefore, the discourse that the local is an important living space for democracy and participation, and that it keeps these values alive and nurtures, does not intersect with the field of activism and emerged a reality in which the part is shaped according to the whole.

In this study, the approach that the local makes significant contributions to democracy and participation is discussed and despite the affirmative approaches to the issue of local democracy and participation, a critical perspective is developed on the distance between discourse and action.

Keywords: Local Democracy, Participation, Citizenship, Common Good

While starting...

History of political science, democracy, equality, freedom, participation, representation, election, etc. has been in an effort to put forward ideas, approaches, theories, and paradigms about phenomena. These phenomena have been tried to be constructed as a process that is considered at a local scale as well as a value on a universal and national scale, which starts locally and envisages it to become universal. In this context, the local as the place where the aforementioned phenomena find a living space is blessed in every period. The local, which is

seen as the living space of the meaningful unity of democracy, participation, and representation, has been evaluated as a structure that has the dynamism to include social stakeholders in this unity, and it has been considered important.

Because the local, which has the identity of the closest administrative units that meet the social needs, has managed to attract attention as a place where democracy and participation have a close relationship. Is this an exaggerated interest? Or is it a tribute to its potential? The answers to these questions can be found partly in the past communal reality of the locals, and partly in the identities of modern times shaped by the political center and harmonized and reconciled with itself. However, there is a fact that since the 1980s, while the identities that the local has gained in historicity with neoliberalism are reproduced, its content is desired to be filled with the elements and new management approaches of globalization compatible with neoliberalism and capitalism (Kandeğer and Telsaç, 2022). The principles that determine the formal quality of local identity are discourses such as democracy, participation, equality, freedom, transparency, effectiveness, efficiency, accountability, supervision, and control.

At its core, the neoliberal approach strives to build a minimal and effective state administration. Local governments, which are an object of this effort, are considered as a factor that will play a dominant role in minimizing the state. It is considered to be more difficult to establish a relationship with the center than with the local governments. Because it may be necessary to compromise with the bureaucracy in terms of participating in the decision processes of the central government and influencing the decisions. Therefore, local governments are considered a structure that can overcome this difficulty.

By drawing attention to the harmony and unity between neoliberalism, globalization, and capitalism, the importance of the local for democracy and participation, it emphasizes that many mechanisms should be built locally in order to exist and maintain a pluralist, democratic, participatory and free local community. For this purpose, in the axis of neoliberal and globalization and within the framework of new management approaches participation tools that will ensure the effective participation of citizens, groups and masses in local governments are presented as the stones of the "road of rights and freedoms". The governance approach, which is based on the idea of establishing a local government structure where citizens, groups and mass organizations can have a voice, also places capital groups, privileged and powerful classes in the area where the fiction becomes reality. Therefore in this text, it would be meaningful to make an analysis that discursively, the idea of a democratic and participatory local government corresponds to a locality where privileged and powerful capital groups have a say, beyond an egalitarian and libertarian locality.

Local Democracy and Participation

At its most basic, democracy is the rule of "the people manage themselves". In a sense, this corresponds to the fact that the people have a say in the political and administrative field. The more limited content of democracy has emerged as a "citizenship" rights that existed in classical Greek political thought. This democracy, unique to ancient Greece, has an important place in political thought as "direct democracy". It is possible to find the broad definition of democracy in Abraham Lincoln's "Gettysburg Address" about "Government of the people, by the people, for the people" in his. (Heywood, 2018: 147).

The original place of the principle of self-government of the people, which is the purest form of democracy, is undoubtedly local governments. Local governments are defined as institutions that meet the needs of the local community, provide public goods and services, and are managed by the bodies elected by local citizens. In this context, local governments have an important place in the realization of three main objectives such as freedom, democracy, and efficiency. It is possible to local citizens to come together and be free in the

production and consumption of public goods, to produce and provide services b local needs, and to realize the understanding of democracy locally (Tekeli, 1983: 3). These structures are the places of local democracy in terms of their contribution to the democratic structure of the society due to their ontological closeness with the principles such as majoritarianism, minority rights, political equality and regular elections, which are considered the basic principles of democracy. It is accepted as with their close relationship with values such as efficiency, participation, democracy and freedom (Görmez 1997:68). Therefore, these structures have a very important place in the development of democracy.

In modern times, many political thinkers have spoken on the relationship between local governments and democracy. While Sydney Webb, one of the Fabian socialists, suggested "municipal socialism" on the basis of democratic local partnership, John Dewey drew attention to the contribution of local governments to the creation of "citizenship awareness", and Montesquieu emphasized the importance of cities and advocates an ideal state could be created by local communities. Despite the positive thoughts about the locals, Rousseau has a negative view, looks at the local governments as a tool to protect the interests of the privileged classes (Tekeli, 1983: 4-5). J. S. Mill, on the other hand, defines local governments as the building blocks of the democratic system because they expand the participation opportunities of citizens and include them in politics and administration practices (Act. Alada, 2008: 271). According to Mill, since centralized power stands as a threat for freedom, it is local governments that help limit central power and secure freedom (Cited by Güler, 2006: 50-51). One of the prominent concepts related to the phenomenon of local governments is undoubtedly democracy. Because, in a general perspective, local governments are considered as the cradle or school of local democracy (Hill, 1974: 79). Local governments are defined as the basic building blocks of democracy, as structures that ensure the participation of the people in the administration, give the people the virtue of self-government of the people, and contribute to the development of democracy (Keleş, 1993: 3). In this context, local government structures provide more opportunities for principles and approaches such as like representation, participation, transparency, and accountability to gain depth, by choosing their organs. In particular, local democracy is important in terms of enabling citizens to have a say in local issues. While the diversity of tools, conditions, and methods that will make the local people have a say, makes local democracy entrenched, the degree to of local structures having the conditions of democracy can happen also have a great impact on local democracy. Elements such as political culture and system, economic structure, traditional values, historical conditions, civic consciousness and awareness; are other dynamics that determine the meaning, scope and state of being established of national and local democracy. Therefore, in the concept of local democracy, local democratic values are emphasized (Pustu, 2016: 102). In this context, local democracy is considered as a small-scale world, a living space, where the people are directly affected, real and concrete problems of daily life set the agenda, are discussed, resolved and put into practice (Hill, 1974: 71).

Local governments differ from other organizations in the sense that decision-making and executive bodies are elected by the people. In this respect, this administration practice has a meaning beyond the fulfillment of local services and is based on democracy. In this framework, key facts such as representation and participation in the local area gain importance (Çiççi, 1996: 5). The possibilities and conditions of local democracy are shaped by the spatial proximity of the elements of election, representation and participation. By raising the level of representation of the close relationship that; the voters can relation establish with the representatives and they can expand the field of participation (Çiççi, 1996: 6).

The spread and massification of the understanding of democracy is an important factor in the formation of a participatory local. A democratic structure that a management process without

the participation of the public can create in the name of locality is very unlikely. In this respect, there is a need for active participation beyond being representative for participation. Participation is defined as the dynamism of the society, the preferences of people and the changes in these preferences that can affect the political decision-making process uninterruptedly (Şaylan, 1998: 84). In this direction, the phenomenon of local democracy, which aims the participation of citizens in the management processes, includes control, accessibility, accountability, transparency, etc. can reach a depth with the effective use of tools.

There is a close connection between the democratic and participatory identities of local governments and the existence, diversity and quality of civil society. The existence of a strong, pluralistic civil society is a determinant in local governments having a strong, democratic and participatory identity. Therefore, the existence of a strong local government ensures the power and effectiveness of the civil society (Tekeli, 1983: 6).

Another important factor that determines the power of democracy and participation is the identity of “active citizenship”. There are many methods of participation in order to ensure that citizens are included in the decision-making processes. These methods are divided into two as classical (traditional) and new methods according to their emergence in the historical process. While classical methods are classified as local elections and local referendum methods, new participation methods are; local agenda 21, city councils, assemblies and working groups, recall mechanism, participatory budgeting, advisory boards, public meetings/conventions, planning forums, citizens' committees, futued workshops, online participation, roundtable meetings and opinion polls (Yılmaz and Telsaç, 2021a:248-251; Mecek ve Yılmaz, 2021:254). Another point that needs to be touched on about participation is that the phenomenon of participation in local governments is evaluated in two aspects as direct participation and participation in the decision-making process. While this process takes place through public voting, which is one of the methods of direct participation, participation in the decision process, which is the other method, takes place through a platform that allows citizens to come together to talk, discuss and exchange ideas for specific local issues (Coşkun and Sezer, 2004: 282).

As tools that ensure local democracy and participation in England; Participation tools such as Neighborhood Bureaus, White Paper, Public Jury, Public Panels, Public Meetings, Referendum, Surveys, Focus (Representation) Groups, Question Hour, Stakeholder Meetings, Chairman's Policy Meetings and One-Step Briefing are implemented. Opportunities to participate in the administration, to have a say in local issues and to provide control-control arise through these practices. Practices for public participation allow the development of citizenship awareness, the awareness of people's own importance as individuals, and the strengthening of the relationship between representation and the right to govern (Doğan ve Şentürk, 2017:367). Provided that they collect a certain number of signatures; In order to establish an active citizenship in the local area by gaining continuity of local democracy and participation, it is ensured that the citizens can discuss certain local issues in local assemblies, apply for a referendum and ask questions to the parliament in private meetings. In addition, methods that ensure participation, such as the obligation to answer questions, make participation remarkable as tool that provide dynamism to the local in this context.

Democracy and Participation in a Neoliberal Context

According to the liberal understanding of local governments, local governments were created by the society against feudalism in the 12th century, developed by protecting and developing bourgeois values despite kingdoms and powerful monarchies, adopting the founding character of nation states and making them general rules; it is expressed as a Western-specific reality that emerged from the bottom up, within social dynamics, spontaneously and in spite of the

state by stating that it made progress in the process of capitalism (Güler, 1993; 88-89). In this context, rethinking the local democracy and participation phenomena in the axis of neoliberalism will be remarkable in order to make sense of these phenomena. Along with neoliberalism and globalization, in the axis of the new state paradigm (Neoliberal State), the central government started to transfer many of its powers to international organizations, capital and non-governmental organizations, and many authorities began to be transferred to local governments (Kandeğer, 2016). These tendencies show their effect especially in the name of democratization and bringing public services closer to the public (Yüksel, 2007: 290).

The limited state approach of neoliberalism offers arguments in the form of free trade, market discourses, localism, privatization and marketization. The discourses that build on these elements, on the other hand, try to build a more “democratic and participatory local” in terms of participation, democracy, civil society, effectiveness, efficiency, transparency and accountability. It should be said that this local unit was built from within the market. In this axis, each citizen is reduced to a customer and consumer identity, and within this identity, individuals are encouraged to participate in the administration in order to realize their personal interests, not acting with citizenship awareness and responsibility (Akdoğan, 2008: 17). Neoliberal approaches and policies transform local participation into a kind of participation fetishism and present “local plebiscite” as participation practice. In a sense, this situation forces local governments to take quick decisions about management in a process where the options cannot be discussed, and the local people are asked to give their approval against these decisions. The name of this cycle is expressed as the “guided local participation cycle”. Every way sought for the realization of ratification is imposed on citizens as new participation methods (Güneş and Baykal, 2010: 27). Therefore, it is possible to say that the citizenship understanding of neoliberalism corresponds to a customer/consumer identity. Participation in management also takes place on the basis of individual interest. While neoliberal understanding actually distanced participation from its political purpose with a superficial point of view, it has dominated a utilitarian method in which the services provided by local governments are evaluated as "good/bad" or "adequate/inadequate" (Akdoğan, 2008: 20). Neoliberal thoughts and policies constitute an obstacle to gaining an identity. The marketist understanding of neoliberalism builds a ground where the management of local resources and urban services gives capital a greater say.

Local governments must have sufficient financial resources to perform public services. Therefore, it is emphasized that they need have financial autonomy. While this autonomy aims to reduce the dependency on the central government, it is also seen as important in terms of strengthening the democratic qualities of local governments and building their own income sources and taxes (Özer, 2000: 138). Although this approach is discursively correct, in practice it creates a result that makes local governments dependent on global powers by borrowing local governments against national and international capital in the name of financial autonomy. Therefore, this idea, which is advocated in order to make the local financially autonomous, saves the local from dependence on the center with neoliberalism and globalization, while making it dependent on global institutions and capital. Therefore, the democratic participation of citizens in local government structures whose dependency is globalized cannot go beyond a formal meaning. The fact that localities and cities are frequented by capital in the neoliberal period creates a transformation in the spatial projects and strategies of the state (Aydiner, 2018: 53). With neoliberal policies, urban transformation projects, large-scale urban projects, sheltered housing types and shopping centers are increasing significantly in urban space (Kırbaş, 2017: 6). With localization, national and international capital gains a say in urban rent areas by obtaining the financing, production and management of these investments in order to meet the urban infrastructure and service needs

(Geray, 2001: 8). This relationship, by making central and local governments seriously dependent on capital, causes legal regulation and policies to be made in the interest of capital.

Due to the equal and balanced distribution of representative power among the stakeholders at the local level, it is important for democracy to be established and effective participation to take place (Yılmaz and Telsaç, 2021b:477). Although the locality, which is envisaged by phenomena such as neoliberalism and globalization, has built a more egalitarian and libertarian local structure, in practice, the privileged segments of the local determine this structure and relationship style. In this context, Marquis de Condorcet points to this reality when he evaluates local governments as an intermediary structure in which the interests of the privileged classes in society are protected. (Tekeli, 1983:5). It should be noted that this reality does not start with neoliberalism or globalization, but this situation reproduces itself with the dynamics of the post-1980s through a reality determined by historical conditions.

According to Henri Lefebvre, capitalism/capital needs the city to survive and transforms it for its own purposes (1991: 53). Lefebvre touches on the existential rights of the citizens of the city by introducing the concept of "right to the city" against the city that the capitalist order has made dependent and reproduced (Lefebvre, 2015). Therefore, the existence of capitalist living conditions is the relationship between the social and cultural values of the city and its economic values. Cities are seen as an economic value and become more remarkable as places of production and consumption. This reality forces cities to compete with each other. This effort constitutes a part of the post-1980 decentralization thought. In this context, Harvey defines localization as a political analysis tool that ensures the free movement of capital in the globalization process, and points to the phenomenon of entrepreneurial local government through decentralization (Cited by Alada, 2008: 279). This view, which also frames the Marxist approach, also refers to a local government structure that is formed within the capitalist state or is a part of it (Akbulut, 2007: 10).

One of the determinations made for the city is that the citizens living in the city can be effective in an organized way and have their demands accepted. (Es, 2008: 107). As the level of organization increases, participation in the administration and the formation of a democratic structure becomes a question (Karabıçak, 2008: 181). Cities create the conditions that allow citizens to be organized and influence the power, but the conditions created by capitalism reduce the level of organization and quality of citizens. The individualist understanding of society of neoliberalism and the success and power of globalization in creating a consumer society significantly weakens the level and effectiveness of social organization. Therefore, capitalism, neoliberalism and globalization practically create conditions that corrode the existence of a democratic and participatory order at the local level.

It should be noted that with neoliberalism and globalization, there is an expansion in urban problem areas. Important subject areas such as poverty, unemployment, zoning, housing, transportation, unplanned urbanization, social security, internal and external migration, social and cultural activities are becoming the most important issues of cities (Yüksel, 2007: 292-294). Therefore, the existence of a strong local government identity that can solve these issues becomes important. The most important factor that can produce this power is the development of a management structure that allows the participation and control of the people and the construction of a democratic culture, values and lifestyle.

The spirit of the time should enable local governments to integrate with the city where the citizens live and to identify with the urban identity. The city should be livable and understandable for citizens from all walks of life and should be able to offer all kinds of opportunities to the citizens (Çukurçayır, 2008: 28). The formation of a sense of urban stakeholder, a democratic and participatory structure, a sense of belonging and citizenship has

a dynamism that can contribute to the construction of a city identity in this sense. The existence of wide participation opportunities will enable a management approach that is in line with the social interest and public interest by aiming at a local administration that is transparent and open to public inspection rather than transferring local resources to capital circles. Particularly, phenomena such as citizenship, participation, democracy, public control, transparency, efficiency and productivity in administration and service have an impact that will ground a dynamic society at the local level (Çukurçayır, 2008: 33).

While finishing...

In the world order formed by the hegemonic effect of neoliberalism and globalization, the management approaches of local structures are tried to be built within the reality of this order. In this context, the issue of democracy and participation for the local is also reproduced by the sovereign order. The idea of having a more democratic and participatory identity of the local discursively is realized in proportion to the power that the local social segments gain. Neoliberalism and globalization, as the twin forces of a capitalist order, the management structure they have established from within the market, the capital accumulation regime, individual interest, etc. approaches and thoughts cause local communities to become passive entities in matters of democracy and participation. The corrosive and abrasive effect of capitalist living conditions in daily life cannot carry the issue of democracy and participation beyond being formal. The effect of these conditions seriously weakens social organization, participation, volunteering activities, in other words, participation and the establishment of democracy. Because, as a result of a market-oriented approach, there is a hegemonic thought and approach towards the construction of an order/structure that is based on capital instead of the public interest and can serve its interests. Ultimately, the ground for the formation of a citizenship and community identity that is conscious, able to take initiative, speak out and act in its own living space is weakening under neoliberal, capital and global conditions.

Although there are mentions of effective participatory mechanisms that make democracy entrenched discursively and formally at the local level, it is not possible to operate these mechanisms in a meaningful way in living conditions. Strong capital groups and groups organized for their own class interests can participate in local decision processes and be effective on decisions through these mechanisms. Another point is that the lack of civic awareness produces a result that erodes the organizational level and effectiveness of the local community, weakens the sensitivity about local issues and eliminates the will to take initiative. Therefore, in cases where civic consciousness is weak, the probability of a strong existence of democracy and participation is very low. Another problem is that local government units stay away from a management approach that can allow the democratic participation of the local community. Another factor that will make it meaningful for the local to consider democracy as a living space can be achieved if local administrators care about democracy, internalize it, and demonstrate a democratic administration. There is a strong proportional relationship between the level of a democratic culture at the national and local level and democratic participation. Democracy and participation at the local level; it should be said that it is shaped by the relationship between democratic culture, civic consciousness, opportunities and conditions of democracy and participation, level of social organization, and the capacity of local governments to respond to democracy and participation. More importantly, neoliberal thinking, globalization, capitalist order and new management approaches transform the meaning of the local and the content of participation. To conclude it seems, the limited reality of democracy and participation that emerge with neoliberalism at the local level is somewhat similar to the democracy of ancient Greece. A limited and privileged citizenship approach can be seen as the common denominator of this similarity...

References

- Akbulut, Ö. Ö. (2007). "Belediye Yönetimi Reformu: Monolitik İktidar Yapısının Güçlendirilmesi" *Çağdaş Yerel Yönetimler Dergisi*, 16 (1), ss. 7-29.
- Akdoğan, A. A. (2008). "Yeni Yerel Yönetim Yasalarında Katılım," *Yerel Yönetimlere Katılım*, Dosya-08, Bülten 64, Mimarlar Odası Ankara Şubesi Yayını, ss. 17-27.
- Alada, A. B. (2008) "Yerel Yönetim Anlayışındaki Değişim ve Türkiye'deki Yansımaları", *Devlet ve Sermayenin Yeni Biçimleri*, (Edit. Ramazan Günlü), Dipnot Yayınları, Ankara, ss. 269-301.
- Aydiner, T. (2018). "Yerel Siyasetin 'A Priori' Sınırları Üstüne Kuramsal Bir Tartışma", *Çağdaş Yerel yönetimler Dergisi*, 27 (3), ss. 45-65.
- Çiççi, O. (1996). "Temsil, Katılım ve Yerel Demokrasi", *Çağdaş Yerel Yönetimler Dergisi*, 5 (6), ss. 5-14.
- Coşkun B. ve Sezer, S. (2004). "Muğla Kent Meclisinin Örnek Olay Olarak İncelenmesi", *Yerel Yönetimler Kongresi: Düünden Bugüne Yerel Yönetimlerde Yeniden Yapılanma*, (Bildiriler Kitabı), Çanakkale Onsekiz Mart Üniversitesi Yayını, ss.281-297.
- Çukurçayır, A. (2008). *Yerel Demokrasi ve Yerel Siyaset*", Yerel Yönetim Sempozyumu, Okutan Yayınları, İstanbul, ss. 15-36.
- Doğan, K. C., & Şentürk, S. H. (2017). İngiltere'de On Yedinci Yüzyıl Devrimler Çağı ve Parlamentarizmin Gelişimi Doğrultusunda Bütçe Hakkı. *Karadeniz Teknik Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Dergisi*, 7(14), 353-373.
- Es, M. (2008). "Kentlilik Bilinci ve Yerel Siyaset, Yerel Yönetim Sempozyumu, Okutan Yayınları, İstanbul, ss. 91-114.
- Geray, C. (2001). "Kentleşme Sorunlarının Çözümü Açısından Küreselleşme, Özelleştirme, Yerelleşme ve Yerel Yönetimler" *Çağdaş Yerel Yönetimler Dergisi*, 10 (4), ss. 7-22.
- Görmez, K. (1997) *Yerel Demokrasi ve Türkiye*, Vadi Yayınları, Ankara.
- Güler. B. A. (1993). "Yerel Yönetimler Tarihine Yaklaşım Sorunu" *Amme İdaresi Dergisi*, 26 (1), ss. 87-96.
- Güler. B. A. (2006). *Yerel Yönetimler: Liberal Açıklamalara Eleştirel Yaklaşım*, İmge Kitabevi, Ankara.
- Güneş, M. ve Baykal, T. (2010). "1980 Sonrası Dönüşümün Yerele Etkisi: Yeni Yerel Katılım Biçimlerinin Genel Bir Eleştirisi," *Toplum ve Demokrasi Dergisi*, 4 (8), ss. 19-32.
- Heywood, A. (2018). *Siyaset*, BB101 Yayınları, İstanbul.
- Hill, D. M. (1974). *Democratic Theory and Local Government*, Plurabelle Books, London.
- Kandeger, B. (2016). "Reform Söylemleri Üzerinden Devleti Okumak "İkinci Meşrutiyetten Günümüze", *Yayınlanmamış Doktora Tezi*, İstanbul Üniversitesi Sosyal Bilimler Enstitüsü, İstanbul.
- Kandeger, B. ve Telsaç, C. (2022). "Yeni Kamu Yönetimi Düşüncesinin "Ekonomi Politigi" Yerelden Globale Tüm Boyutlarıyla Kamu Yönetimi: Geçmişten Geleceğe Yaşanan Gelişmeler, *Gazi Kitabevi*, Ankara, ss. 155-174.
- Karabıçak, M. (2008). "Yerel Siyaset Ekseninde Sivil Toplum Örgütleri: Önemi ve Etkileri", *Yerel Yönetim Sempozyumu*, Okutan Yayınları, İstanbul, ss. 167- 186.

- Keleş, R. (1993). "Demokratik Gelişmemizde Yerel Yönetimler", Kent ve Siyaset Üzerine Yazılar (1975-1992), IULA-EMME, İstanbul.
- Kırbaş, F. U. (2017). Neoliberalizmin Kent Üzerindeki Sosyo-Mekansal Etkisi: Ankara Örneği, Ankara Üniversitesi Sosyal Bilimler Enstitüsü, (Yayınlanmamış Yüksek Lisans Tezi), Ankara.
- Lefebvre, H (2015). Şehir Hakkı, Sel Yayınları, İstanbul.
- Lefebvre, H. (1991). The Production of Space, Wiley-Blackwell Publising, Oxford.
- Mecek, M. ve Yılmaz, V. (2021). Postmodern Kamu Yönetimi Ekseninde Yerel Yönetişim ve Katılım, Postmodern Kamu Yönetimi (Ed. Bekir Parlak, Kadir Caner Doğan) Publisher: Nobel Yayınları, Ankara.
- Pustu, Y. (2016), "Yerel Demokrasinin Kökeni", Sayıştay Dergisi, Sayı 100.
- Özer, M. A. (2000), "Yerel Demokrasi, Demokratik Yerel Yönetimler ve Yerel Yönetimlerin Demokratikleşmesi Kavramlarının Tahlili Üzerine", Türk İdare Dergisi, Yıl 71 (426), ss.129-144.
- Şaylan, G. (1998). Demokrasi ve Demokrasi Düşüncesinin Gelişmesi, Türkiye Ortadoğu Amme İdaresi Enstitüsü Yayınları, Ankara.
- Tekeli, İ. (1983). Yerel Yönetimlerde Demokrasi ve Türkiye'de Belediyelerin Gelişimi, Amme İdaresi Dergisi, 16 (2), 3-23.
- Yılmaz, V. ve Telsaç, C. (2021a). Yerel Yönetimler ve Katılım, Journal of Süleyman Demirel University Institute of Social Sciences Year: 2021/2, Number: 40, p. 235-254.
- Yılmaz, V. ve Telsaç, C. (2021b). Yerinden Yönetim ve Katılım, Middle East International Conference On Contemporary Scientific Studies-V -March 27-28, 2021 Ankara, Turkey
- Yüksel, F. (2007). Sosyal Devletin Dönüşüm Sürecinde Yerel Yönetimlerin Yeni İşlevleri", Mülkiye Dergisi, 62 (1), ss. 279-298.

SUSTAINABLE URBANIZATION

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Abstract

The concept of sustainable urbanization emerges as a new trend in which sustainable, social and environmental dynamics are prioritized by abandoning the classical economic-based development approach. It basically points to positive efforts to advance economic and social urban development in line with objectives such as increasing the quality of life, using renewable energy sources and controlling population growth.

We can specify sustainable urbanization as nature, life support systems and society, and we can express the subjects that need to be developed in this direction as people, economy and society. This concept; encompasses the whole of policies and actions that need to be produced in terms of environmental, economic, spatial, cultural and administrative aspects. According to this; there are five main issues that communities should pay attention to in order to ensure urban sustainability. It should develop more determined and bold policies on issues such as non-polluting of underground and surface water resources, smart consumption, urban and industrial waste management, and air pollution. Economic development and improving the living standards of cities should be done without harming natural resources. Establishment of high environmental quality, optimal city size and minimum use of energy resources should be ensured. Equality, pluralism, security and quality of life, which are a social necessity, are an important balance parameter that must be ensured in terms of urban. The inclusion of the public, which is one of the factors that most affect the future of the concept of sustainability, should be ensured in all aspects.

In this study, which was prepared by using the literature review and observation method; especially in today's conditions where global warming and urban population density continue to increase, the importance of urban sustainability policies is emphasized.

Keywords: Sustainable Urbanization, Environment, Ecosystem, Quality of Life, Development.

INTRODUCTION

Local governments are the most important locomotive of social and economic development. It is not a coincidence that many managers who have achieved great success in-country management on a world scale have local management experience in their past. Urban life emerges as a phenomenon that increases its importance day by day. It should be stated that the increasing population density in the world exhibits a higher increase in the city-specific. The urban population tends to increase continuously making it inevitable for local governments to

act in this direction and take precautions. Considering the limited and exhaustible resources, it is of great importance to make consumption smarter and more planned. Continuing urban life in a sustainable way without destroying the environment and nature will be possible with the right policies and determination to be taken in this direction.

Some basic criteria should be considered to understand urban sustainability. It is possible to state these criteria under five main headings. First of all, the importance of producing more determined and strong policies on issues such as preventing unconscious consumption of underground and surface water resources, preventing the pollution of these resources, developing smart consumption models, developing systematic practices in urban, industrial waste management, and reducing air pollution is expressed. Secondly; The issue of economic development and improving the living standards of cities, which constitute the basic dynamics of a city, is gaining more importance day by day. Following these issues, the creation of high environmental quality, optimal city size, and the use of minimum energy resources are important factors to be considered in terms of sustainability. One of the issues with high awareness in our age is shaped around the concepts of equality and pluralism. In parallel with this, city safety and quality of life are of great importance. Finally, in terms of management mechanisms, the participation of the people in the administration; stands out as one of the main arguments that affect the fate of the city.

CONCEPTUAL FRAMEWORK

The concept of sustainable urbanization means ensuring urban development by prioritizing ecological values. It is based on the principle of providing today's needs with methods that will not prevent future generations from meeting their own needs. The basic approach finds its response through the balance of protection-use. Urban sustainability develops depending on many factors. Sustainability is based on the principle of protecting the ecological balance for economic, social, and environmental policymaking. The concept of sustainability is seen as equivalent to development in Western countries. However, it should be noted that there is a difference between them. Because for this sustainable development: It would be more correct to say that economic growth is provided by including the environmental and social effects of the decision-making process. Three “P” (People, Planet, and Profit) definitions are also made for sustainability in the literature. The term sustainability emerges as a concept originally used in ecology. It is used to indicate the conditions that an ecosystem needs to sustain itself in the long run. So much so that even the dictionary meaning of the concept directly points to the environment.

According to the Cambridge dictionary, sustainability is defined as “the quality of causing little or no damage to the environment and therefore able to continue for a long time”. This definition corresponds to causing little or no harm to the environment and therefore maintaining quality for a long time. For urbanization, we see a “the process by which more and more people leave the countryside to live in cities” (Cambridge, 2022).

For the same concepts, in the Oxford dictionary, “the use of natural products and energy in a way that does not harm the environment” finds an answer as the use of natural products and energy in a way that does not harm the environment. The Oxford dictionary says for urbanization “the process in which towns, streets, factories, etc. are built where there was once countryside” (Oxford, 2022). The intersection point of both dictionaries is that initiatives from rural to urban should be made without harming nature or the environment.

Ecosystem refers to a continuous situation that occurs with the mutual relations of the living things in the geographical area and the inanimate environment surrounding them. Accordingly, the benefits, physical efficiency and natural resources that need to be transferred to future generations should be transferred to other generations without being completely

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consumed. In this respect, they should have the biophysical resources and opportunities provided by the ecosystem for the cities to be lived in the future as much as we do.

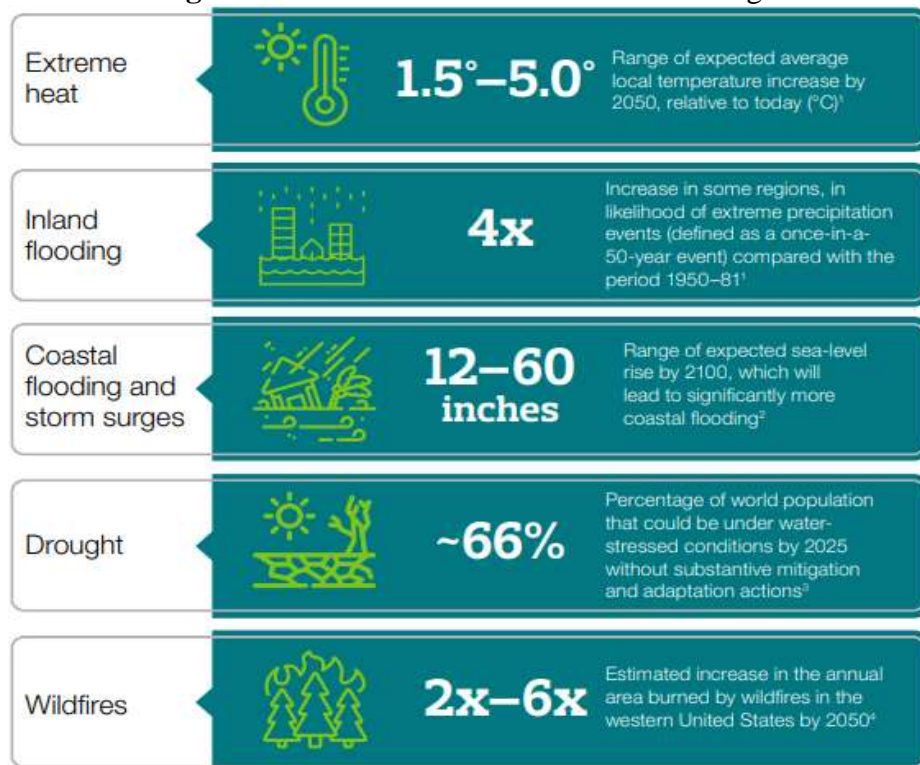
DIMENSIONS OF SUSTAINABLE URBANIZATION

There are five basic dimensions that form the basis of urban sustainability. The first one is the environment: It refers to non-contamination of underground and surface water resources, smart consumption, urban and industrial waste management, and air pollution. Economy: It refers to the economic development of cities and the improvement of living standards and the preservation of natural resources. Spatial: It relates to high environmental quality, optimal city size, and minimal use of energy resources. Cultural: Equality, pluralism, security, and quality of life, which are social necessities, are important balance parameters that should be provided for the city. Management: Public participation, which is one of the factors that most affect the future of the concept of sustainability, should be ensured in all aspects.

Environment Dimension

By 2030, approximately 60 percent of the world's population, that is, close to 5 billion people, is expected to live in cities. By 2050, this rate is expected to increase to almost 70 percent. By 2050, if these trends continue, it is estimated that as many as 3 billion city dwellers will live in informal settlements or slums. By 2050, cities will be in a position to produce about 85 percent of global economic output, that is, Gross domestic product (GDP). It is thought that an average of one billion urban dwellers will prefer to live in low-altitude coastal areas and therefore will face floods and natural hazards due to climate change (UN, 2022).

Figure 1. The inherent risk from climate change



Source: Boland et al., 2021:7.

We are in a period where sudden climate changes, one of the inevitable effects of global warming, are constantly increasing. According to United Nations data, 47 percent of the urban population in Sub-Saharan Africa currently lives in slums. These people, who often struggle to survive in exposed areas with inadequate infrastructure and poor-quality housing in terms of accommodation, face great difficulties. The overall vulnerability of these people living in

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informal settlements tends to be exacerbated by climate change and related rising sea levels, flooding, landslides, heat stress, water scarcity, and other threats (UN, 2022). If a sustainable solution to the global warming problem that our world is facing in the near future is not produced, the proliferation of such scenes is inevitable.

If current trends continue, a large proportion of the new urban population will have to face multiple and serious challenges over the next 15 years. Urban policy decisions will have far-reaching effects on reducing poverty and inequalities and on energy, transport, waste management, food supply, water and sanitation, education, health care. When we look at the main problems in front of sustainable urbanization, we see that the following issues are prioritized (Bentivegna, et al. 2002; Boland, et al. 2021; ERP, 2021; GSDR, 2019; UN, 2022; ICLEI, 2022; WCED, 1987:6):

- Air pollution,
- Pollution of fresh water resources,
- Environmental wastes,
- Pollution of seas and oceans,
- Infrastructure deficiencies,
- Concreting of agricultural lands,
- Improper use of chemicals used in agriculture,
- Sudden temperature differences,
- Forest and green space deficiencies,
- Consumption of fossil fuels,
- Inadequate use of mobility in terms of urban transportation,
- Building quality, location and materials used in its construction,
- Increasing urban temperature,
- Noise pollution,
- Landlessness, refugees and population migrations,
- Rapid population growth and wrong zoning,
- Global (debt-related) economic crises,
- Global climate change,
- And perhaps the most important topic, drought and lack of access to fresh water.

Considering all the above-mentioned troubles, each of them is a very big problem in itself. It has to be fought systematically. Interested parties and expert researchers should come together to discuss the issue seriously and contribute to the solution. Especially in terms of urban management, it is extremely important to produce sustainable policies by taking ideas from institutes, universities and environmental organizations. Our world is getting more polluted, hotter, and hopeless every day. The brutal and selfish policies pursued are destroying our world with each passing second. The role of cities, especially wrong urbanization and unsustainable urban policies, constitutes the lion's share in this regard. Accurate and conscious urbanization is one of the basic elements that will increase the quality of urban life in every sense and will enable us to leave a more livable world to other generations.

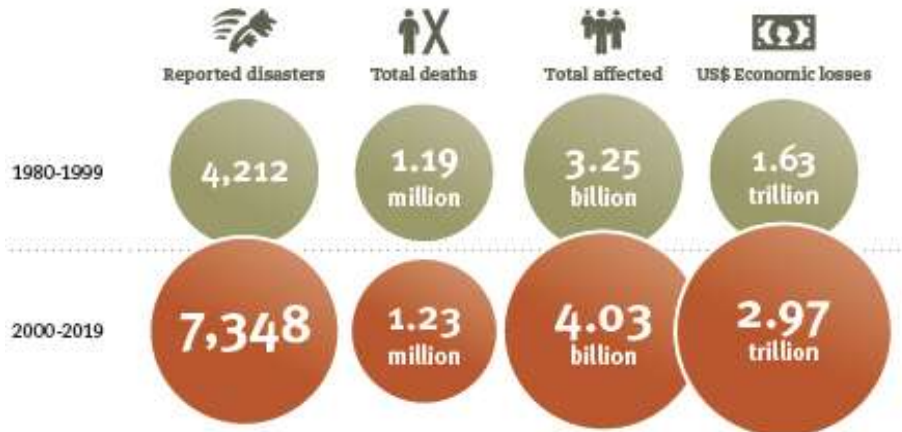
Figure 2. Table showing the water restriction for drinking, sink and simple hand cleaning.



Source: United Nations, 2022, <https://sdgs.un.org/goals/goal6>.

Air pollution is one of the biggest problems of our age, especially in the urban sense. When a worldwide assessment is made, approximately 99 percent of people living in cities breathe polluted and poor quality (10 micrograms of particulate matter per cubic meter) air that does not meet the standards of the World Health Organization. This situation becomes even more dramatic in low- and middle-income countries, especially in cities with more than 100,000 people. From smoke hanging like a mantle over cities to smoking indoors, air pollution poses a major threat to health and climate. The combined effects of ambient (outdoor) and household air pollution causes millions of premature deaths each year, largely as a result of increased mortality from stroke, heart disease, chronic obstructive pulmonary disease, lung cancer, and acute respiratory infections. Household combustion appliances, motor vehicles, industrial plants and forest fires are common sources of air pollution. Particulate matter, carbon monoxide, ozone, nitrogen dioxide and sulfur dioxide are among the important pollutants that threaten public health in the urban sense. Air pollution kills an estimated seven million people worldwide each year. Considering that almost the entire global urban population breathes poor quality air, it is clear that this situation is unsustainable (WHO, 2022).

Figure 3. Disaster Impacts: 1980-1999 vs. 2000-2019

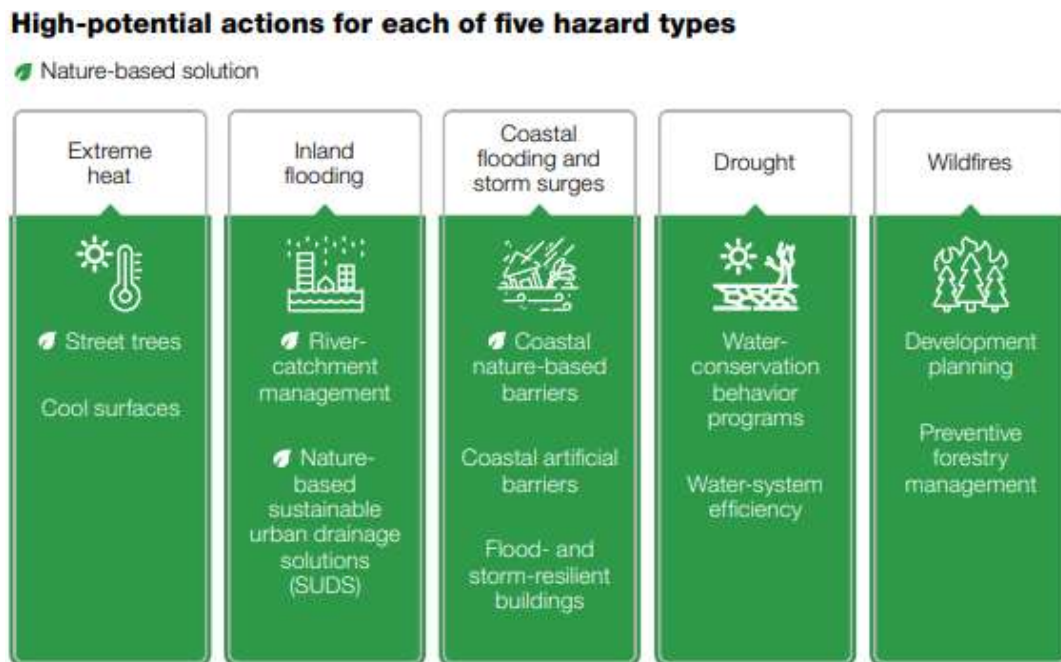


Source: UNDDR, 2019: 7

When figure 4 is examined, between the years 1980-1999 and the years 2000-2019; we see that there are indicators regarding the reported incident, the number of deaths reported, the

total number of affected persons, and the economic loss experienced. Our world is becoming more open to disasters and calamity day by day. Even this picture alone shows the seriousness of the situation and the importance of the urban and national policies that need to be taken.

Figure 4. A strategic approach to climate adaptation in cities



Source: Boland, et al. 2021:9.

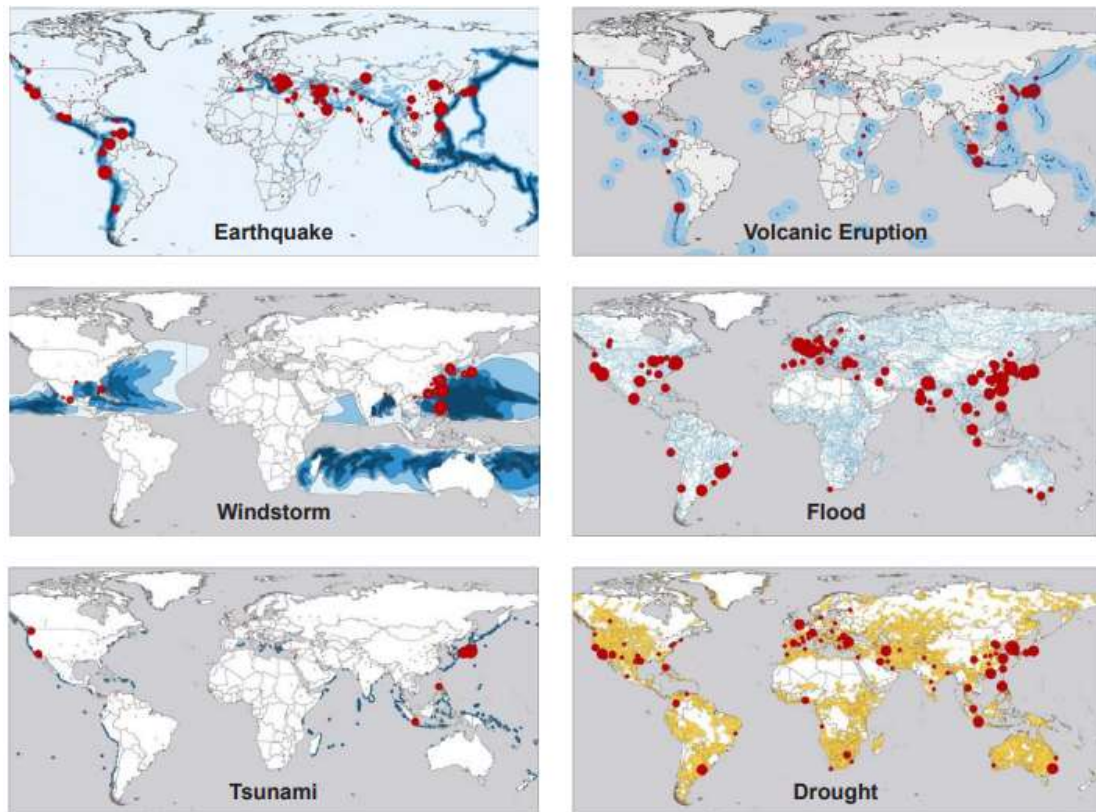
In terms of a sustainable urban environmental policy:

- In order to prevent air pollution and greenhouse gas emissions, measures should be taken especially for businesses that consume solid fuel and vehicles that consume fossil fuels. Steps should be taken to decarbonize the energy sector. Investments should be made in environmentally friendly technologies. Private and public transport sectors should be encouraged to use cleaner, cheaper and healthier fuels (BuiltHup, 2021:6).
- Sustainable agricultural policies should be implemented to protect freshwater resources. Citizens should at least be made aware of issues such as bathing, brushing teeth, washing hands, washing clothes and dishes (ERP, 2021: 13).
- Environmental wastes cause great harm to both human health and natural life. The habit of separating garbage for recycling should be persistently maintained and encouraged until it is winning for citizens.
- Pollution of seas and oceans points to a very important urban problem. The seas, which provide most of the oxygen and clean air, unfortunately, face major human-induced problems. Considering that most of the sewage wastes of cities with coastlines are discharged into the sea, it is obvious that urgent and decisive action is required. Local and national policies should be produced on prevention, and awareness-raising (ERP, 2021:15).
- The opening of agricultural lands for expedience-base development should be prevented. Cities should be managed with a participatory management logic that includes all relevant parties.
- The damage caused by agricultural chemicals to the environment is enormous. Which substance is used, should be known how much, and how should be followed seriously (ERP, 2021:16).

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- It is necessary to prevent the forestry lands, which directly affect the air quality of the city, from being opened to zoning and expedience. Tree planting should be encouraged and social awareness should be created on this issue (ERP, 2021: 12).
- It is time for us to move to a new dimension in terms of environmental awareness. Accordingly, we should also pay attention to how east-friendly the materials used in the construction of the buildings are. In addition, the energy efficiency of buildings needs to be increased (BuiltHup, 2021:6).

Figure 5. Map of Disaster Hazards Faced by World Cities



Source: Cambridge World City Risk Atlas, 2015:8

As seen in the figure above, many cities of the world are at risk of earthquakes, volcanic eruptions, hurricanes, floods, tsunamis and droughts. In particular, one of these disasters, earthquake alone reveals the importance of building quality. The panic and destruction that occurred at the time of the earthquake produces such dramatic results that the city almost disappears, let alone urban sustainability. The building quality of the buildings and the measures against earthquakes are of vital importance.

- One of the other big problems in the urban sense is the high urban temperatures caused by global warming. For example, cities have higher temperatures than rural areas, resulting in a phenomenon known as the "urban heat island". Accordingly, forest and green areas should be increased in order to reduce urban heat. In terms of transportation, smart mobility applications should be adopted. In addition, the use of reflectors placed on roofs and building terraces, which have been applied in recent years and have achieved successful results, should be encouraged.
- Drought is one of the growing and striking problems of our age. Providing to public education to create drought awareness on how water should be consumed can reduce water consumption. In addition, solutions for the accumulation of rain water can be produced (Chesson, 2013: 12).

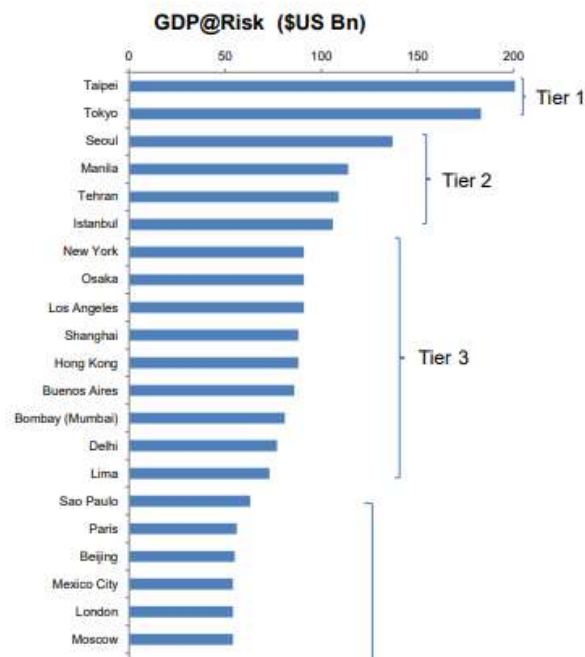
Economic Dimension

There is no doubt that cities offer opportunities for employment and poverty reduction and growth. In this context, cities can host research and development in which academic, scientific, and private sector institutions that direct innovation is concentrated (Telsaç and Gözcü, 2021: 172). The large number of people living in cities where the right policies are produced also brings along the potential for efficiency and large-scale progress. But all these advantages can turn into a nightmare if the right steps are not taken. Unsustainable infrastructure and urban designs can pose major problems for future generations to deal with.

Figure 6. Top 20 cities ranked by nominal GDP@Risk, 2015-2025

Cambridge Centre for Risk Studies

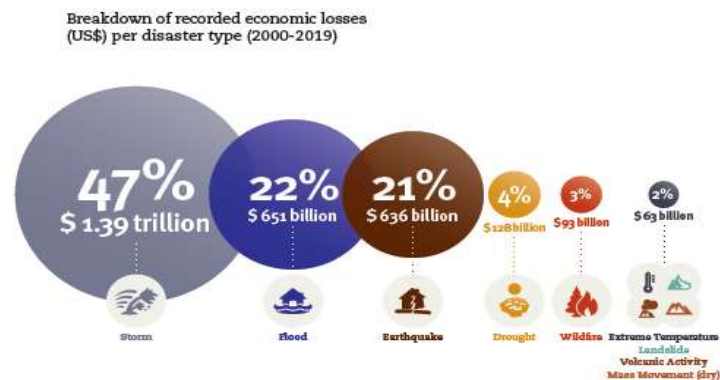
Rank	City Name	Country	GDP@Risk (\$US Bn)
1	Taipei	Taiwan	202
2	Tokyo	Japan	183
3	Seoul	Republic of Korea	137
4	Manila	Philippines	114
5	Tehran	Iran	109
6	Istanbul	Turkey	106
7	New York	United States	91
8	Osaka	Japan	91
9	Los Angeles	United States	91
10	Shanghai	China	88
11	Hong Kong	Hong Kong	88
12	Buenos Aires	Argentina	86
13	Bombay (Mumbai)	India	81
14	Delhi	India	77
15	Lima	Peru	73
16	Sao Paulo	Brazil	63
17	Paris	France	56
18	Beijing	China	55
19	Mexico City	Mexico	54
20	London	United States	54



Source: Cambridge Centre for Risk Studies, 2015:10.

As can be seen from the figures above, the cities of the world that produce high GDP figures are more vulnerable to natural disasters. Ranking 6th in the example, Istanbul is Turkey's largest city in terms of both population and GDP contribution. The cities of Taipei and Tokyo, which top the list by a large margin, surprisingly rank first in terms of both GDP and risk. This situation is not different in terms of Istanbul. If one infers, it would not be an extreme allegation to say that not environmentally friendly economic development also damages the environment, causing climate change and urban temperature rise. A sustainable economy is only possible by making future-oriented calculations without harming the environment and natural resources.

Figure 7. About breakdown of recorded economic losses (US\$) per disaster type (2000-2019).



Source: UNDDDR, 2019:7.

When Figure 7 is examined, it is seen that the economic losses due to disaster are extremely high. Since development that does not harm the environment is thought to be more costly, caution is not taken. However, in many areas, harming the ecosystem in order to avoid small costs; in the future, it generates much larger bills.

Another issue that the discussed is the topic of irregular migration. Immigrants, who are mostly displaced due to wars, political, social, economic, demographic reasons and sudden climate changes, create serious pressure on the resources and infrastructure of the destination city they go to because they seek opportunities in urban areas (Yılmaz and Telsaç, 2021a: 37-38). Many unexpected events can cause unwanted refugee tensions over the city. In addition to irregular migration, internal migration within national borders also poses a problem in the urban sense. Many people who live in rural and suburban areas tend to move to better-resourced cities and create new opportunities. These people mostly seek economic, social and cultural enrichment. In addition, the chance to have better education, health and income opportunities compared to rural areas is also a driving factor (Telsaç and Telsaç, 2022a: 428; Kates and Parris, 2003; Dasgupta, 2010:5).

It is important to take the following measures in terms of economic sustainability (BuiltHup, 2021:6-7; Yılmaz and Telsaç, 2021b: 143-145; Sharma and Singh, 2020: 50):

- Public institutions and private sector companies should be encouraged to use environmentally friendly technologies.
- In terms of urban transportation, cleaner, cheaper and healthier forms of private and public transportation should be, and habits for public transportation should be developed.
- Incentives should be made for the environmentally oriented progress of industry innovation that is open to innovations in every sense.
- In order to prevent climate-related urban energy loss, it is necessary to increase the energy efficiency of buildings.
- Although it is a very difficult issue, steps should be taken to decarbonize the energy sector in order to leave a better generation for the future by considering the income and environmental balance (Pew, 2003: 86).
- Participatory budgets should be established to improve urban environmental standards.
- Income inequality should be fought against.
- Basic services, social protection, welfare, livelihoods and poverty reductions should be calculated taking into account disadvantaged groups.

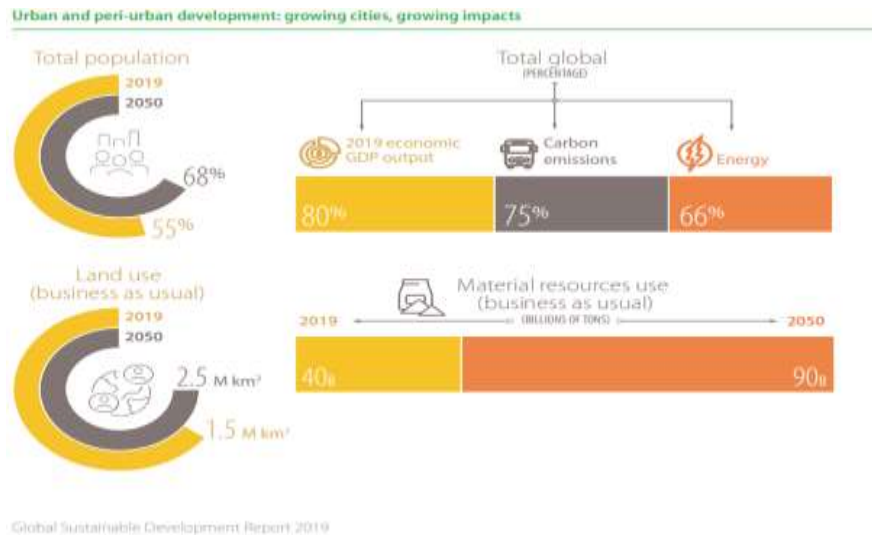
Physical Dimension

Rapid, distorted, and wrong development has become almost inextricable with the continuation of the influx of rural immigrants to the city. Urban institutions and private

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sectors remained insufficient to meet the urgently increasing housing demands (Erder, 2002: 117). This picture, which has turned into a real nightmare in terms of urban sustainability, has inextricable results. Exactly at this point, the concept of optimal population size for cities should be taken seriously. The limited skiing and opportunities of the city should be directed to a correctly determined and limited population.

Figure 8. Urban development, expansion towards rural borders (peri-urban), growing cities, increasing effects.



Source: Global Sustainable Development Report 2019. Date of Access: 21.03.2022

When the above-mentioned figure is examined, it is seen that the world population is increasingly shifting towards cities. So much so that this figure is expected to increase to 68 percent in 2050. Another important issue is the fact that the area in square meters used as commercial space will increase significantly until 2050. In addition, the use of material resources for trade is expected to more than double and reach 90 billion tons by 2050. In the face of this frightening picture, it is necessary to make campus and development plans without deteriorating the quality of urban life by taking the opinions of experts and non-governmental organizations for the future in terms of spatial sustainability.

While creating spatial policies, rent and interest relations should be avoided. While planning, a settlement should be arranged within reach of public transportation vehicles (Todorov and Marinova, 2009:1221). It is an issue where the concept of smart city stands out to a great extent. Because the city campus's school, hospital, parks, cinema/theatre, shopping centers should be within walking distance or public transportation distance. City plans are should be carried out by providing public participation with the support of researchers and universities who are experts in construction. In many cities of the world, disabled people cannot access public transportation, public buildings and trade centers. When these areas are not made accessible to citizens with disabilities, they create great difficulties in front of an active life.

Social Dimension

Inequalities constitute one of the main problems that human beings struggle with at almost every age. There are large income disparities between the rich and the poor, sometimes even within a radius of several kilometers. There is often a wide income gap between residents living in some upscale neighborhoods and low-paid immigrants and the urban poor. Income inequality, which is not usually taken into account among the development parameters of a city, is a great development scale even by itself. In most cases, people's use of common living spaces and benefiting from cultural and artistic activities that enable them to socialize can develop in line with financial opportunities. However, in order to create a common culture in terms of urban life; urban identity and awareness should be ensured. However, there are

serious problems in practice. If this requirement is paralleled by the line of financial possibilities, the disturbing outputs of income inequality will show themselves immediately in this sense. The resulting economic class differences can affect students negatively. It is also a problem that families have to move frequently and live on rent. For this reason, students frequently change schools and experience adjustment problems. In addition to this, the fact that the father comes home a lot in the evenings due to his job affects the students negatively. (Telsaç and Telsaç, 2022b: 435-437). Such problems can turn into gangrene in terms of urban adaptation. In many cases, cities are supported by slums and/or surrounding rural areas suffering from high poverty rates in order to receive the services they need. Urban income distribution, which should be considered as a whole piece of cake, is an important indicator of social justice, life security and fair distribution. Urban sustainability is possible by giving due importance to the participation and access of disadvantaged women, young people, disabled people and other vulnerable groups, while respecting human rights (Alicı and Kandeğer, 2017a: 399; Mecek, 2021:440). Pluralism is another important element of a city. It is necessary to respect different ideas, thoughts, beliefs and values in democratic cities. In this sense, the urban texture is can be possible with the awareness of urbanity. In this sense people tend to view the environment as the place where they live and interact. Space provides an important share of the sense of belonging and identity that is partly responsible for the formation of culture (Lucas, 2009:548).

Governance Dimension

In today's urban management approach, governance; it is the most dominant paradigm that highlights the phenomenon of participation as a focal point. The concept of governance; it is expressed with concepts reflecting the urban spirit such as accountability, participation, decentralization, and transparency (Yılmaz and Telsaç, 2021b:246-247; Alicı and Kandeğer, 2017b:251). Governance approach is states that not only central institutions and local governments, but also non-governmental organizations, private entrepreneurs and non-profit organizations should be included in the city administration (Telsaç, 2020: 60; OECD, 2001:5).

CONCLUSION

Urban areas cover less than 1 percent of the Earth's land surface but are home to more than half of its people. Local governments, thanks to their dynamic structure; It has a key position in many fundamental issues such as democracy, peace, social justice, health, welfare and sustainability. The urban ground is often best equipped for planning a society's future. Cities should have a solid economic foundation, proper housing (zoning), accessible education opportunities, and green public spaces in a decent way. For sustainable urbanization, decision makers in the public and private sectors need to get urban planning and land use, high quality infrastructure and public services, transportation systems and digital connections right. An ideal city should be accessible to all, including women, youth, the disabled and other vulnerable populations, leaving no one behind. Citizen participation, which is one of the main keys of sustainability, should be kept at the highest level. In this sense, urban development is possible with a well-planned, integrated and inclusive manner where necessary expert reports are taken into account, and city administrations act together with businesses and civil society.

Cities' economic activities and planning need to be organized in such a way as to ensure pro-poor development and access to decent work for all (Seers, 1967:5). Urban sustainability is made possible by giving due importance to the participation and access of disadvantaged women, youth, people with disabilities and other vulnerable groups, while respecting human rights. Local governments and the private sector must invest in sustainable industries and livelihoods that enable growth without harming the ecosystem. Inequalities in urban life are not only economic. In many cities of the world, disabled people cannot access public

transportation, public buildings and trade centers. When these areas are not made accessible to citizens with disabilities, they create great difficulties in front of an active life.

If the world is to want to achieve the goals enshrined in the Paris Agreement, urban systems such as water, transport, energy and others, as well as the buildings being built now, so must be built with carbon-free raw materials. An ideal urbanization; it is about creating more compact, economically, dynamic and lower-emission cities built around public transport. The benefits that should be passed on to future generations should be passed on to other generations without completely depleting physical efficiency and natural resources. In this respect, it is necessary to consider that they have the right to have the biophysical resources and opportunities offered by the ecosystem for the cities to be lived in the future as much as we do.

Especially in terms of urban management, it is extremely important to produce sustainable policies by taking ideas from institutes, universities and environmental organizations. Our world is getting more polluted, hotter, and hopeless every day. The brutal and selfish policies pursued are destroying our world with each passing second. The role of cities, especially wrong urbanization and unsustainable urban policies, is very high in this topic. Accurate and conscious urbanization is one of the basic elements that will increase the quality of urban life in every sense and will enable us to leave a more livable world to other generations. At the last, successful urban and rural governance must first be inclusive and participatory. It should have the right interaction that reflects the cultural, social character and history of the city, taking into account the priorities and values of all relevant stakeholders.

REFERENCES

- Alıcı, V.O. ve Kandeğer, B. (2017a). Yerelde Katılımcı Demokrasi Bağlamında Kent Konseyleri, International Congress Of Islamic Economy, Finance And Ethics Proceedings Book / Istanbul.
- Alıcı, V.O. ve Kandeğer, B. (2017b). Belediyelerin Yönetiminde Kadın Yöneticiler, Akademik Sosyal Araştırmalar Dergisi, Yıl: 5, Sayı: 56, Ekim 2017, s. 397-410.
- Bentivegna, V., Curwell, S., Deakin, M., Lombardi, P., Mitchell, G., & Nijkamp, P. (2002). A vision and methodology for integrated sustainable urban development: BEQUEST. Building Research & Information, 30(2), 83-94.
- Boland, B., Charchenko E., Knupfer, S., Sahdev, S. Farhad, N. Garg, S., Huxley, R. (2021). Focused adaptation, A strategic approach to climate adaptation in cities. McKinsey Sustainability.
- BuildHub, (2021). Deliverable 3.1 - Inventory structure and main feature and datasets. <https://iclei-europe.org/publications-tools/?c=search&uid=IPZiBkqL> Date of Access 20.03.2022.
- Cambridge (2015). Centre for Risk Studies, Cambridge Risk Atlas, University of Cambridge Judge Business School. Cambridge, UK.
- Cambridge Dictionary (2022). <https://dictionary.cambridge.org/dictionary/english/sustainability>, Date of Access: 20.03.2022
- Chesson, J. (2013). Sustainable development: Connecting practice with theory. Journal of Environmental Assessment Policy and Management, Vol. 15, No. 1.

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

- Dasgupta, P. (2010). Nature's role in sustaining economic development. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1537), 5-11.
- Erder, S. (2002). Urban migration and reconstruction of kinship networks: The case of Istanbul. *Autonomy and dependence in the family: Turkey and Sweden*. 117-135.
- ERP, (2021). *Ecosystem Restoration Playbooka, Practical Guide To Healing The Planet*. <https://unenvironment.widen.net/s/ffjvzcflw/>. Date of Access 20.03.2022.
- GSDR, (2019). *Global Sustainable Development Report 2019*. United Nations. <https://sustainabledevelopment.un.org/globalsdreport/2019>. Date of Access: 17.03.2022
- ICLEI, Europa. (2022). *Local Governments for Sustainability*. <https://iclei-europe.org/publications-tools/> Date of Access 20.03.2022.
- Kates, R. W., & Parris, T. M. (2003). Long-term trends and a sustainability transition. *Proceedings of the National Academy of Sciences*, 100(14), 8062-8067.
- Lucas (2009). The five dimensions of sustainability, *Environmental Politics*,18:4,539-556. DOI:10.1080/09644010903063669.
- Mecek, M. (2021). *Akıllı Yaşam ve Kent Aracı Olarak Yerel Yönetimlerin Güvenli Kent Uygulamaları*, (Ed. Kocaoğlu, M. ve Usta, S.) *Kurumsal Bilgi Yönetimi: Teknolojik Eğilimler* Publisher: Eğitim Yayınları.
- OECD (2001). *Sustainable development strategies What are they and how can development co-operation agencies support them?* Policy Brief.
- Oxford Dictionary (2022). <https://www.oxfordlearnersdictionaries.com/definition/english/sustainability?q=sustainability>, Date of Access: 20.03.2022
- Pew Research Center for the People & the Press. (2003). *Views of a changing world*. Washington, D.C.: The Pew Research Center for the People & the Press.
- Seers, D (1967) "The Meaning of Development", *IDS Communication* 44: 1-26.
- Sharma, P., & Singh, K. (2020). Sustainable development: Dimensions, intersections and knowledge platform. *Sustainability: Fundamentals and Applications*, 43-68.
- Telsaç, C ve GÖZCÜ, A. (2021). "*Kamu Sektöründe İnovasyon*", *Atlas 8th International Social Sciences Congress* June 11-13, Ankara, TURKEY, ss.169-179.
- Telsaç, C. ve Telsaç, Y. Ö. (2022a). *Causes Of Migration and its Effects*, 2nd International Symposium"Global Migration Phenomenon" With its Security, Economic, Social, Political and Cultural Dimensions, Ankara.
- Telsaç, Y. Ö. ve Telsaç, C. (2022b). *Main Educational Problems Regarding The Children Of Migrant Families*, 2nd International Symposium"Global Migration Phenomenon" With its Security, Economic, Social, Political and Cultural Dimensions, Ankara.
- Todorov, V., & Marinova, D. (2009). Models of sustainability. In *Proceedings of MODSIM 2009 International Congress on Modelling and Simulation*. The Modelling and Simulation Society of Australia and New Zealand.
- UN (2022). United Nations <https://sdgs.un.org/goals/goal6>. Date of Access: 27.03.2022
- UN (2022). United Nations, <https://sdgs.un.org/topics/sustainable-cities-and-human-settlements>, Date of Access: 17.03.2022
- UNDDR, (2019). *The human cost of disasters: An overview of the last 20 years 2000-2019*.
- WCED, (1987). *World Commission on Environment and Development, Our common. future*. Oxford: Oxford University Press.

WHO (2022). Air pollution. https://www.who.int/health-topics/air-pollution#tab=tab_1

Yılmaz, V., Telsaç, C. (2021a). Göç Olgusu Ve Türkiye'deki Suriyeli Göçmenlerin Kentlerdeki Sayısal Durumu, (Ed. E. Arslan), *Bölgesel Gelişmeler Işığında Uluslararası Göç ve Türkiye*, Nobel Yayınevi.

Yılmaz, V., Telsaç, C. (2021b). Akıllı Kentler ve Dijitalleşme, Akıllı Kentler (Uygulamalar, Sorunlar ve Çözümler) Ed. (Yakup Bulut, M. Miraç Aslan) Chapter: 7, Publisher: Ekin Yayınevi

Yılmaz, V., Telsaç, C. (2021c), "Yerel Yönetimler ve Katılım". Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, S. (40), ss.235-254.

A COMPARATIVE ANALYSIS OF HURUFISM: ON THE INVESTIGATION OF
ORIENTALIST ELIAS GIBB

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Abstract

The Hurufism sect (a Sufi doctrine based on the mysticism of letters (ḥurūf) spread in Azerbaijan and Iran in the 14th-15th centuries, and in Anatolia in the 15th-16th centuries. Representatives of this religious and philosophical sect considered letters and numbers sacred and gave them mystical meanings. According to the Hurufis, every letter, even the lines of the Qur'an, is rich in unknown mysteries and undiscovered truths. Letters are the roots of speech that express thought.

The presented study investigated the views of Gibb and provided a detailed analysis of the orientalist about the doctrine. After the publication of the “Oriental Manuscripts” catalog by the English orientalist Edward Granville Browne in 1896, Elias Gibb also investigated the hurufism. However, before reading of the works by Edward Brown about “Javidan-i Kabir”, Gibb did not fully understand the meaning of al-Hurufi. Edward Browne likened this religion to the ancient Ismailis on the one hand and to the modern Babylonians on the other. Gibb had a different point of view. According to Gibb, Hurufism was not in fact a new religion, it had developed as a branch of the Muhammadi and Sufi sects, and the Javidannama and other books by Fazlullah did not deny the Qur'an, but simply sought to make it more modern. Fazlullah updated the ancient sources in his possession by applying them to the requirements of his special theories, that is, he said that the letter given as an element of the word appeared as an expression of thought. The method of historical excursions and systematic analysis is used in the study.

Keywords: Hurufism, doctrine, Elias Gibb, Nasimi.

INTRODUCTION

The Hurufism doctrine spread in Azerbaijan and Iran in the 14th-15th centuries, and in Anatolia in the 15th-16th centuries. Representatives of this religious and philosophical sect considered letters and numbers sacred and gave them mystical meanings. According to the Hurufis, every letter, even the lines of the Qur'an, is rich in unknown mysteries and undiscovered truths. Letters are the roots of speech that express thought. They considered the speech as sacred as the speaker, and the word of God as sacred as God Himself. God's word is the source of all things, eternal, first and last, hidden and open. In order to reach the divine truth, it is necessary to unravel the mysteries of the word.

The Hurufis took the concept of Sufi metaphysics - “*Wahdat al-wujud*” (it literally means “the Unity of Being”, *Wujud* refers to God here.) According to their belief, God is in union with nature, things, man and the whole universe, in short, with the spiritual and the material, with the creature. God is the only reality and truth. There is no truth in existence, both material and spiritual, other than the truth of God. The essence, the manifestation, the meaning, the image,

the content and the form are the Truth itself. However, a fundamental difference between Hurufism and other sects, trends and doctrines was that they linked everything to words and letters. The name of such a sect comes from here (*huruf* means letters). (Babayev 2007: 60)

According to the Hurufism, a person has seven lines on his face: two eyebrows, four eyelashes, and one hair line. Because man is born with seven lines, they are called "hutut-u ummiya" - the main lines (motherhood). These lines are 14 when calculated by state and position. The man also has 7 more lines that appear during adolescence: two mustaches, two beards, two nose lines and a line on the chin on the right and left sides. These are also called "hutut-u abiyya", ancestral lines (fatherhood). These lines are 14 when calculated by state and position. Their sum is 28 and the Qur'an is based on 28 letters. When the hair is parted, it is "32", and Fazlullah Naimi's "*Javidani-Kabir*" is written in 32 letters according to the Persian alphabet. (Gölpınarlı 1973: 18).

The ideas of such a mystical sect also attracted the attention of European orientalists. Some orientalists have simply touched on this subject, while others have studied it in detail. One such orientalist is Elias John Wilkinson Gibb.

Problem statement

The first references to Hurufism in the literature date back to the time of the emergence of this doctrine. However, the information given in the sources of this period is extremely scarce. As E. Browne rightly notes, regarding the Hurufi sect and its founder, the Persian historians of this period for some reason are silent. One of the earliest sources mentioning Hurufism is the work of Ibn Hajar al-Askaloni, along with some information about Fazlullah Naimi, also tries to give a general description of the main provisions of this sect and evaluates it as a whole as a heresy. The information presented by Askaloni is repeatedly given in various studies on Hurufism in the future. (Кулизаде 1970: 7-8)

The concepts of such a mystical sect also attracted the attention of European orientalists. In particular, some orientalists who have studied Eastern science, religion and culture have only touched on this subject, while others have studied it in detail. Such orientalists include Elias Gibb, Annemarie Schimmel, Edward Granville Browne, Clement Huart, John K. Birge, Kathleen R. F. Burrill, Hellmut Ritter.

Elias John Wilkinson Gibb

Elias Gibb, a prominent orientalist, translator and writer, was born in 1857 in Scotland. He studied at the University of Glasgow, where he began studying Arabic, Persian and Turkic languages and literature. The scholar, who studied the life and work of Muslim poets and scholars, also had a huge library in this field. Interestingly, although the prominent orientalist traveled to Europe, he never visited the East. One of his greatest works is "History of Ottoman Poetry", written in 6 volumes. Due to his untimely death, he published only the first volume of the work, and the other volumes were edited and later published by the English orientalist Edward Granville Brown.

Till Gibb, several monographs and articles on the history of Turkic poetry were written. Particularly important efforts in this area were made by the Austrian orientalist and translator Joseph von Hammer-Purgstall. His most famous work in this field is the 10-volume "*History of Ottoman Poetry*". This work deals more with the life and work of poets than the history of Turkic poetry. However, as a novelty of Gibb's work, he showed that he studied the works of poets, determined their styles, as well as the social, political and religious environment of that time, and the impact of that atmosphere on the works of these poets. The main purpose of writing this book is not to provide orientalists with materials related to the development of Ottoman poetry, but to introduce it to English readers by translating it into English. Examples

in Arabic and Persian were familiar to Europe, but people unreasonably concluded that the Turks had no literature. The author emphasizes that he writes the history of Ottoman poetry to free people from this ignorance. The first volume of this work deals with the source, characteristics, scope of Ottoman poetry, traditions, philosophy, mysticism and historical contours in this poetry, while other volumes cover five periods dedicated to the life and work of various Turkic poets and their main ideas. The fourth chapter of the second volume of the book is devoted to the study of the Hurufi sect and the life and work of the Hurufi poets Nasimi and Rafi.

Elias Gibb's Notes on Hurufism

After the publication of the "Persian Manuscripts" catalog by the English orientalist Edward Granville Brown in 1896, Elias Gibb told him that the Turkic poet Nasimi was also called "*al-Hurufi*" in the commentaries of a number of Turkic poets. (Browne 1928: 369) However, before reading what Edward Brown had written about Javidan-i Kabir, Gibb did not fully understand the meaning of al-Hurufi. In these commentaries, he showed Nasimi's hints of Fazlullah to Edward Brown, which clearly proved that the sect of the Turkic poet was the same as that of Fazlullah Naimi:

*"If thou would'st know of the science of philosophy
[or of the love of wisdom], come, come, O philosopher;
Hearken thou to the speech of Nesimi, and behold Fazlu'llah!
[or the excellence of God]."* (Browne 1898: 62)

Elias Gibb first summarized the main ideas of Brown's teaching of hurufism and considered them important:

- 1) Hurufism is a mysterious science. Mastering this science is the highest duty and the highest happiness of every human being. This science shows and explains the meaning and significance of the mystical harmony that unites the earth and the sky, and everything that happens on earth and in the sky.
- 2) This mystical science also exists in the Qur'an, but the key to this science was in the hands of Fazlullah Naimi, the so-called "master of tafsir" who revealed its secrets.
- 3) Man is the most perfect being created in the person of God - the microcosm, which is the work of God, the essence and dimension of all beings. After creating all beings, God sat on His throne and created angels as objects of worship for man. Only Satan proudly refused to worship man.
- 4) According to the teachings of Hurufism, while there is a deep meaning in both the Qur'an and the obligatory deeds, it does not mean that the Qur'an has only a literal meaning and that the obligatory deeds are performed only formally. (Gibb 1900: 338-339)

According to Gibb, the main feature of this teaching is the mystical identities. Probably one of the most important parallels and identities is the work of God - "Man" and "Qur'an". The human head and image are identified with the first surah of the Qur'an, Fatiha. Surat al-Fatihah consists of 7 verses. There are 7 lines on a person's face. In Surat al-Fatihah, 18 letters indicate 18,000 worlds.

Edward Browne likened this religion to the ancient Ismailis on the one hand and to the modern Babylonians on the other. Gibb had a different point of view. According to Gibb, Hurufism was not in fact a new religion, it had developed as a branch of the Mohemmadan and Sufi sects, and the *Javidannama* and other books by Fazlullah did not refute the Qur'an, but simply sought to make it more modern. Fazlullah restore the ancient sources in his possession by applying them to the requirements of his special theories, that is, he said that the letter given as an element of the word appeared as an expression of thought. Turkic poets, who were considered followers of the teachings of the Hurufi doctrine, were not particularly interested in the cabalistic notion of the hidden virtue of the letter, nor in the fantastic similarities between the sacred texts and the human body. That is, he who knows himself also

knows God. The main feature that distinguished Hurufi poets from other poets was that they accepted man in physical and spiritual unity, and in their works they demonstrated humanism, prostration and admiration for man. (Gibb 1900: 341)

The poet, who is mentioned in both literal sources as Nasimi and Seyid Imadeddin, is described in these sources as the brightest figure of this school. Giyasaddin describes him as one of the most educated, most perfect, and most prominent dervishes in even one of the main sources in "Istivaname" (one of the important personalities of the Hurufis, written by Emir Giyaseddin (after 852/1449), about the life, ideas and caliphs of Fazlullah-i Hurufi, the founder of the sect). Gibb called Nasimi "the first true poet of the Western Turks" and assumed that he had met Fazlullah, because his literal sources, especially Amir Qiyasaddin's Istivaname, contain hints and narrations about Turkic poets.

Divan of Nasimi in Turkic gives grounds to say that his poetry is in fact the point where two elements, the Sufi and the Hurufi elements, meet and merge. The Hurufi element occupied a unique position in his works. The main idea of the Sufis was the reflection of God in man, that is, God reflects the existence of man through man, and the true man is the mirror of the Divine Beauty, the love inspired by this mirror is the "Typical Love" which is the "Bridge" to the "True Love," and this casts a shadow over the love of Truth. But according to the Hurufs, the real man is not the reflection of God, but his embodiment, and love is not the "Bridge" but the "Target". In other words, Gibb concludes that Nasimi's object of love is not the mirror of God, but God himself. (Gibb 1900: 352)

According to the Hurufi belief, the appearance of being is the sound that exists in every being. In other words, if we hit an inanimate object with another, the sound that is its essence appears, and in living things, this is manifested by will and authority. The voice is a perfect word, that is, it appears only in human beings. A word consists of letters, and in this case the word and the sound are the original letters. The basis of the Hurufi faith is the deification of man. On this basis, Fazlullah benefited from the earlier religions, the importance given to man in Islam, and Sufism. The universe is the manifestation of the Absolute Being, and this revelation came from the world of power to the world of nature and the elements, and from the union of these elements with the heavens came the inanimate and animate world. Man stands at the center of the universe. However, inside every human being there is a person who is the ruler of the universe. This man is a prophet and an imam. (Gölpınarlı 1973: 18).

CONCLUSION

Speaking about the sect of Gibb, Gibb emphasizes that this sect lasted until the XVII century. As a reason for this, Katib Chalabi wrote in his work "Javidan-i Kabir" written in Persian by Fazlullah Naimi in the XVII century, one of the main ideas of this sect and noted that this work is popular and widespread among the followers of the Hurufi sect. These words give grounds to say that this sect existed at that time as well.

In general, according to Gibb, the Turks were never a fanatical people, they were not persecuted for any religious denomination. The cause of certain murders and massacres was not religious hatred, but issues arising from social and political processes. While the victims of such killings were members of certain denominations and religious communities, the reason was that revolutionaries in the East had always used religion as a political tool. One of the basic laws of the Turks was that if a society, as a rule, lives peacefully in accordance with the law, then the members of that society should not be treated differently according to their religious affiliation. If you think that the bitter fate of Nasimi and other followers of the Hurufi contradicts these ideas, it is worth mentioning that Nasimi himself was killed outside the borders of the Turkic state. Like him, a number of Hurufs were executed not by Turks, but by Arabs and Persians. (Gibb 1900: 386-387)

REFERENCES

- A.Gölpınarlı (1973) Hürüfilik metinleri kataloğu. Türk Tarih Kurumu Basımevi-Ankara.
- E.G.Browne (1928) A literary history of Persia (3 volumes), Vol. III. Cambridge University Press.
- E.G.Browne. (Jan., 1898) Some Notes on the Literature and Doctrines of the Hurufi Sect. The Journal of the Royal Asiatic Society of Great Britain and Ireland, Cambridge University Press, pp.61-94.
- E.J.W.Gibb (1900) A History of Ottoman Poetry. Vol.I, London, Luzac & Co., Great Russel Street.
- J. Hammer-Purgstall.(1840) Histoire de L'Empire Ottoman, Vol. 1, Paris: Parent-Desbarres, 1840.
- Y.Babayev.(2007) Təriqət ədəbiyyatı:sufizm, hürufizm. Bakı «Nurlan».
- З. Кулизаде. (1970) Хуруфизм и его представители в Азербайджане. Баку: ЭЛМ, 1970.

IMPACT OF CYLINDER SIZE ON SURFACE ELECTRICAL RESISTIVITY

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Abstract

Analysis of concrete electrical resistivity is essential for its adoption as a durability parameter of concrete. The study aims to evaluate the surface electrical resistivity of concrete with three major types of cement and four different w/c ratios. The experimental program is comprised of the Proceq manufactured commercially available Resipod 4-point Wenner probe meter for electrical resistivity measurements. A total of 48 cylinders were tested in the study for the two standard cylinder sizes (100 mm × 150 mm and 200 mm × 300 mm), both with the same mix design specifications. Specimens were continuously cured in water tank and resistivity values were obtained at periodic intervals of 3, 7, 14, 28, 56, 91, and 161 days of curing time. Consequently, the development of surface electrical resistivity was examined with respect to corresponding w/c ratios and cement types. In addition, the impact of cylinder size on the surface resistivity of concrete was observed. The results show that the surface electrical resistivity of concrete is inversely related to cylinder size.

Keywords: Cylinder size, NDT, Surface resistivity.

INTRODUCTION

One of the big issues in concrete structures is chloride-induced corrosion. Corrosion resistance must be determined before retrofitting concrete buildings and bridges. As a result, there has been an increase in the demand for developing and incorporating electrical response strategies as a structural health monitoring technique in concrete structures over the last decade. Chloride-induced corrosion in reinforced concrete structures has been closely linked to the linked to concrete's electrical characteristics in previous studies (Azarsa and Gupta, 2017). Previous attempts to incorporate destructive testing failed to produce accurate estimates of chloride ion permeability in concrete structures (Sengul, 2014; Gjorv, 2013). Nondestructive testing (NDT), on the other hand, has proven to be a more time-efficient and cost-effective method of evaluating concrete quality. The advancement in electrical resistivity determination technique was standardized by AASHTO TP 95 for the quantification of concrete surface resistivity (AASHTO TP 95). Ghosh and Tran investigated the effect of geometric shape and probe spacing on the surface resistivity of cylindrical concrete samples of varying diameters using ternary-based HPC mixtures. Their results showed a good match between the experimental and theoretical surface resistivity ratios for specimens with dimensions of 100 millimeters by 200 millimeters and 150 millimeters by 300 millimeters (Ghosh and Tran, 2015). However, they ignored the chemical properties of cement and the water-cement ratio of concrete mixes, which have a

greater impact on the microstructure of concrete and can affect the electrical resistivity values accordingly.

In this study, the development of surface electrical resistivity values of concrete for two different cylinder sizes (100 mm × 150 mm, and 200 mm × 300 mm) was compared for a long-term curing period of 3 to 161 days. The study incorporated three different cement types (Type-I/II, Type-III, and Type-V) and four varying w/c ratios (0.45 to 0.60). The effect of cylinder diameter on the surface electrical resistivity of concrete was investigated, and a geometric shape factor for standard cylindrical shapes was proposed based on the cement type and surface electrical resistivity of concrete.

MATERIALS AND METHODS

The ACI 211 concrete mix design was followed during the experimental investigation (ACI 211). The cement samples used in this study were collected from LafargeHolcim US. The study tested two cylinders for each mix raio, for a total of eight cylinders for each cement type and a total of 48 specimens for the two standard cylinder sizes (100 mm × 150 mm and 200 mm × 300 mm) were tested in the study. The experimental program is depicted in Table 1.

Table 1. Experimental Program

Specimen Sizes	100 mm × 150 mm, 200 mm × 300 mm
Types of Cement	Type-I/II (MH), Type-III, Type-V
Mix Ratios	0.45, 0.50, 0.55, 0.60
Test Days	3, 7, 14, 28, 56, 91, 161 days
Test Mehtod	Resipod Resisitivity Meter (38 mm) by Proceq

The electrical resistivity meter used in this study was Proceq manufactured commercially availabale concrete resistivity meter called Resipod with a probe spacing of 38mm. Surface resistivity values were recorded at 0, 90, 180, and 270 degrees for each cylinder’s circular face and the results were averaged. After specific curing days, test specimens were removed from the water tank and tested at saturated surface dry (SSD) conditions at 23 ± 2 °C, as specified in AASHTO TP-95 (AASHTO TP 95). The obtained data was in Kohm-cm.



Figure 1. Surface Electrical Resistivity Measurement

RESULTS

Figures 2 – 4 show the relationship between surface resistivity values for two standard-sized concrete cylinders (100 × 200 mm, and 150 × 300 mm) for 3, 7, 14, 28, 56, 91, and 161-days curing period and four varying w/c ratios (0.45, 0.50, 0.55, and 0.60) with regard to cement Type-I/II, Type-III, and Type-V respectively.

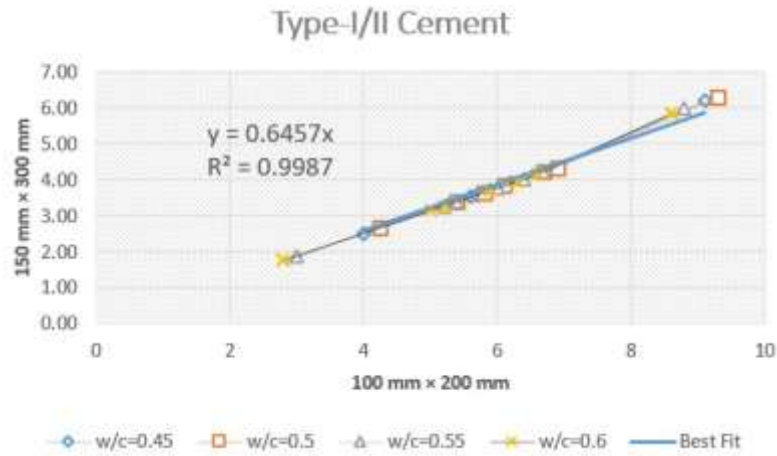


Figure 2. Correlation between surface resistivity of 100 mm × 150 mm and 200 mm × 300 mm concrete cylinders for Type-I/II cement at long-term curing period and varying w/c ratio

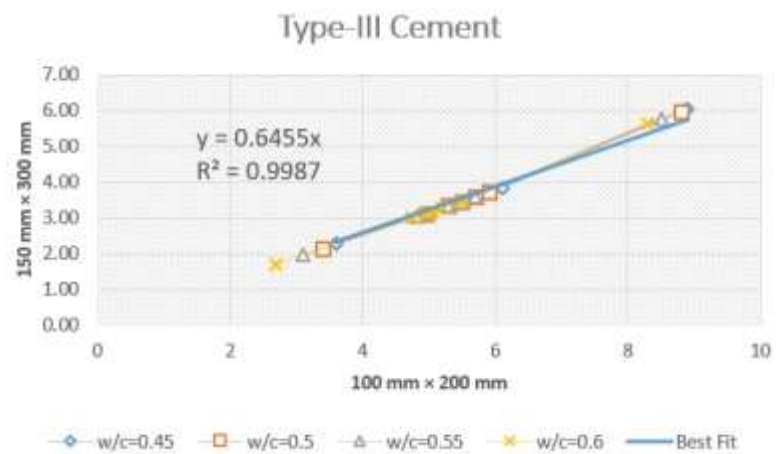


Figure 3. Correlation between surface resistivity of 100 mm × 150 mm and 200 mm × 300 mm concrete cylinders for Type-III cement at long-term curing period and varying w/c ratio

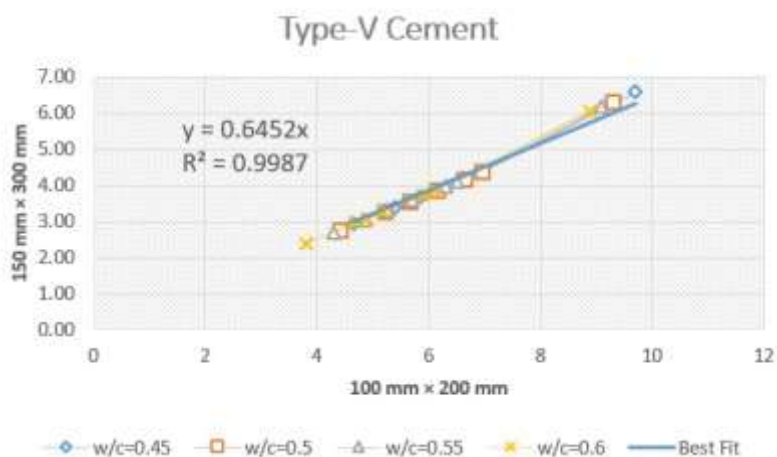


Figure 4. Correlation between surface resistivity of 100 mm × 150 mm and 200 mm × 300 mm concrete cylinders for Type-V cement at long-term curing period and varying w/c ratio

DISCUSSION

Surface electrical resistivity growth for two different cylinder diameters was consistent in all three figures, regardless of cement type, w/c ratio, or curing time, which is consistent with previous research (Ghosh and Tran, 2015). Furthermore, the coefficient of determination (R^2) values were close to 1.0, indicating a strong correlation between two types of surface resistivity on all curing days and for all three cement-based concrete mixtures. The best-fit line equation in Figs. 2-4 can be rewritten as $y = 0.645 x$, suggesting that the surface resistivity of 100 mm × 200 mm concrete mixtures was approximately 1.5 times higher than that of 150 mm × 300 mm mixtures, despite the fact that the w/c ratio and probe spacing were comparable. Because electrons are more constrained by the small cylindrical shape, large geometries can result in lower concrete surface resistivity (Azarsa and Gupta, 2017).

$$\rho_{100} = 1.55 \times \rho_{150} \quad (1)$$

However, as shown in equation 1, similar resistivity values can be obtained by implying the geometrical factor for cylindrical test samples.

CONCLUSION

Surface electrical resistivity measurement proved to be a suitable nondestructive (NDT) tool for quality control and durability evaluation of reinforced concrete structures. This method has the potential to be more precise and faster than other destructive testing methods such as the Rapid Chloride Permeability (RCP) test for long-term corrosion evaluation. It has been observed that the geometric size of the cylinder influences the surface electrical resistivity of concrete. However, there is no other effect due to the cement type, mix ratio, and curing days. The results show that the surface electrical resistivity of concrete is inversely related to cylinder size, and that a geometrical correction factor is required to obtain comparable values for standard cylindrical sizes.

REFERENCES

- AASHTO TP-95. (2014). Standard Method of Test for Surface Resistivity Indication of Concrete's Ability to Resist Chloride Ion Penetration, American Association of State Highway and Transportation Officials, Washington, D.C.
- ACI PRC-211.1-91. (2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- Azarsa, P., & Gupta, R. (2017). Electrical resistivity of concrete for durability evaluation: a review. *Advances in Materials Science and Engineering*.
<https://doi.org/10.1155/2017/8453095>
- Ghosh, P., & Tran, Q. (2015). Influence of parameters on surface resistivity of concrete. *Cement and Concrete Composites*, 62, 134-145.
<https://doi.org/10.1016/j.cemconcomp.2015.06.003>
- Gjorv, O. E. (2013). Durability design and quality assurance of major concrete infrastructure. *Advances in concrete construction*, 1(1), 45.
<https://doi.org/10.12989/acc.2013.1.1.045>
- Sengul, O. (2014). Use of electrical resistivity as an indicator for durability. *Construction and Building Materials*, 73, 434-441. <https://doi.org/10.1016/j.conbuildmat.2014.09.077>

**CHARACTERIZATION OF CARBON NANOPARTICLE WITH ITS
ANTIMICROBIAL AND ANTICANCER ACITIVITY OF FEW AQUATIC PLANTS**

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Abstract

Recently, development of reliable experimental protocols for synthesis of metal nanoparticles with desired morphologies and sizes has become a major focus of researchers. Green synthesis of metal nanoparticles using plants has emerged as a nontoxic and ecofriendly method for synthesis of metal nanoparticles. In this study characterization of stable carbon nanoparticles were done by using biosoot sample of *Nelumbo nucifera*, *Pistia stratiotes* and *eichhornia creassipes* leaves. In this study, the biosoot of leaves was studied for its particle characterization. The soot formed by burning of the leaves of leaves were studied using Dynamic Light Scattering (DLS) measurement of the particles to learn the size, Fourier Transform Infra-Red (FTIR) spectrum to learn the presence of associated organic compounds and X-ray Diffraction (XRD) of particles were studied. GC-MS analysis revealed that the leaf extract of Leaves, contains active chemical constituents. These bioactive principles are found to be responsible for bioreduction during the formation of carbon nanoparticles. The preparation of nano-structured carbon particles using leaves, thus it provides an environmentally friendly option, as compared to currently available chemical and physical methods. The results of the study will be discussed in detail.

Keywords: Biosoot, Carbon nanoparticles XRD, EDX, FT-IR, GC-MS analysis

AN ACCELERATED TENSORIAL DOUBLE PROXIMAL GRADIENT METHOD
FOR TOTAL VARIATION REGULARIZATION PROBLEM

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Abstract

We consider the constraint tensorial total variation minimization problem for regularizing ill-posed multidimensional problems arising in many fields, such as image and video processing, multidimensional data completion, etc. The non-linearity and the non-differentiability of the total variation minimization problem make the resolution directly more complex. The aim of the present paper is to bring together the resolution of this problem using an iterative tensorial double proximal gradient algorithm and the acceleration of the convergence rate by updating some efficient extrapolation techniques in the tensor form. The general structure of the proposed method will expand its to many fields of application. We will restrict our numerical application to the multidimensional data completion which illustrates the effectiveness of the proposed method.

Keywords: Tensorial total variation regularization, proximal gradient method, polynomial extrapolation, t-product, tensor inpainting.

**ENZYMES AND ITS EFFECT IN ENDOPHYTES ENHANCED PAH-
DEGRADATION IN PHYTOREMEDIATION**

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Abstract

Bacteria PAH degradation is shown to be performed by dioxygenase enzymes as demonstrated in bacteria endophytes. Isolation of the bacteria endophytes was done using the mineral base medium. A total of 19 distinct isolates that were morphologically identified were isolated from 4 species of plant with a follow-up confirmatory identification using molecular technique. Polymerase chain reaction (PCR) of 16S rRNA gene with specific primers (16S-27F PCR and 16S-1491R PCR). The sequence of the PCR products were carried out, compared with similar nucleotides available in GenBank. Results of the phylogenetic analysis of the isolates indicated their belonging to 4 different clades including Proteobacteria, Actinobacteria, Cyanobacteria and Firmicutes. These were related to the genera Bacillus, Pseudomonas, Terribacillus, Virgibacillus, stenotrophomonas, paenibacillus, Brevibacterium, Geobacillus, Acinetobacter. From the result, Pseudomonas demonstrated a higher incidence in the plants sampled. The in-vitro degradation study and the presence of deoxygenase genes indicated that these lists of endophytes are able to use the list of PAHs tested as their source of food and energy leading to their breakdown. This means that the endophytes with helps of the enzyme genes are responsible for the remediation of petroleum hydrocarbons in planta, a situation that would have been phytotoxic to the plant alone. Therefore, these bacteria endophytes could be potential organism for enhanced phytoremediation of PAHs.

Keywords: Enzymes, Biodegradation, Phytoremediation, Oil sludge, PAH, Plants, Endophytes, Bacteria

Introduction

The environment is constantly been flooded with various organic contaminants such as the petroleum aromatic hydrocarbon (PAH), as a result of the unscrupulous activities of man (Ubani et al., 2016). These PAHs introduced through the anthropogenic activities of man have been implicated in the environment and are known to cause certain health defect to man the organism. The introduction of PAHs has been reported to amongst other means to occur through seeps from the sludge described as natural sludge leaks from unlined pits, dams, or reservoirs (Pampanin and Sydnes, 2013). The rate at which PAHs are identified in the environment and the harmful effects it exacts on nature requires that appropriate measures be taken to contain it.

Various measures has been identified for the control of the toxic effects of pollutant-containing PAHs, they include the physical, chemical, and biological method (Lawal, 2017). These methods are reported to have their limitations leading to the quest for effective and environmentally friendly alternatives. Phytoremediation, which is a green method of using plants to manage the toxic effects of PAHs in soil, and bioremediation (the use of microorganism), has been lauded for its effectiveness (Atagana, 2011a/b). However, the recalcitrance properties of most of the long chain PAHs have generally defiled conventional remediation practices and techniques such as phytoremediation or bioremediation (Sharma, 2012). Literature has reported on interests of the synergy between endophytes (microorganisms that live in plant) and plants, and how they can provide an effective method to remediate recalcitrant organic compounds from the soils (Anyasi and Atagana, 2011).

The effectiveness of endophyte enhanced phytoremediation ranges from the ability of the microorganism strain to reach larger population size because of reduced competition, to their ability to degrade any absorbed xenobiotics in planta in such a way as to reduce phytotoxic effects (Ryan et al., 2008). The limitation of phytoremediation is often because of the toxicity of these chemicals or their toxic end products in plants (Hur et al., 2011). This can however be ameliorated through endophyte-assisted phytoremediation either by means of natural colonization or by genetic manipulation of the plant as this has recently drawn attention (Wei et al., 2014). Various studies have reported that plants sometimes take several years to reach its maturity and the toxicity of most of the heavy chemicals allows limited activity during plants dormant phases. As a result modification of plants using plant-associated bacteria for a more potent environmental clean-up could become a remedy for such shortcoming (van Aken et al., 2011). Therefore, removal of toxic compounds from the soil can be enhanced by the use of endophyte-assisted phytoremediation; this is because endophytes assist their host plants through various means as elucidated in the application of McGuinness and Dowling (2009). The steps involved in PAH catabolism entails the enzymatic oxidation of the substrates leading to the formation of less toxic residues (Hesham et al., 2014). The negative effect of endophyte-enhanced phytoremediation has minimal effect to the environment and the technique removes organic compounds permanently, without long-term liability; as such, is preferred by the public.

Materials and methods

Plants

Plants were collected from the neighbourhood of a sludge dam, making sure that all the different plant species were sampled. The collection of the plants did not involve protected or endangered species, hence was safe to the environment. The GPS coordinates of the sampling point are E 29.99°42.33", N 30.94° 88.68".

Soil was also collected from the same point that plants were collected to obtain the concentration of the total PAH at the sampling sites.

Reagents

Standard samples of pyrene, chrysene and perylene and other analytical reagents were purchased from Sigma Aldrich South Africa. The entire reagents were of analytical grade.

Extraction of PAHs from plants and soil

The dried plant samples collected from the sludge dam were ground using commercial blender, sieved at 2 mm and were stored prior to extraction while the soil samples were ground using a commercial mortar and was sieved at 2 mm. The extraction process adopted was 'Method 3540 Soxhlet Extraction' (Erickson, 1998) which was formally used by Chen *et*

al, (2010). 5 g of 2 mm sieved dry soil as well as 5 g of 2 mm sieved plant samples were extracted using soxhlet apparatus for 4 hrs at 4-6 cycles per hour with 150 ml mixture of hexane-acetone (1:1, v/v), after which the extracted solution was concentrated to 2 ml in rotary evaporator (Buchi Rota vapor™ Japan model R-200 with heating bath B-490 and heating intensity of 20-180 °C). USEPA Method 3630B: Silica Gel Cleanup was used as this method has been shown to specifically address organics (Erickson, 1998). The extract from soxhlet extraction was diluted with hexane to a volume of 10 ml and passed from a glass chromatographic column (i.d 20 mm and 400 mm height) packed with layers of silica gel and anhydrous sodium sulphate and then eluted with 100 ml of hexane. The eluent was finally concentrated with rotary evaporator for the second time to about 1ml and was analyzed using GC-MS.

Isolation of PAH-degrading endophytic bacteria

Mineral salt medium (MSM) was used in this study, the content of which include 500 mg KH_2PO_4 , 500 MG $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, 500 mg $\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$, 500 mg NH_4Cl , 4000 mg NaCl , 500 mg NaHCO_3 , and 500 mg Na_2CO_3 , which was mixed with 1 ml trace elements solution containing 1500 mg $\text{FeCl}_2 \cdot \text{H}_2\text{O}$, 9000 mg NaCl , 197 mg $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$, 900 mg CaCl_2 , 238 mg $\text{CoCl}_2 \cdot \text{H}_2\text{O}$, 17 mg $\text{CuCl}_2 \cdot \text{H}_2\text{O}$, 287 mg ZnSO_4 , 50 mg AlCl_3 , 62 mg H_3BO_3 , 24 mg $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$, 10 ml 10.18 M HCl per liter of distilled water. All the reagents were dissolved in 1 litre of distilled water.

Enrichment culture

Soil collected at the area around the sludge dam was sampled. In each of a 250 ml flat-bottom flasks containing 100 ml of sterile MSM flooded with 10ml each of the three tested PAHs of initial concentration of 50 mg/l, 10 g of the soil was added. The mixture was made in triplicate for each type of PAH, and a control experiment was also prepared similar to the ones described, but without PAHs. The flask was stoppered with cotton wool, and covered with aluminium foil and left in the incubator in the dark at 28 °C on a rotary shaker at 120 rpm for 21 days. One millilitre of each was transferred from each flask into another set of flasks of equal volume as before containing 100 ml of sterile MSM also spiked with the PAHs. Each subsequent transfer was incubated at the same condition. At the end of each incubation period, samples were withdrawn from each flask for determination of concentrations of the PAHs by gas chromatography/mass spectrometry (GC/MS). The final culture was however, used for the isolation and identification of the PAH degraders.

Mineral salt agar (MSA)

In a 2 litre bottle containing 900 ml of MSM, 20 g of bacteriological agar was added and swirled to mix. The mixture was autoclaved at 121 °C for 15 min. the medium was then allowed to cool at the laminar flow to about 50 °C, followed by the addition of 1 ml of trace element solution filtered through a 0.2 μm membrane filter before dispensing in the Petri dishes under aseptic conditions. Each plate was overlaid with 50 μl of filter-sterilized PAHs.

Isolation of PAH-degrading bacteria from enrichment cultures

PAH-degrading bacteria were isolated from the enrichment cultures using serial dilution (10⁻⁶). An aliquot of 0.1 ml taken from the 10⁻⁵ to 10⁻⁶ dilutions was inoculated on the MSM plates. The plates were then incubated for 21 days at 28 °C, being checked daily for bacteria growth. Distinct colonies from the plates were stroke into nutrient agar plates and incubated for three days at 28 °C. Pure cultures were made from distinct colonies from nutrient agar plates by serial dilution (10⁻³), plated on nutrient agar plates and incubated for three days at

28 °C. The colonies were further purified by streaking onto new nutrient agar plates. Identification was done using gram testing, followed by the molecular techniques.

Nutrient broth

In a two litre bottle containing 1 l distilled water was poured 15 g of nutrient broth. The mixture was sterilized at 121 °C for 15 min and allowed to cool in the laminar flow, followed by the dispensing of 10 ml each into centrifuge test tubes with caps and stored at 4 °C.

Preparation of overnight cultures

The colonies from the streaked plates were inoculated into the nutrient broth in the test tubes, by carefully picking the colonies with sterile wire loop in the Lamina flow. The test tubes were capped and incubated overnight at 28 °C.

Molecular characterization of bacteria isolates

Morphological characterization

Pure colonies of the bacteria isolates from the soil as well as that of the plants were identified and characterized using the results of their gram reaction tests and the features of their morphology when compared to the Bergey's manual according to Cerqueira et al. (2011).

Extraction of genomic DNA from bacteria isolates

The genomic DNA extraction was conducted using the commercial DNA extraction kits (Quiagen kits from Whitescience South Africa) with the provided extraction protocol. The protocol follows the preliminary harvesting of bacteria and incubation with lysosome to lyse the cell walls of the bacteria preceding the proper purification. Cleaning of the DNA was also done using the commercial kits (Quiagen from Whitescience SA).

After extraction of the genomic DNA, it was separated using agarose gel electrophoresis with 1 % agarose stained with 0.1 µg/ml ethidium bromide running at 100 V for 50 mins on tris acetate EDTA (TAE) electrophoresis buffer. Visualization of the DNA was done with UV fluorescence.

Polymerase chain reaction (PCR) and sequencing

Aliquots of the master mix of PCR was dispensed into individual PCR tubes and the samples of DNA were added to each tube. A control was set up without a DNA template used to check for contamination. In each of the PCR tubes were containing 50 µl, made up of 5 µl of buffer, 1.5 µl of MgCl₂, 2 µl each of the primers (forward and reverse), 1 µl of dNTP mix, 0.25 µl of Dream Taq DNA Polymerase, 3 µl of the DNA samples, and sterile water used to make up the volume. The reaction of the PCR was run using MJ mini thermal cycler (BioRad, Hercules-CA, USA). The PCR products were separated also using agarose electrophoresis as described previously, and visualized by UV to determine the size of the amplified bands. The products which were measured to be 20 µl each were then cleaned using a commercial kit (Quiagen, Whitescience SA). The cleaned product was then sequenced at the Inqaba Biotech, Pretoria. The sequences of the 16S rRNA region obtained were edited using BioEdit software and the edited sequences were copied in a FASTA format. Blasting was done on the National Center for Biotechnology Information (NCBI) website to compare the sequences with those already existing on the database. From the lists of the identical sequences, similar sequences were clustered into operational taxonomic units (OTUs) with the help of Mothur 1 software. Using Shannon Diversity index (H), the community structure of the isolated organisms was defined based on their abundance and evenness (Shannon, 1948; Obi et al., 2016). Five of the organisms were selected for each bacterium from the GenBank for phylogenetic analysis.

Shannons Diversity Index (H) = $\sum - (P_i * \ln P_i)$, $i = 1$

Where: P_i = fraction of the entire population made up of specie i

Phylogenetic analysis

The bacteria sequences from the five treatments: soil, root, stem, leaf and control were aligned using online Muscle software in MEGA. The phylogenetic analyses were done using MEGA 7 software and the evolutionary distance of the isolates was computed using neighbour-joining methods. The tree was drawn from 1000 replicates and all positions containing gaps as well as missing nucleotide data were eliminated from the data-set. *Escherichia coli* (E-coli) were used as the out-group.

Identification of bacteria isolates with δ -cresol indophenol (δ -CIP)

In order to screen the bacteria cultures, their pure cultures were inoculated into a nutrient agar in tubes prepared in a slant form. The components of the test tube include Bushnell Haas broth that was incubated for 24 h at 37 °C at 180 rpm. A mixture of 0.5 % (w/v) δ -cresol indophenol (δ -CIP), 0.1 % Tween 50 and 3 % (v/v) PAHs was introduced into the tubes. The experiment was monitored daily for change. The control experiment was also prepared without the inoculum and the set up were made in triplicate in accordance with that of Varjani et al. (2013). The experiment was allowed for 7 days in a rotatory incubator at 28 °C observing the colour change. Afterwards the experiment was filtered to separate the biomass. The filtrate was then centrifuged at 8000 rpm for 15 min, and the supernatant analysed at 609 nm using the ultra violet-visible (UV-VIS) spectrophotometer (UNICAM S675). The percentage of biodegradation was subsequently estimated as follows:

Degradation % = $1 - \text{Absorbance of treated sample} / \text{Absorbance of control} \times 100$

Detection of enzymes (catechol-1,2 and 2,3-deoxygenase genes) in bacteria isolates

Most enzymes are involved in the metabolism of organic compounds and catechol dioxygenase is an important extradiol moiety for the breaking down of aromatic rings by bacteria (Broderick, 1999; Mesarch et al., 2000; Peixoto et al., 2011). To carry out this test, colony PCR was performed on the bacteria isolates using the specific primers:

C230F (5'-AAG AGG CAT GGG GGC GCA CCG GTT CGA-3') and

C230R (5'-TCA CCA GCA AAC ACC TCG TTG CGG TTG CC-3'),

This is in accordance with the study of Hupert-Kocurek et al. (2012) and Hesham et al. (2014), to amplify the catechol-1,2 and -2,3-deoxygenase genes in a 20 ul PCR reaction. The cycling conditions were as follows: one cycle at 98 °C for 10 s, followed by 34 cycles at 98 °C for one second, 55 °C for 1 min and 72 °C for 15 seconds, then a final extension step was taken using 72 °C for 1 min performed for 1 cycle. The PCR products were examined using 1 % agarose gel.

Result

Isolation, identification and characterisation of PAH-degrading bacteria

In this study, plants collected around petroleum sludge dam were cultured for three days and soil through enrichment cultures for 21 days. The isolated organisms include gram-positive and gram-negative bacteria. A total of 19 distinct colonies that were able to colonize with clear zones were isolated and selected from the plants and soil cultures for molecular characterization. The variations of the isolates were 12 from plants, 5 from the soil, and 2

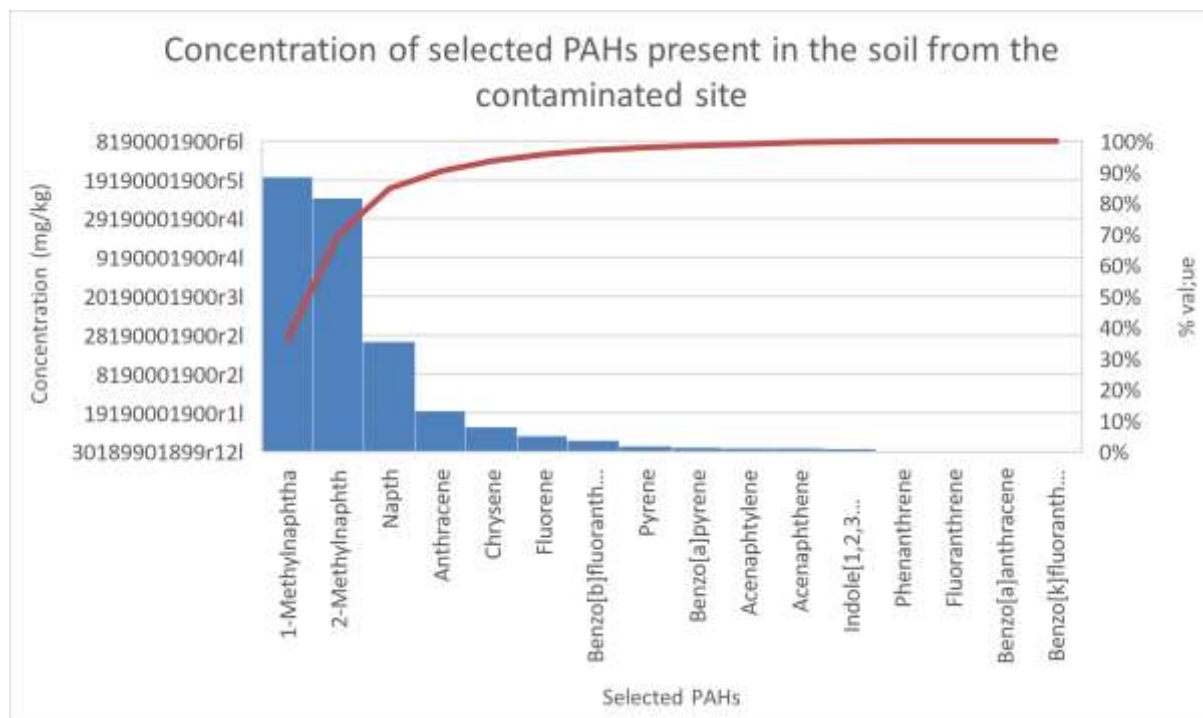
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from the control varied into 10 Gram-negative and 9 Gram-positive bacterial of which bacilli represented 94.74 %, while the remaining 5.26 % was coccobacilli isolated from one of the control samples. The oligonucleotide primers used were able to amplify 1489 base pairs of 16S rRNA gene fragments using 3 µl DNA sample. The homology sequence and phylogenetic

Table 1: Properties soil as used in the experiment

Soil parameter Characteristics	Concentration
Sand [% wt]	61.3
Silt [% wt]	23.7
Clay [% wt]	5.0
Texture	Sandy loam
pH (H ₂ O)	5.72
Total organic carbon in % [mg/l]	1.19
Total organic N [mg/l]	23
Total P [mg/l]	4.9
Cr [mg kg ⁻¹]	129.3
Pb [mg kg ⁻¹]	41.13
Ni [mg kg ⁻¹]	27.18
Cu [mg kg ⁻¹]	52.12
Zn [mg kg ⁻¹]	10.36
Mn [mg kg ⁻¹]	92.38
Fe [mg kg ⁻¹]	72.90
Co [mg kg ⁻¹]	6.21
Mg [mg kg ⁻¹]	31.05
Dry matter content [% DM]	104.02
Moisture content [% MC]	9.81

Figure 2: Concentration of the selected PAHs in the soil collected from the sludge dam. Values are means of three replicates.



analyses of the 16S rRNA of the isolates indicated that they belong to 2 different clades namely Proteobacteria and Firmicutes drawn from different class (Table 3-4). According to the distinct grouping of these organisms, they tend to exist phylogenetic relationships between them with high bootstrap. This result showed that the isolates represented distinct groups that are closely related hence forming a coherent group existing in a synergistic relationship, as to be able to initiate degradation of the target compounds. According to the results, the variations of the isolates as were drawn from the two clades are as shown in Tables 3 and 4. *E. coli* were used as the out-group. The molecular and phylogenetic analyses indicated that the isolates are related closely in 7 genera. Their relations are shown in Figure 3. These isolate were allocated the accession numbers (CP008876 - CP026048), and their closely related genera compared from the GenBank are shown in the tree (Figure 3). The result of the enrichment cultures of soil are presented in Table 7. The results are means of 3 replicates and the results are focussing on the 16 priority PAHs in soil and the selected 3 PAHs in plants. From the enrichment technique bacteria isolates capable of resisting the toxicity of PAHs as they use the compounds as their source of carbon and energy were isolated and used to compare with the plants isolates.

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Table 2: Morphological and molecular identification of bacterial endophytes isolated from plants from the contaminated environment

ID of bacteria isolates	Shape of bacteria	Gram reaction test	Molecular identification	Percentage of homology (%)
NPSI	Bacilli	+	<i>Terribacillus aidingensis</i>	100
NPLI	Bacilli	+	<i>Bacillus safensis</i>	100
NPR4	Bacilli	+	<i>Bacillus safensis</i>	100
NPR6	Bacilli	+	<i>Bacillus altitudinis</i>	100
NPL2	Bacilli	-	<i>Pseudomonas parafulva</i>	100
NPS2	Bacilli	-	<i>Pseudomonas parafulva</i>	100
NPS5	Bacilli	-	<i>Stenotrophomonas maltophilia</i>	99
NPR2	Bacilli	+	<i>Bacillus altitudinis</i>	99
S ₃ 1	Bacilli	+	<i>Bacillus sp.</i>	100
R12	Bacilli	+	<i>Bacillus sp.</i>	99
R1-13	Bacilli	+	<i>Bacillus safensis</i>	100
S12	Bacilli	-	<i>Pseudomonas parafulva</i>	93
R1-11	Bacilli	+	<i>Bacillus safensis</i>	100
NPR3	Bacilli	-	<i>Acinetobacter junii</i>	100
NPR1	Bacilli	-	<i>Stenotrophomonas maltophilia</i>	99
L1-13	Bacilli	-	<i>Pseudomonas putida</i>	93
S31	Bacilli	-	<i>Pseudomonas sp.</i>	93
Control 1	Cocccobacilli	-	<i>Pusillimonas sp.</i>	95
Control 3	Bacilli	-	<i>Burkholderia stabilis</i>	99

Bacteria molecular characterization

From the sequences of the bacteria isolates, operational taxonomic units (OTU) were generated for a more thoroughfare classification. Using the BLAST program, species identification was done based on the DNA nucleotide sequences. The sequences of the 16S rRNA gene were group into 11 OTU with 93 % and above similarity (Table 4). However, using Bootstrapping for 1000 repetitions, only values higher than 50 % are shown.

Using Shannon Diversity index (H), the species was calculated to be 0.325. *Bacillus* sp was found to be higher in Shannon Diversity Index than the rest species, the higher the value of H, the greater the diversity. However, the distribution of the bacteria were heterogeneous in nature, with the most dorminant isolates selected from OUT 2, 3 and 6 genus levels were closely related to *Bacillus*, and represented about 42.1 % of all the isolates. The list of level representation is shown in Figure 4 and Table 4.

Table 3: Classification of the bacteria endophytes based on their OTU representatives and sequences.

OTUs	Number of sequences	OTU Representatives	Phylum	Class
1	1	<i>Terribacillus aidingensis</i>	<u>Firmicutes</u>	Bacilli
2	2	<i>Bacillus safensis</i>	Firmicutes	Bacilli
3	2	<i>Bacillus altitudinis</i>	Firmicutes	Bacilli
4	3	<i>Pseudomonas parafulva</i>	Proteobacteria	γ-Proteobacteria
5	2	<i>Stenotrophomonas maltophilia</i>	Proteobacteria	γ-Proteobacteria
6	2	<i>Bacillus sp.</i>	<u>Firmicutes</u>	Bacilli
7	1	<i>Acinetobacter junii</i>	Proteobacteria	γ-Proteobacteria
8	1	<i>Pseudomonas putida</i>	Proteobacteria	γ-Proteobacteria
9	1	<i>Pseudomonas sp.</i>	Proteobacteria	γ-Proteobacteria
10	1	<i>Pusillimonas sp.</i>	Proteobacteria	β-Proteobacteria
11	1	<i>Burkholderia stabilis</i>	Proteobacteria	β-Proteobacteria

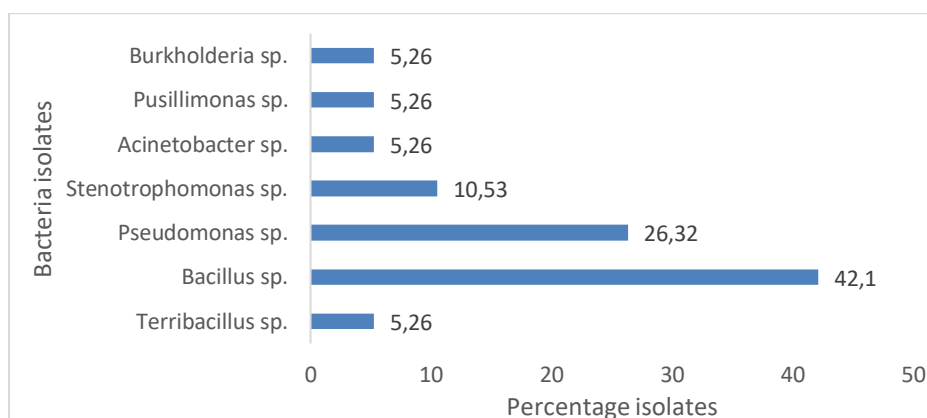


Figure 4: Percentage diversity of the bacteria genus isolated in the study

Screening of bacteria isolates for PAHs degradability

From the results obtained, the entire bacteria isolates could grow on the MSA flooded with the three selected PAHs as the only source of carbon. Meanwhile, using o-CIP as an indicator, showed a positive response on 17 of the 19 isolates with *Pseudomonas sp.* response as the best degrader. This was shown by the rate at which the bacteria was able to decolourise the compound indicator. The sequence of the reaction is in this order *Pseudomonas sp.* > *Bacillus sp.* > *Terribacillus sp.* > *Stenotrophomonas sp.* > *Acinetobacter sp.*

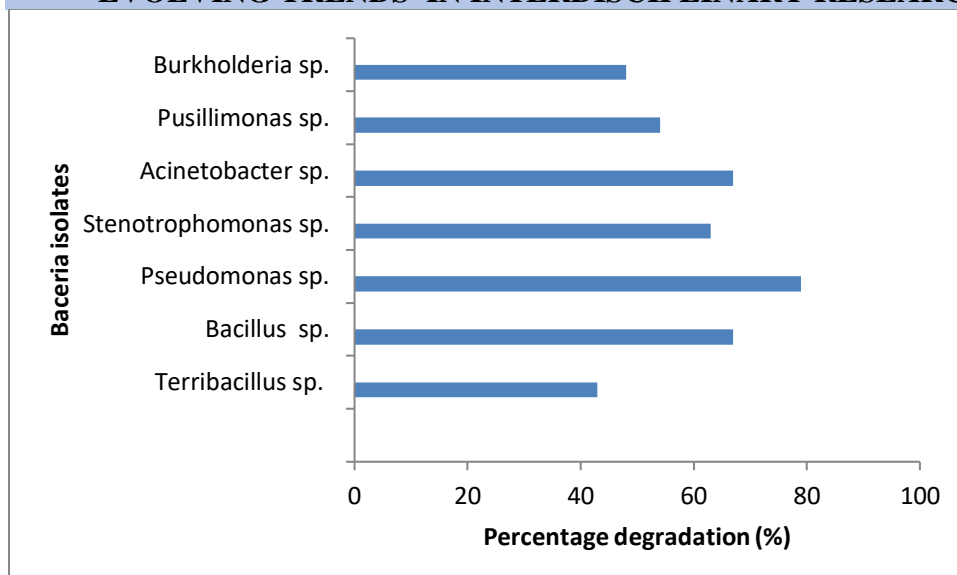


Figure 5: Estimated percentage degradation rate of perylene by the bacterial isolates using δ -CIP.

Test for enzymes

Detection of catechol-1,2 and catechol-2,3-dioxygenase genes in bacterial isolates was done by amplification of the genes through PCR reactions using the appropriate primers specific for the bacteria isolates. Using the 650 and 820 bp for the gene fragments amplified from the isolated genomic DNA from the Gram-negative bacteria endophytes strains, and analysed using agarose gel electrophoresis, it was discovered that the genes for C12O was present in all the tested isolates, but that of the C23O was not found in *Terribacillus* sp. as well as in *Pusillimonas* sp. (Table 5).

Analysing the sequence of the dioxygenase genes

For further verification of the presence of the two enzymes, their amplifies fragmnets were then sequenced using two different bacteria (*Pseudomonas parafulva* and *Bacillus pulmulus*), that are capable of degrading PAHs hence the reason for their selection. Patial nucleotide sequences of the two genes were 99, 96 and 93 % similar to the same genes found in *P. putilda* (AB294550), *B. sefensis* (KY020051) and *P. fulva* (AB284248). While C12O was similar to the first two, C23O was similar to the three strains (Table 6).

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Table 4: PCR amplification of the enzyme genes from gram-negative bacterial strains.

Isolates	Catechol-1,2-dioxygenase gene	Catechol-2,3-dioxygenase gene	Genotype description
NPSI	Positive	Negative	←
NPLI	Positive	Positive	↔
NPR4	Positive	Positive	↔
NPR6	Positive	Positive	↔
NPL2	Positive	Positive	↔
NPS2	Positive	Positive	↔
NPS5	Positive	Positive	↔
NPR2	Positive	Positive	↔
S ₃ 1	Positive	Positive	↔
R ₁ 2	Positive	Positive	↔
R ₁ -1 ³	Positive	Positive	↔
S ₁ 2	Positive	Positive	↔
R ₁ -1 ¹	Positive	Positive	↔
NPR3	Positive	Positive	↔
NPR1	Positive	Positive	↔
L ₁ -1 ³	Positive	Positive	↔
S ₃ 1	Positive	Positive	↔
Control 1	Positive	Negative	←
Control 3	Positive	Positive	↔

←↔ The first symbol denotes only C12O present while the second symbol denotes both C12O and C23O positive.

Table 5: Homologous sequence of the dioxygenase genes for PAH-degrading endophytes

Organism	Dioxygenase gene	% Homology	Homologous gene	Source
Pseudomonas parafulva NPL2	Catechol-1,2-dioxygenase gene	99	Catechol-1,2-dioxygenase gene	P. putilda
		99	Catechol-1,2-dioxygenase gene	P. putilda
		96	Catechol-1,2-dioxygenase gene	B. sefensis
Bacillus pulmulus R12	Catechol-2,3-dioxygenase gene	99	Catechol-2,3-dioxygenase gene	B. sefensis
		96	Catechol-2,3-dioxygenase gene	P. putilda
		93	Catechol-2,3-dioxygenase gene	P. fulva

Table 6: Reduction in concentrations of the priority PAHs in enrichment culture. Values are mean of three actual values ± standard error

Selected PAH	Initial conc. (mgkg-1)	Final conc. Enrichment culture (mgkg-1)	% reduction
1-methyl naphthalene	187.16±2.14	33.11±1.2	82
2-methyl naphthalene	172.92±0.31	30.00±0.10	83
Naphthalene	85.11± 0.04	16.23±0.3	81
Anthracene	32.33±0.42	10.28±0.18	68
Chrysene	41.95±4.07	9.26±2.6	78
Fluorene	18.17±0.05	2.72±2.09	85
Benzo[b]fluoranthene	19.62±2.1	3.20±1.13	84
Pyrene	13.80±1.10	2.09±1.04	85
Benzo[a]pyrene	5.82±1.12	1.27±0.08	78
Acenaphthylene	4.75±0.05	1.01±2.02	79
Acenaphthene	6.25±0.96	1.14±0.04	82
Indenol (1,2,3-cd)pyrene	5.20±1.15	1.04±1.26	80
Phenanthrene	1.28±0.32	0.23±0.27	57
Fluoranthene	1.30±0.60	0.19±0.35	85
Benzo[a]anthracene	1.29±0.09	0.24±0.18	81
Benzo[k]fluoranthene	2.05±0.03	0.33±0.24	84

Discussion

This study was aimed at isolating and characterizing bacteria that has the ability to use PAHs as their source of carbon and energy. This phenomenon could find its use in the phytoremediation of such compounds in plants. From the characterisation of the sampled bacteria, several isolates belonging to the Gram-negative type of bacteria. Reports of several Gram-negative bacteria being involved in the degradation of petroleum hydrocarbon are found in the literature (Hesham et al 2014). From the results of this study, the dominant specie was from the phylum Proteobacteria drawn mostly from the γ -Proteobacteria class and few β -Proteobacteria (Table 4). The result of this study is synonymous with that of Obi et al. (2016), which reported that these class of bacteria has the ability to use nitrogen-sulphur-oxygen fractions of petroleum hydrocarbons as their source of nutrients.

PAH-degrading bacteria from our finding belong to these genera: *Pseudomonas*, *Bacillus*, *Terribacillus*, *Stenotrophomonas*, and *Acinetobacter*. The studies of Guzik et al. (2009), Alquati et al. (2005), Liu et al. (2010), and Mishra et al. (2014), were all in agreement with the findings reported thus, stating that these list of bacterial endophytes could make use of petroleum hydrocarbons as their source of carbon and energy. *Bacillus* and *Pseudomonas sp.* forms the greatest population with diversity level of over 42 and 26 % respectively while *Pseudomonas* were the genus with the highest degradation ability. Past literatures indicated that the excessiveness of *Bacillus* and *Pseudomonas* in a toxic organic environment as is found in the PAH-contaminated environment could have rendered them the ability to possess the highest substrate-degradation potential (Obi et al., 2016; Al-Wasify and Hamed 2014; Hara et al., 2013).

In the quest towards determining the ability of endophytic bacteria to utilize petroleum hydrocarbon substrates, δ -CIP, an electron acceptor was introduced into a culture medium of the microorganisms. A sudden change in colour of the compound to colourless after it has been reduced from its original blue colour at oxidized state, is an indication that the PAH was utilized. This was formally demonstrated by the study of Chen et al. (2008), using a PAH-degrading bacteria endophytes. Past studies has demonstrated and classified *Pseudomonas* and *Bacillus* genera bio-emulsifiers because they tend to have the capability to increase the bioavailability of PAHs towards enhancing their degradation in a contaminated environment (Mishra et al., 2014). Other bacteria endophytes drawn from the lists highlighted in this study have also been implicated in these activities, demonstrating an agreement with the reports of this study. This was made possible because of the possession of the suitable catabolic pathways for the catalysis of the petroleum hydrocarbons (Rajaei et al., 2013). However, some of the isolates were unable to induce colour change within the days of incubation/observations; this does not mean that such isolates cannot degrade the provided PAHs but could be attributed to the fact that the days of incubation was short as some organisms are faster than others in their degradation ability. Literature indicated many factors that could be responsible for this and they include temperature, PH, and bioavailability of the compound (Karigar and Rao, 2011; Ghosal et al., 2016). As a result, molecular tools was used to ascertain the presence of the catabolic genes in the bacteria isolates.

When catabolism of aromatic compounds using oxygen results in three intermediate formation, catechol, protocatechuate and gentisic acid. These was further metabolized to from simple acids and aldehydes that are easily accessible to the microorganism (Guo et al., 2015; Mishra et al., 2014; Singh and Chandra, 2014; Al-Wasify and Hamed 2014). From the result of the assay of the enzyme genes using the appropriate primers, the study was able to establish the presence of the genes in the bacteria isolates, which renders them the ability to catabolise aromatic compounds. This finding is agreement with that of Guo et al. (2015), which reported that the presence of such genes in a bacteria conforms to them the ability to degrade

hydrophobic compounds. And in this study, the presence of catechol-1,2-dioxygenase genes in the bacteria isolates enables them to degrade PAHs (Sivaraman et al., 2012).

Conclusion

For pure bacteria endophyte cultures to grow in and utilize PAH as sole source of carbon and energy has provided a greener method of dealing the PAHs. Considering the menace caused by the toxicity of PAHs resulting from the presence of petroleum product in the atmosphere, could now be controlled by the isolation of endophytic bacterial from plants growing around petroleum-contaminated environment. This study was able to isolate, test and characterize bacteria from plants collected from the surrounding of a PAH-contaminated soil. Degradation of PAHs by these microbial consortia as reported in this study showed that they have specialized cometabolic capacities, as they were able to reduce the concentration of the tested PAHs. In oil-polluted environments, specialised bacterial consortiums are abundant because of their adaptation ability to pollutants. These bacteria are the most predominant microorganism among others in either *in situ* or *ex situ* bioremediation processes, indicating that they are the main agents responsible for the degradation of oil. All these characteristics was demonstrated by the endophytes isolated in this study.

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References

- Alquati, C., M. Papacchini, C. Riccardi, S. Spicaglia and G. Bestetti. 2005. Diversity of naphthalene-degrading bacteria from a petroleum contaminated soil. *Ann Microbiol.* 55:237–242.
- Al-Wasify, R.S. & Hamed, S.R. 2014. Bacterial biodegradation of crude oil using local isolates, *Int. J. Bacteriol.*, 2014:1–8.
- Aly, A.H., A. Debbab, J. Kjer and P. Proksch. 2010. Fungal endophytes from higher plants: a prolific source of phytochemicals and other bioactive natural products. *Fungal Divers* 41:1–16.
- [Aly, A.H.](#), [Debbab, A.](#) and [Proksch, P.](#) 2013. Fungal endophytes - secret producers of bioactive plant metabolites. *Pharmazie*, 68(7):499-505.
- Anyasi, R.O. and H.I. Atagana. 2011. Biological remediation of polychlorinated biphenyls (PCB) in the environment by microorganisms and plants. *Afr. J. Biotechnol.* 10(82):18916-18938.
- Atagana, H.I. 2011. Bioremediation of co-contamination of crude oil and heavy metals soil by phytoremediation using *Chromolaena odorata* (L) King & H.E. Robinson. *Water Air Soil Poll.* 215(1-4):261-271.
- Atagana, H.I. 2011. The potential of *Chromolaena odorata* (L) to decontaminate used engine oil impacted soil under greenhouse conditions. *Int J Phytorem.* 13:627-641.

Azevedo, J.L., W. Macchioni, J.O. Pereira and W.L. Araujo. 2000. Endophytic microorganisms: a review on insect control and recent advances on tropical plants *Elect. J. Biotechnol.*, 3:40-65.

Broderick, J.B. 1999. Catechol dioxygenases, *Essays Biochem.*, 34(11):173–189.

Cerqueira, V.S., E.B. Hollenbach, F. Maboni, M.H. Vainstein, F.A. Camargo, R.P.M. do Carmo and F.M. Bento. 2011. Biodegradation potential of oily sludge by pure and mixed bacterial cultures. *Bioresour. Technol.*, 102(23):11003–11010.

Chen, C.-H., Z.-M. Sheu and T.-C. Wang, 2008. Host specificity and tomato-related race composition of *Phytophthora infestans* isolates in Taiwan during 2004 and 2005. *Plant Dis.*, 92: 751–755.

Chen, Y.Y., X.M. Gu, S.Q. Huang, J.W. Li, X. Wang and J. Tang. 2010. Optimization of ultrasonic/microwave assisted extraction (UMAE) of polysaccharides from *Inonotus obliquus* and evaluation of its anti-tumor activities. *Int. J. Biol. Macro.*, 46:429-435.

Erickson, B. 1998. Standardizing the world with microwaves. *Anal. chem.*, 70:467-471A

Ghosal, D., S. Ghosh, T.K. Dutta and Y. Ahn. 2016. Current State of Knowledge in Microbial Degradation of Polycyclic Aromatic Hydrocarbons (PAHs): A Review. *Front. Microbiol.* 7(1369):1-27.

Guo, G., T. Fang, C. Wang, Y. Huang, F. Tian, Q. Cui and H. Want. 2015. Isolation and characterization of two novel halo tolerant catechol 2,3-dioxygenases from halophilic bacterial consortium. *Scientific Reports*, I(5):17603

Guzik, U., I. Greń, D. Wojcieszńska and S. Łabużek.. 2009. Isolation and characterization of a novel strain of *Stenotrophomonas maltophilia* possessing various dioxygenases for monocyclic hydrocarbon degradation. *Braz. J. Microbiol.*, 40:285–291.

Hara, E., M. Kurihara, N. Nomura, T. Nakajima and H. Uchiyama. 2013. Bioremediation field trial of oil-contaminated soil with food-waste compost. *J. JSCE.*, 1(1):125–132.

Hardoim, P.R., L.S. van Overbeek, G. Berg, A.M. Pirttilä, S. Compant, A. Campisano, M. Döring and A. Sessitsch. 2015. The hidden world within Plants: Ecological and evolutionary considerations for defining functioning of microbial endophytes. *Microbiol. Mol. Biol. Rev.*, 79:293–320.

Hesham A.E., A.M.M Mawad Y.M. Mostafa and A. Moreit. 2014. Biodegradation Ability and Catabolic Genes of Petroleum-Degrading *Sphingomonas koreensis* Strain ASU-06 Isolated from Egyptian Oily Soil. *BioMed. Res. Inter.*, 2014: 167274.

Hupert-Kocurek, K., U. Guzik and D. Wojcieszńska. 2012. Characterization of catechol 2,3-dioxygenase from *Planococcus* sp. strain S5 induced by high phenol concentration. *ACTA Biochem. Pol.*, 59(3):345-359.

Hur, M., Y. Kim, H.R. Song, J.M. Kim, Y.I. Choi and H. Yi. 2011. Effects of genetically modified poplars on soil microbial communities during the phytoremediation of waste mine tailings. *Appl. Environ. Microbiol.*, 77: 7611-7619.

Karigar, C.S. and S.S. Rao. 2011. Role of microbial enzymes in the bioremediation of pollutants: a review. *Enzyme Res.*, 2011:805187.

Lawal, A.T. 2017. Polycyclic aromatic hydrocarbon: A review. *Cog. Environ. Sci.*, 3: 1-89.

Liu, Y.C., L.Z. Li, Y. Wu, W. Tian, L.P. Zhang, L. Xu, Q.R. Shen and B. Shen. 2010. Isolation of an alkane-degrading *Alcanivorax* sp. Strain 2B5 and cloning of the *alkB* gene. *Bioresour. Technol.*, 101:310–316.

McGuinness, M. and D. Dowling. 2009. Plant-assisted bacterial degradation of toxic organic compound in soil. *Int. J. Environ. Res. Pub. Health*, 6:2226-2247.

Mesarch, M.B., C.H. Nakatsu and L. Nies. 2000. Development of catechol 2,3-dioxygenase-specific primers for monitoring bioremediation by competitive quantitative PCR," Appl. Environ. Microbiol., 66:678–683.

Mishra, S., S.N. Singh and V. Pande. 2014. Bacteria induced degradation of fluoranthene in minimal salt medium mediated by catabolic enzymes in vitro condition. Bioresour. Technol. 164:299–308.

Obi, L.U., H.I. Atagana and R.A. Adeleke. 2016. Isolation and characterisation of crude oil sludge degrading bacteria. SpringerPlus. 5:1946.

Pampanin, D.M. and M.O. Sydnes. 2013. Polycyclic aromatic hydrocarbons constituents of petroleum: presence and influence in aquatic environment. In Hydrocarbon. Dr. Vladimir Kutcherov (Ed.), InTech, pg 81-118.

Peixoto, R.S., A.B. Vermelho and A.S. Rosado. 2011. Petroleum-Degrading Enzymes: Bioremediation and New Prospects. Enzyme Research, Pg. 1-7.

Rajaei, S., S.M. Seyedi, F. Raiesi, B. Shiran and J. Raheb. 2013. Characterization and potentials of indigenous oil-degrading bacteria inhabiting the rhizosphere of Wild Oat (*Avena Fatua* L.) in South West of Iran. Iran J. Biotechnol., 11:32–40.

Ryan, R.P., K. Germaine, A. Franks, D.J. Ryan and D.N. Dowling. 2008. Bacterial endophytes: recent developments and applications. FEMS Microbiol. Lett., 278:1-9.

Shannon, C.E. 1948. A mathematical theory of communication. Bell. Syst. Tech. J., 27:376-423/623-656.

Sharma, S. 2012. Bioremediation: Features, Strategies and applications. Asian J. Pharm. Life Sci., 2:202-213.

Singh, K. and S. Chandra. 2014. Treatment of petroleum hydrocarbon polluted environment through bioremediation: A review. Pak. J. Bio. Sci., 17:1–8.

Sivaraman, C., G. Anasuya and M. Srikanth. 2012. Cloning and expression of catechol 2, 3 dioxygenase and cyclodextrin glucanotransferase gene in *e.coli* and its role in biodegradation. Int. J. Life. Sci. Pharma Res., 2:10-19.

Strobel, G. and B. Daisy. 2003. Bioprospecting for Microbial Endophytes and Their Natural Products. Microbiol. Mol. Biol. Rev., 67:491–502.

Ubani, O., H.I. Atagana, S.R. Mapitsi and R. Adeleke. 2016. Characterisation of oil degrading bacteria from tailored compost containing crude oil sludge. Indian J. Biotech., 15:243-250.

Ubani, O., H.I. Atagana, S.R. Mapitsi and R. Adeleke. 2016. Identification and characterisation of oil sludge degrading bacteria isolated from compost. Arc. Environ. Prot., 42:67-77.

Van Aken, B.V., P.A. Correa and J.L. Schnoor. 2010. Phytoremediation of polychlorinated biphenyls: New trends and promises. Environ. Sci. Technol., 44:2267-2776.

Varjani S.J., D.P. Rana, S. Bateja and V.N. Upasani. 2013. Original research article isolation and screening for hydrocarbon utilizing bacteria (HUB) from petroleum samples. Int. J. Curr. Microbiol. Appl. Sci., 2:48–60.

Wei, Y., H. Hou, Y.X. ShangGuan, J.N. Li and F.S. Li. 2014. Genetic diversity of endophytic bacteria of the manganese-hyperaccumulating plant *Phytolacca americana* growing at a manganese mine. Eur. J. Soil. Biol., 62:15–21.

ASSESSING THE IMPACT OF WATER POLLUTION ON THE ENVIRONMENT

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Abstract

The essence of this study was to assess the pollution of Elands River by quantifying the biological and chemical characteristics. Sequel to the assessment, the pollution index of the river revealed that the concentration of most pollutants downstream is above 50% of the upstream concentration. The natural sources of the pollution in Elands River are the weathering of geological formations; whereas the anthropogenic sources are agriculture; Municipal WWTW and direct deposit of waste into the river. The natural sources of pollution contributed towards chemical pollution; whereas the anthropogenic sources contributed both chemical and microbiological pollution. The Elands River is hypertrophic downstream of the Rooiwal WWTW; however, the current physiochemical state of the River warrants its ability to be used for safe irrigation in agricultural practices. The current microbiological state of the River does make it harmful for human consumption especially as drinking water; however, the water should be treated prior to use to inactivate the bacteria present in the water. The study was able to provide in analysis the variation of the contaminants in the River.

Index Terms: Environmental studies, Water pollution, Elands River, South Africa, Water analysis.

I. INTRODUCTION

The phenomenon of water pollution occurs when unwanted materials enter a water body and contaminate it [1]. Water Pollution may be caused by natural or anthropogenic causes. The pollutants are normally suspended solids, silt, pathogens, and soils, erosion particles from river banks, cosmetics, sewage materials, emissions, and construction debris. These pollutants contaminate the water and may include Toxic substances, carcinogenic chemicals, organic matter and heavy metals [2]. The biological, physical and chemical pollution of surface water is a global phenomenon and there is great interest in it [3]. Most anthropogenic activities that utilise water will ultimately produce wastewater (**Figure 1**); and the quantity of wastewater produced increases as the demand for water grows [4]. Three largest producers of waste water globally have been identified as agriculture, industry and municipalities; with agriculture producing 6%, industry producing 16% and municipalities producing 8% waste water [4], [5].

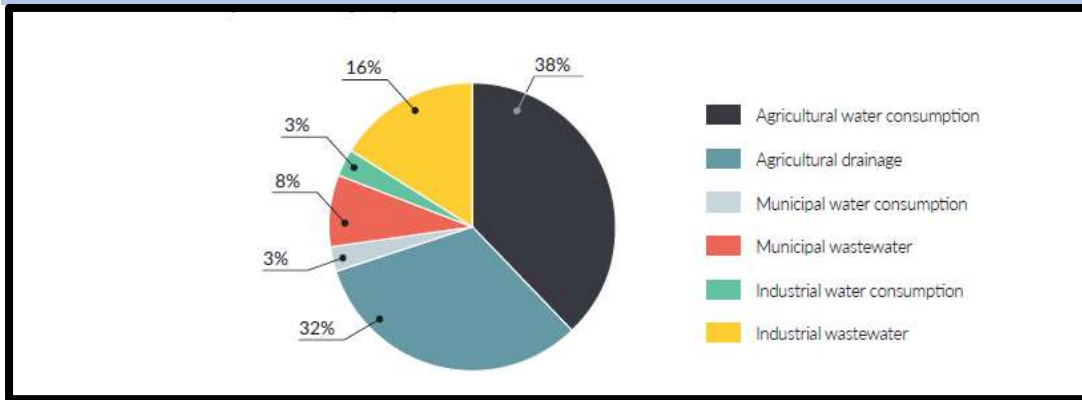


Figure 1: Global water consumption and waste water production by major water use sectors [4], [5].

The challenge with waste water is that a large amount of it is discarded into the environment as it is and no pre-treatment is performed. An average of 30% of wastewater that is not treated is released into the environment in developed countries and over 90% of wastewater that is not treated is discarded into the environment in developing countries. The discharge of untreated waste water is a key cause of global water pollution. [4], predicts that the global water demand will increase by a great deal over the next few decades as a results of increased urbanisation, agricultural, and industrial activities. The development of informal settlements as a result of urbanisation is also contributing greatly to the generation of wastewater.

Rivers play a vital role in surface water pollution as they collect waste water from industries, municipalities as well as water from agricultural activities. Contaminants that enter rivers will not only contaminate river water but river bed sediment too due to the continuous adsorption and desorption process between water column and bed sediment [3]. Sediment can act as a storage facility for water contaminants and can contain elevated levels of contaminants; for example sediment can contain from 100 to 1000 times more microbial load than their overlying water [6], [7]. Microorganisms can be re-suspended by means of activities such as boats, storms, or high winds [7].

The 2016 South African Water Quality Management study was aimed at identifying South Africa's water quality management priority areas through the assessment of South Africa's water quality issues; top 5 water quality management priority areas are eutrophication, sedimentation, salinization, urban runoff, acidification, and acid mine drainage. There is a gap in the understanding of issues such as dissolved oxygen and organics, pathogens and agrochemicals although it is known that they are an impact on water quality. Intensive monitoring of these issues is required to increase the level of understanding before these issues can be classed as priority issues [8].

The Elands River runs through the Tshwane Metro of Gauteng Province and named after the prolific vervet monkeys that inhabited the area when the first settlers arrived in the Fountains Valley [9]. The Bon Accord Dam was built across Elands River in the north of Pretoria in 1925 to supply irrigation water to crop farmers in the region. Agriculture, power generation and waste water treatment are some of the activities that take place on the banks of the Elands River. Urban and rural communities are found to be living near the Elands River. Sources of Elands River pollution include water waste treatment plant effluent, power station effluent, agricultural runoff and effluent, urban and rural runoff [10]. Elands River is a prolific river that traverses areas of Pretoria, Gauteng. Effluent from many anthropogenic sources is discharged into the river [9]. This includes effluent from 4 Waste Water Treatment Works (WWTW) [10]. The challenge that the WWTW are experiencing is that with rapid urbanisation. Therefore, it is important to study the chemical pollution on the Elands River.

This research aim is to develop a comprehensive understanding of the physical, chemical and biological pollution of the Elands River water in near the Rooiwal WWTW

II. LITERATURE REVIEW

Recent studies on the Elands River place a large focus on the effects of the Elands River Pollution on human wellbeing and do not describe the impact of pollution on the aquatic environment [6],[7],11]; therefore it will be important to study the impact of the Elands River pollution on the aquatic environment. A large number of recent South African water quality studies have focused on eutrophication, sedimentation, salinization, urban runoff pollution, acid mine drainage and acidification, allowing for these issues to be classified as priority water management issues, while there is a gap in the understanding of issues such as dissolved oxygen and organics, pathogens and agrochemicals; therefore, there is a need for more research on these topics [8].

Natural factors and anthropogenic activities both contribute towards river water pollution. The contribution of natural factors and anthropogenic activities is at both the river and watershed scale [1]. The anthropogenic pollution will either come from point sources or non-point sources. The pollution from natural factors will normally come from non-point sources. Both the anthropogenic and natural factors will have an effect on the river. Many households and farmers rely on surface waters for their daily activities. However, they can easily be polluted by non-point source (NPS) or point sources. As illustrated in **Figure 2**, NPS are the more prolific polluters as they are responsible for more than 60% of river water pollution.

NPS of pollution include animal faeces, faulty septic and sewage systems, storm water drainage and urban run-off. NPS are more difficult to recognise, put a figure on and explain than point sources as illustrated by Wright & Nebel [13]. Point sources include municipal WWTW, and livestock handling drainage. Fertilisers may either be chemical or organic. Chemical fertilisers mainly contain nitrates, phosphates and potash. Organic fertiliser is manure and also contains high levels of nitrates and phosphates [3]. The BOD of rivers is caused by 2 counteractive mechanisms organic pollutant loading and natural cleaning capabilities of rivers [4]. Organic pollution depletes the dissolved oxygen (DO) content of aquatic environments while breaking down organic matter. The amount of oxygen required for the total breakdown of organic matter present is referred to as biochemical oxygen demand (BOD); therefore, BOD is an indication of organic pollution intensity [5]. Chemical Oxygen Demand (COD) can also be used to establish the amount of oxygen that would be reduced from an aquatic body due to bacterial activities.

Scientist has been studying the occurrence of faecal bacteria in water environments ever since 1952 [14]. They investigated the origins of *E. coli* pathogens in riverbed sediment, their dispersion over time, and lifespan. They demonstrated that non-pathogenic strains of *E. coli* lived longer in sediment than in the overlying water proving that *E. coli* can overwinter in sediments [7]. It was also demonstrated that the pathogens have a high preference for sediments and high natural carbon levels even in extreme temperature conditions. In 2005, Ferguson *et al.* [15], showed that there were elevated levels of *Enterococcus spp.* in intertidal sediment; and that the re-mixing of these bacteria into the column of water at the beach may reduce the quality of the beach water. This may raise doubt on the effectiveness of this indicator for defining fresh faecal contamination. In 2017, Ekwanzala *et al.* [7] found that enterococci bacteria and faecal coliforms in river water and sediment are highly related genetically, which indicates that it may have come from the same place, perhaps been transported in the same manner.

Various researches have shown that it is possible to have *Salmonella* existing in river sediment while not existing in water above [9]. Storms cause sediment particles to mix with

the overlying water increasing the amount of *Salmonella* in the water column [2]. *Shigella* spp. can live and reproduce in sediment [7] revealed that *Salmonella* spp. and *Shigella* spp. in river sediment and water above are approximately 99% related genetically, which indicates that may come from the same place and been transported in the same manner. This also demonstrated that there is cross-transference of microorganisms between sediment and the overlying water column. Natural factors and anthropogenic activities both contribute towards river water pollution. The contribution of natural factors and anthropogenic activities is at both the river and watershed scale [1].

The Elands River is located within the Apies-Pienaars River (A23) tertiary-catchment area. This region has a high population rate which is dense due to the City of Tshwane [13]. Most of the water required by the city is sourced from the Vaal River System; however, four sewage treatment plants are in close proximity to the River. The Rooiwal Water Waste Treatment Works (WWTW), located 8.4 km north of Bon Accord Dam, releases 100 million litres of treated sewage water into the Elands River per day. Storm-water from the city and the river is also discharged into the Elands River [4], [8]. The sites were sampled every two weeks for a month and a half. The site localities and site details are presented in **Table 1** and the parameters analysed are presented in **Table 2**.

Table 1: Water Quality Sampling sites

Site Id	Site Name	Distance from Site	GPS Coordinates
AP1	Upstream of Olifants River	3.9 Km	24°55'27"S 29°20'45"E
EF1	Crocodile River (West)	2.1 Km,	24°17'18"S 27°31'8"E
AP2	Downstream of Crocodile River (East)	4.7 Km	20°43'21"S 29°20'45"E

III. MATERIALS

Sterile 1 liter plastic bottles, Sterile 500g plastic containers, Augar, Coolerbox, Ice, Water samples, Hatch Lange Probe, filter papers, Analytical balance, Laboratory oven, Aquakem Konelab discrete analysers, Agilent 5110 Inductive Coupled Plasma Optical Emission Spectrometry (ICP-OES), Filter flask, Rubber stopper, Stainless steel base, Membrane filter, Forcep, Locking ring, Funnel, Beakers, Vacuum pump, Petri dishes, Endo agar, Laboratory oven, Original culture, Broth, Test tubes, Glass spreader.

IV. METHODS

Sterile one litre plastic sample bottles were used to collect grab river water samples aseptically at the sampling site, and the cap replaced immediately. The sample bottles were labelled and stored on ice to maintain lowest temperature possible. Augar was used to collect sediment samples. Auger was inserted into sediment at a 0-20° angle to the vertical, rotated and slowly withdrawn and transferred into a container. This was repeated 3-4 times at all sampling sites AP1 and AP2 to collect a composite sample. Sediment was kept in a container and stored on ice to maintain lowest temperature possible. The water and sediment samples were then delivered to Meriux Nutriscences Laboratory (Midrand-South Africa), for 16s rRNA sequencing and Regen Waters Laboratory for chemical and microbiological analysis (results not included).

pH and electrical conductivity were measured *in situ* at each site using the Hatch Lange Probe (Germany). Suspended solids were determined by filtration, measurement and calculation. At Regen Waters Laboratory (Witbank-South Africa), the concentrations of nutrients (Chloride, Fluoride, Nitrate, Nitrite, Ammonia, Otrho-Phosphate) in water samples were determined

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using the Aquakem Konelab discrete analysers by Thermo-Scientific (South Africa). The concentration of E.Coli, Faecal Coliforms and Total Coliforms in water samples was determined using the SANS 5221 membrane filtration method. The concentrations of metals (sodium, potassium, calcium and magnesium) in water samples were determined using the Agilent 5110 Inductive Coupled Plasma Optical Emission Spectrometry (ICP-OES).

Extraction of DNA from Water Samples

At Merieux Nutrisciences Laboratory, a 100 mL of a composite water sample of sites AP1 and AP2 was centrifuged at 7500 revolutions per minutes (rpm) for 10 min [8]. Genomic DNA was then extracted from the resulting pellets using the ZR Soil Microbe DNA MicroPrep™ (Zymo Research Corp., Irvine, California, USA). The concentration and quality of the extracted DNA was measured using a NanoDropsND-2000 spectrometer (NanoDrop Technologies, Wilmington, DE, USA). This purified PCR product was then sequenced on ABI PRISMA Sequencer to generate the 16S rRNA sequences of bacterial species present. Sequences were analysed by comparing them with known 16S rRNA sequences using the BLASTn algorithm (<http://blast.ncbi.nlm.nih.gov/Blast.cgi>) to find the closest match in GenBank, EMBL, DDBJ, and PDB sequence data. Most similar type species that showed 97% sequence similarity with the isolates were selected as identical species (results not included).

V. RESULTS

Pollution Index (PI): The average downstream water quality downstream was compared to the average upstream water quality (**Table 2**). The Pollution Index (PI) was determined based on the ratio between downstream and upstream sample results. A PI ratio of less than 1.5 means that concentrations are less than 50% higher at the downstream site compared to upstream and these were highlighted in green. A PI ratio of 1.5 to 5 means that concentrations are between 50 and 100% higher at the downstream site compared to upstream and these were highlighted in orange. A PI ratio of above 5 means that concentrations are more than 100% higher at the downstream site compared to upstream and these are highlighted in red.

Table 2: Comparison of water quality properties Upstream (AP1) and Downstream (AP 2) Rooiwal WWTW

ANALYSIS RESULTS mg/l	AP 1 (AVE)	AP 2	AP 3 (AVE)	Pollution Index
<i>Escherichia Coliform Per/100ML</i>	364.0		2420.0	6.6
<i>Total Dissolved Solids</i>	308.0		432.0	1.4
<i>Suspended Solids</i>	4.6		46.6	10.1
<i>Conductivity (mS/m)</i>	55.2		85.7	1.6
<i>4 Hours Oxygen Absorbed</i>	3.4		13.9	4.1
<i>Chemical Oxygen Demand</i>	16.0		97.0	6.1
<i>Nitrate - NO₃ as N</i>	0.9		1.3	1.5
<i>Nitrite - NO₂ as N</i>	0.1		0.8	12.8
<i>Ortho - Phosphate - PO₄ as P</i>	0.1		1.9	34.5
<i>Chlorides as Cl</i>	38.7		60.0	1.6
<i>pH - Value (pH Units)</i>	8.2		7.8	1.0
<i>Calcium as Ca</i>	41.2		39.8	1.0
<i>Magnesium as Mg</i>	23.1		18.4	0.8
<i>Sodium as Na</i>	36.5		84.2	2.3
<i>Potassium as K</i>	6.4		13.1	2.1

The dominant highlighted colours on **Table 2** are orange and red; which indicates that the concentration of most pollutants downstream is more than 50% of the upstream concentration. Therefore the Rooiwal WWTW and surrounding activities have a significant adverse impact on the river.

Physiochemical Water Quality

The pH of the Elands River samples range between 7.8 and 8.3 (**Figure 2**). The pH of the Rooiwal WWTW effluent is almost neutral at 7.45. The EC of the Elands River water follow the same trend as the TDS; with the downstream site having higher values than the upstream sites.

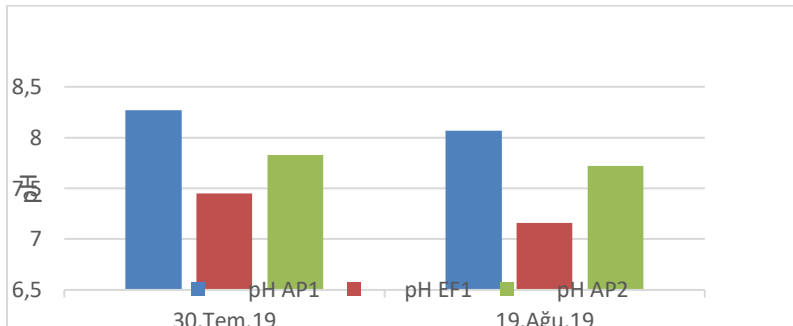


Figure 2: pH of sample sites AP1, AP2 and EF1

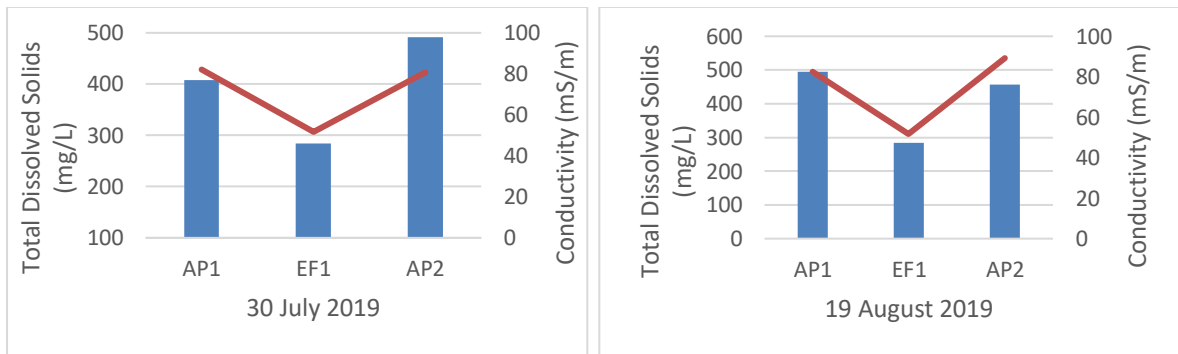


Figure 3: Physiochemical properties of sample sites AP1, AP2 and EF1

COD is a measure of organic pollution intensity. COD was higher at the downstream site. Nitrates NO_3^- follow a similar trend as the COD with higher concentrations at the downstream and the highest concentrations from the Rooiwal WWTW effluent (**Figure 3**).

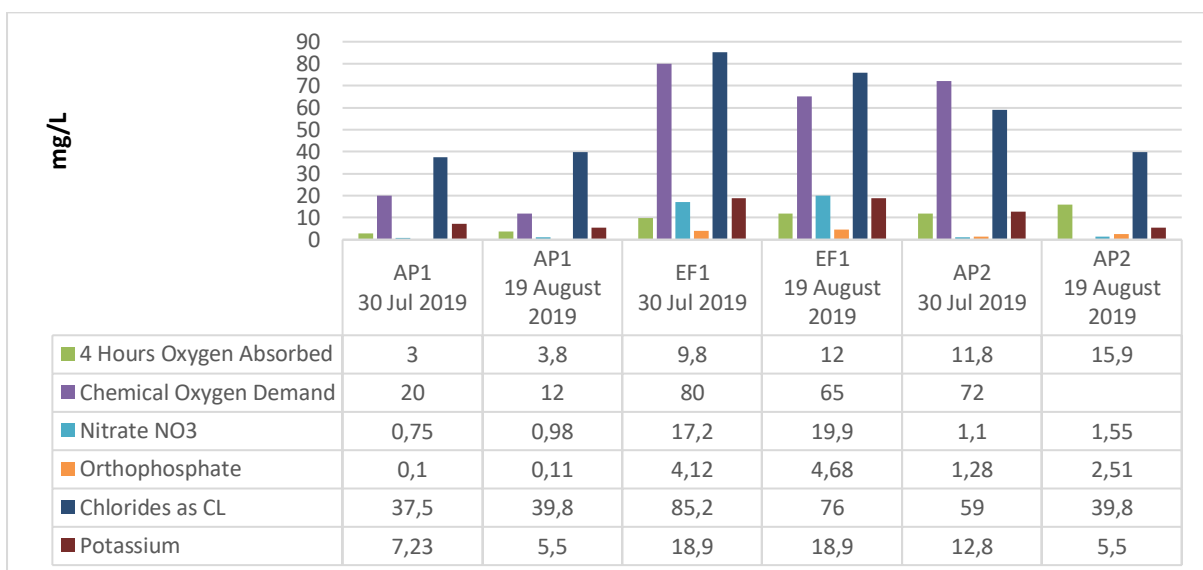


Figure 4: Chemical properties of sample sites AP1, AP2 and EF1

The average Orthophosphates PO_4^{3-} concentration of the river is 0.055 mg/L at the upstream site and 1.895 mg/L at the downstream site. Chloride and Potassium concentrations of the

river water are higher downstream to the Rooiwal WWTW and significant concentrations are observed in the effluent of the Rooiwal WWTW [3]. The physiochemical properties of Elands River water upstream (AP1) of Rooiwal WWTW complies with the SANS 241 drinking water standard. The physiochemical properties of Elands River water downstream of Rooiwal WWTW (AP2) does not comply with the SANS 241 drinking water standard due to the high concentrations of ammonia in the water which have been introduced by the effluent from Rooiwal WWTW (Figure 3).

Microbiological Water Quality

Table 3: Comparison site AP1 microbiological properties against SANS 241 drinking water standard

Date	Total Coliform Bacteria Per/100ML	API		Heterotrophic Plate Count Per 1.0 ML
		Faecal Coliform Per/100ML	Escherichia Coliform Per/100ML	
Standard Limits	≤10	NIL	NIL	≤1000
2-Jul-19	≥2420	60	41	1793
30-Jul-19	325	NIL	NIL	800
19-Aug-19	≥2420	850	687	1488

The significant difference in microbiological pollution between the samples collected upstream of Rooiwal WWTW and downstream WWTW indicates that the WWTW has an adverse effect on the river (Table 3). However due to the present of a significant amount of microbiological agents in the Elands River upstream of the Rooiwal WWTW is not the only source of microbiological pollution of the Elands River; there must be other sources of microbiological agents upstream Rooiwal WWTW. The identification test proved that the dominant bacteria in the water and sediment samples were *E. coli*. *E. coli* is normally utilised as microbial indicators for possible faecal contamination as it commonly occurs in faeces from humans and animals as reported in literature [3].

VI. DISCUSSION

Elands River Pollution at the Upstream site (AP1)

The dominant highlighted colours on the result (Table 2) are orange and red; which indicates that the concentration of most pollutants downstream is more than 50% of the upstream concentration. The presence of *E.coli* upstream (AP1) shows that there is *E.coli* pollution is not only contributed by the Rooiwal WWTW but other sources of *E. coli* pollution are also present in the area. COD is a measure of organic pollution intensity and the levels of COD range between 12 and 20 mg/l (Figure 4). These levels are fairly low and therefore correlate with the levels of *E. coli* at the site. There are no guidelines for levels of *E.coli* in aquatic ecosystems as it is not pathogenic to fish; however the presence of *E.coli* serves as an indication of human and animal waste in the river [5], [16].

There is a South African Water Quality Guidelines for Recreational use; based on the full-contact recreational guidelines the water at AP1 is unsuitable for swimming and poses a risk of gastrointestinal illnesses. Based on intermediate contact recreation this water is suitable for activities such as canoeing and water skiing [16]. The TDS of the Elands River Upstream ranges between 284 and 332; with chloride, calcium, magnesium and sodium being the most dominant elements in the water. The average Orthophosphates PO₄³⁻ concentration of the river is ranges between 0 and 0.11 mg/L at the upstream site. The values are below the hypertrophic threshold value of 0.13 mg/L; therefore, the Elands River Upstream fluctuates between the state of oligotrophication and eutrophication. The fluctuations may be as a result of variation in the flow of agricultural run-off towards the river [3]. The nitrate ranges

between 0.75 and 0.98 mg/L. Nitrates NO_3^- follow a similar trend as the COD with higher concentrations downstream.

Elands River Pollution at the Downstream Site (AP2)

There average concentration of *E.Coli* at the downstream site is 2420 mg/L. This value is significantly higher than that at the upstream site. The elevated levels of *E.coli* can be attributed to the direct input of Rooiwal WWTW effluent into the river. Based on the full contact and intermediate contact guidelines of the South African Water Quality Guidelines for Recreational use [16]. The Orthophosphates PO_4^{3-} concentration of the river is downstream ranges between 1.28 and 2.51 mg/L. The values are significantly higher than the hypertrophic threshold value of 0.13 mg/L; therefore, the Elands River downstream is hypertrophic as a result of effluent input form the Rooiwal WWTW. The Orthophosphates PO_4^{3-} concentrations of the effluent ranges between 4.12 and 4.68 mg/L due to the use of phosphate in the WWTW processes. The nitrate ranges between 1.1 and 1.55 mg/L . The nitrates levels in the effluent from the Rooiwal WWTW are also very high with an average concentration of 18.3 mg/L as a result of the use of nitric acid at the Rooiwal WWTW as according to Ekwanzala et al.. [7]

Agricultural Use of Elands River Water

According to DWAF guidelines [16], irrigation water can be grouped into three classes: pH < 6.5, pH between 6.5 and 8.4 and pH > 8.4. The Elands River water is therefore within the water quality target for irrigation; which commonly occurs both upstream and downstream. The TDS of the Elands River water ranges between 284 and 408. Literatures suggests that a TDS of less than 450 mg/L is optimum for irrigation water indicating that the water from the river is well below the threshold [12], [13]. The TDS of the Rooiwal WWTW effluent is higher than that of the river water and there is an increase in the TDS downstream due to the effluent discharge. The isolation of bacteria *E coli*, *Klebsiella pneumonia*, *Cronobacter sakazakii* and *Citrobacter freundii*; in the river water and sediment demonstrated the microbiological contamination [3], [6], [7]. Therefore, there are higher chances of exposure to these pathogens, meaning that the use of Elands River water for domestic purposes should be avoided.

Domestic Use of Elands River Water

The results shows that physiochemical components of the Elands River upstream (AP1) of Rooiwal WWTW is relatively unpolluted and complies with the physiochemical limits set out in the SANS 241 Drinking Water Standard [16]. The introduction of high concentrations of ammonia by the Rooiwal WWTW results in the downstream portion of the river being non-compliant with the physiochemical limits of ammonia that are set in the SANS 241.

VII. CONCLUSION

The Elands River is polluted both chemically and microbiologically. The pollution index of revealed that the concentration of most pollutants downstream is more than 50% of the upstream concentration. The natural source of the Elands River is the weathering of geological formations; whereas the anthropogenic sources of the Elands River are agriculture, municipal WWTW and direct deposit of waste into the river. As natural sources of pollution contributed towards chemical pollution, anthropogenic sources contributed to both the chemical as well as the microbiological pollution.

References

1. Khatri, N. and Tyagi, S., 2015. Influences of natural and anthropogenic factors on surface and groundwater quality in rural and urban areas. *Frontiers in Life Science*, 8(1), pp.23-39.
2. Páll, E., Niculae, M., Kiss, T., Şandru, C.D. and Spînu, M., 2013. Human impact on the microbiological water quality of the rivers. *Journal of medical microbiology*, 62(Pt 11), pp.1635.

3. Ferronato, C., Modesto, M., Stefanini, I., Vianello, G., Biavati, B. and Antisari, L.V., 2013. Chemical and microbiological parameters in fresh water and sediments to evaluate the pollution risk in the Reno River watershed (north Italy). *Journal of Water Resource and Protection*, 5(04), p.458.
4. Connor, R., Renata, A., Ortigara, C., Koncagül, E., Uhlenbrook, S., Lamizana-Diallo, B.M., Zadeh, S.M., Qadir, M., Kjellén, M., Sjödin, J. and Hendry, S., 2017. The united nations world water development report 2017.
5. Mateo-Sagasta, J., Raschid-Sally, L. and Thebo, A., 2015. Global wastewater and sludge production, treatment and use. In *Wastewater* (pp. 15-38). Springer, Dordrecht.
6. Abia, A.L.K., Ubomba-Jaswa, E. and Momba, M.N.B., 2015a. Impact of seasonal variation on *Escherichia coli* concentrations in the riverbed sediments in the Elands River, South Africa. *Science of the Total Environment*, 537, pp.462-469.
7. Ekwanzala, M.D., Abia, A.L.K., Ubomba-Jaswa, E., Keshri, J. and Momba, N.B.M., 2017a. Genetic relatedness of faecal coliforms and enterococci bacteria isolated from water and sediments of the Elands River, Gauteng, South Africa. *AMB Express*, 7(1), p.20.
8. Rossouw, N. and Görgens, A., 2016. *Water Quality and Water Quality Management Challenges in South Africa*. Department of Water and Sanitation, Pretoria.
9. Bolsmann, E., 2001., *Pretoria Artists' impressions, 1857-2001*, Protea Book House, Pretoria.
10. Vogel, A., 2001, April. Persistence of dieldrin and endrin in the Elands River, South Africa. In *Abstracts Of Papers Of The American Chemical Society*, 221, pp. U476-U476.
11. Abia, A.L.K., Ubomba-Jaswa, E., du Preez, M. and Momba, M.N.B., 2015b. Riverbed sediments in the Elands River, South Africa: recommending the use of both *Clostridium perfringens* and *Escherichia coli* as indicators of faecal pollution. *Journal of soils and sediments*, 15(12), pp.2412-2424.
12. Braskerud, B.C., Lundekvam, H. and Krogstad, T., 2000. The impact of hydraulic load and aggregation on sedimentation of soil particles in small constructed wetlands. *Journal of environmental quality*, 29(6), pp.2013-2020.
13. Wright, R.T. & Nebel, B.J. 2005. *Environmental Science: Toward a Sustainable Future*. Pearson Education/Prentice Hall, Upper Saddle River, New Jersey.
14. LaLiberte, P. and Grimes, D.J., 1982. Survival of *Escherichia coli* in lake bottom sediment. *Applied and Environmental Microbiology*, 43(3), pp.623-628.
15. Ferguson, D.M., Moore, D.F., Getrich, M.A. and Zhouandai, M.H., 2005. Enumeration and speciation of enterococci found in marine and intertidal sediments and coastal water in southern California. *Journal of Applied Microbiology*, 99(3), pp.598-608.
16. DWAF (Department of Water Affairs and Forestry, South Africa), 1996. *SA Water Quality Guidelines, Recreational Use*, Department of Water Affairs and Forestry, Volume 2, 1996.

CONTRIBUTION TO THE STUDY OF CONDUCTED ELECTROMAGNETIC
EMISSIONS IN STATIC CONVERTERS CONNECTED TO AN ELECTRIC
NETWORK

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Abstract

Conducted electromagnetic emissions demonstrate difficult-to-predict phenomena, particularly in a complex electrical network comprised of static converters, which are thought to be the source of these disturbances. The Electromagnetic Compatibility (EMC) behavior of a switching cell is investigated in this paper utilizing experimental and simulation experiments. A comparison of the outcomes is also provided. The shape and amplitude of the executed disturbances are significant in the propagation of disturbances to an electrical network employing a line impedance stabilization network (LISN).

The object of this paper is to investigate and describe the EMC signature of conducted EM disturbances created by static converters. The ultimate objective is to provide methods to mitigate the impacts of these disruptions to safeguard prospective victims, such as the electrical network to which these devices are attached. The results will be used in future work to improve the dimensioning of the EMC filter to be positioned at the converter's input based on the network and converter impedances.

As a result, EMI tests were conducted using the two distinct switching topologies, and mitigation measures are now in place to lower electromagnetic emissions and the sensitivity of Switch-Mode Power Supplies (SMPs). This research provides a feasible way for forecasting the EMI of a forward converter using a microelectronics switch. This study describes a technique for predicting both components (CM and DM noise).

Keywords: Electromagnetic Compatibility (EMC), Line Impedance Stabilization Network (LISN), Power Electronics Devices, Conducted Emission, EMC Modeling, Electrical Network.

**PHASE-WISE ASSESSMENT CRITERIA FOR EFFECTIVE IMPLEMENTATION
OF FINAL YEAR ENGINEERING PROJECT**

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Abstract

The final year project forms an integral part of an Engineering curriculum. Projects encourage the students to keep themselves abreast with latest developments in the hardware and software industry. It serves as a platform to enhance their practical, analytical skills and create innovative ideas in various domains.

Students tend to start the project with no clarity on its future course hence leading to improper planning or time management. Some of the problems faced due to lack of understanding of project flow are unclear goals and success criteria, no accountability, budgeting issues and unrealistic deadlines. A common problem faced by faculty members during the assessment of an academic project is that due to the heterogeneous nature of projects, it is difficult to have a standard grading criterion.

Researchers have explained the various phases of the project life cycle. Few researchers have also broadly proposed project evaluation criteria devoid of any phases. This paper outlines the project life cycle and provides phase-wise evaluation criteria. It provides a methodology to address the abovementioned issues in the system. It focuses on the different phases involved in an engineering project such as 'Project/Problem Identification Phase', 'Project Formulation and Preparation Phase', 'Project Implementation Phase' and 'Project Evaluation and Monitoring Phase'. It also highlights the evaluation criteria for each phase in the project. The paper aims to provide a roadmap for successful completion of the entire project. This ensures proper time management and guarantees the quality of the project. They also serve as guidelines for the students to understand the expected outcomes at every phase of the project. It enables the students to achieve the predefined objectives and adhere to the stipulated timeline. The evaluation criteria set a common benchmark for evaluation and thereby ensure uniformity in the project assessment. They also help faculty members to focus on the key concepts and standards that the students are expected to obtain. Some of the advantages of setting proper evaluation criteria and dividing the project flow into these four phases are: the project assessment will be efficient, consistent, objective and unbiased thereby ensuring transparency in the system.

Keywords: Project Assessment, Evaluation Criteria, Project Phases, Project Roadmaps

COMPARATIVE SIMULATION OF VARIOUS NANOCOMPOSITE CEMENT MATRIX

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Abstract

This paper explores the optimum percentage of various nanofiber in cement composites. Two types of micro Nanofibre, i.e., Graphene Nanoplatelet (GNP) and Montmorillonite Nano Clay (MNC), are used in cement composites as an alternative to macro reinforcement. These two nanofibers controls the crack growth of cementitious material at the nanoscale. As the cost of the experiment is high to reduce the cost of analysis and no of trial, some analytical simulation has been done by ANSYS 15.0 with the concept of 3D Represent Volume Element (RVE). RVE is the smallest volume over which a measurement can make that will yield a representative value of the whole. In this RVE pullout model, the GNPs and MNCs are added to the cement matrix at various concentrations (0.02%, 0.08%, 0.1%, 0.15%, 0.2%, 0.3%) by the weight of cement. After generating models, the boundary conditions and connections are set out in the simulation. Each model is analyzed individually, and the comparative results give the elastic as well as the mechanical behavior of the RVE models. The simulation revealed that the strength is enhanced by adding nanofiber, up to 0.15% and 0.2% for GNPs and MNCs cementitious material, respectively. Also, GNPs gives a better response to enhance the rheological property.

Keywords: Graphene Nanoplatelet (GNP), Montmorillonite Nano Clay (MNC), ANSYS 15.0, Represent Volume Element (RVE). Cementitious material, Rheological Property.

DETECTION OF RESPIRATORY DYSFUNCTION WITH WEARABLE SENSOR USING TINYML

Dushyant

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Abstract

According to World Health Organization (WHO), over 435 million people are directly affected by Chronic Respiratory Diseases (CRD), and over 03 million people die each year due to respiratory disorders. Chronic Respiratory Disease (CRD) is not a disease itself but an abundant group of respiratory diseases, these are COPD, Asthma, Lung Infections, Acute Bronchitis, Cold & Flu, Viral Infections (COVID-19), and various other respiratory diseases. To detect these respiratory issues at early stages, a chest belt is made with the Arduino Nano 33 BLE Sense, having built-in IMU and Microphone Sensor. From various tested sensor positions the Upper Chest is found be the highly impacted body part. Whereas standing position of subjects has better range of readings. The dataset comprises of 15 different subjects from three different age groups. Total sample size of dataset is 4500. The dataset is divided into three different classes namely Normal Breathing, Moderate Cough and Severe Cough. Machine Learning models including SVM, Random Forest, Decision Tree, KNN, GaussianNB and CNN are analyzed for best performance, with feature extraction techniques of PCA, ICA and LDA. Random Forest shown the best performance, with PCA feature extraction technique, having an Accuracy of 97.1%, Precision of 97%, Recall of 96.6% and F1-Score of 97%. The best trained Machine Learning model is deployed to Arduino Nano 33 BLE Sense using TensorFlow Lite Micro. The deployed model is just of 387.5 KB, whereas RAM utilization is of 97 KB. This makes the chest belt capable to do all the processing within the device.

Keywords: TinyML, Random Forest, CNN, IMU, PCA, LDA.

1. INTRODUCTION

In 2020, the latest estimate by World Health Organization (WHO) shows that, the Chronic Respiratory Diseases (CRD) are showing steep rise and will be a global threat in future to human health. The primarily reason behind this rapid increase in Chronic Respiratory Diseases (CRD) is Air pollution, occupational chemicals, dust, tobacco smoking, viral infections, and may also be genetic disorder [1-4]. Therefore, there is strong need of a device which should be operating on real-time and continuous data, affordable, portable, and wearable too.

Previously, different sensors like Spirometer [5-9], Microphone, Capacitive Strain Sensor, EMG Sensor and IMU Sensors are used, and different methods have been followed like Lung Sound Analysis, Computer Tomography and Breathe Analysis to achieve more and more accuracy in raw data. Many machine learning and deep learning models like Random Forest,

Decision Tree, CNN, LSTM and RNN[10-12], have been used to get more precision in results, in order to detect obstruction in breathing.

This article is organized as follows. Section 2 describes the methodology implemented and developed. Section 3 discusses the results obtained by the methodological implementation. The conclusion of the paper is given in Section 4.

2. METHODOLOGY

This research work includes the collection of dataset, testing and analyzing multiple Machine Learning models and finally implementation of best performing Machine Learning model to the Arduino Nano 33 BLE Sense, using TinyML technology, as shown in Figure 1;

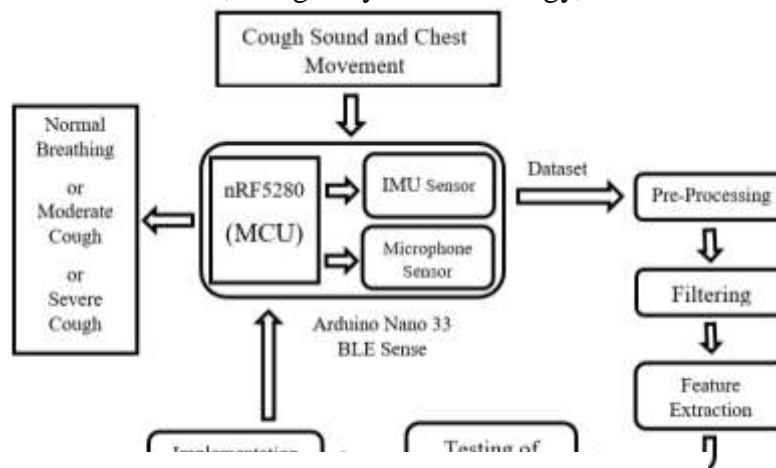


Figure 01: Block Diagram of Methodology

2.1 Pre-Processing

In this step, three different positions of human body are brought into consideration and tested, these are; Upper Chest, Lower Chest, and Abdomen. To check, which position is highly impacted, a small-scale dataset has been collected of 600 sample size. It was found that the Upper Chest is highly impacted position, due to abnormal breathing.

2.2 Dataset Collection

The dataset is collected by placing IMU Sensor (Accelerometer & Gyroscope) and Microphone Sensor, on the Upper Chest of subjects and subjects are in standing position. The dataset is collected belonging to all the three classes, The dataset is collected from 15 subjects and total sample size of dataset is 4500, it makes the 1500 sample size of each class.

2.3 Analyzing Machine Learning Models

Six different machine learning are analyzed to get better performance metrics, these are SVM, Random Forest, Decision Tree, KNN, GaussianNB and CNN. Whereas four performance metrics are used to analyze their performance, which are Accuracy, Precision, Recall, F1-Score.

2.4 Deploying Machine Learning on Microcontroller

Best performing ML model is uploaded to the Arduino Nano 33 BLE Sense using TinyML support. This is achieved by converting the model to c-code, using “micromlgen v1.1.27”.

3. RESULTS AND DISCUSSION

To analyze the Machine Learning models, the dataset is divided into, 70% for training the model, and 30% for the testing of trained model. The obtained performance metrics are summarized in Figure 2;

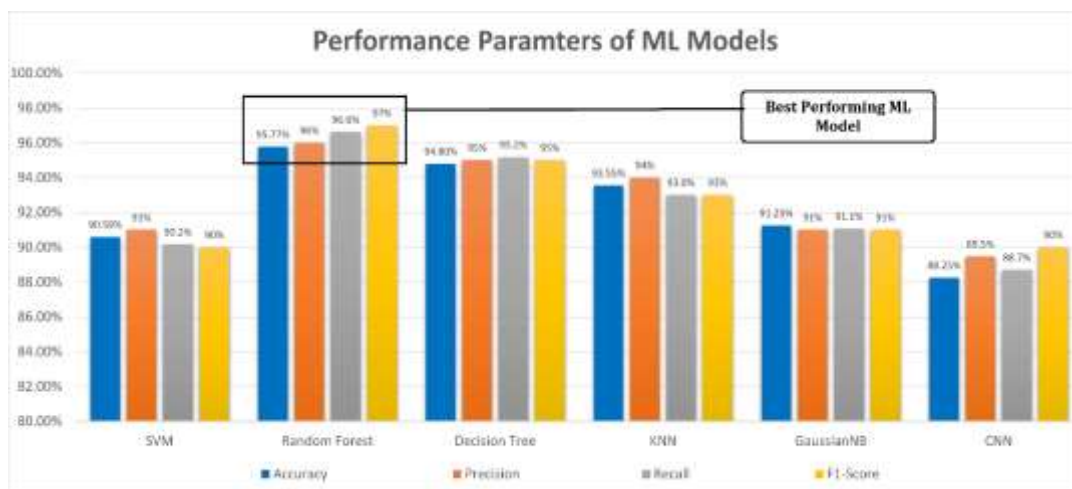


Figure 02: Performance Parameters of ML Models

It is evident from Figure 2, that Random Forest is best performing Machine Learning Model. The best trained machine learning model is deployed to the microcontroller. The overall resource utilization by trained machine learning model to Arduino Nano 33 BLE Sense is, 387.5 Kbytes of storage and 97 Kbytes RAM is utilized.

After processing the readings of both IMU (accelerometer and gyroscope) and Microphone sensor, it finally generates the results, whether person has Normal Breathing, Moderate Cough or have Severe Cough relating with COPD, Asthma, Cold & Flu and Viral infections.

4. CONCLUSION

Conclusively, Arduino Nano 33 BLE Sense, process the readings obtained from built-in IMU and Microphone sensor using TinyML and generates final results locally. In this research, the Random Forest is reported to show the best performance, with PCA feature extraction, having an Accuracy of 97.1%, Precision of 97%, Recall of 96.6% and F1-Score of 97%.

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REFERENCES

- [1] World Health Organization (WHO), “Chronic Respiratory Diseases,” *Chronic Respiratory Diseases*, Mar. 15, 2019.
- [2] E. V. Añazco, P. R. Lopez, S. Lee, K. Byun, and T.-S. Kim, “Smoking Activity Recognition Using a Single Wrist IMU and Deep Learning Light,” in *Proceedings of the 2nd International Conference on Digital Signal Processing*, pp.48–51, 2020. <https://doi.org/10.1145/3193025.3193028>
- [3] X.-Q. Jiang, X.-D. Mei, and D. Feng, “Air pollution and chronic airway diseases: What should people know and do?,” *Journal of thoracic disease*, vol. 8, pp. E31–E40, May 2016. <https://doi.org/10.3978/j.issn.2072-1439.2015.11.50>
- [4] T. Feenstra, M. van Genugten, R. T. Hoogenveen, E. F. M. Wouters, and M. Mölken, “The Impact of Aging and Smoking on the Future Burden of Chronic Obstructive Pulmonary Disease,” *American journal of respiratory and critical care medicine*, vol. 164, pp. 590–596, May 2001. <https://doi.org/10.1164/ajrccm.164.4.2003167>
- [5] M. Soliński, M. Łeppek, and Ł. Kołtowski, “Automatic cough detection based on airflow signals for portable spirometry system,” *Informatics in Medicine Unlocked*, vol. 18, p. 100313, 2020. <https://doi.org/10.1016/j.imu.2020.100313>
- [6] S. Trivedy, M. Goyal, P. R. Mohapatra, and A. Mukherjee, “Design and Development of Smartphone-Enabled Spirometer with a Disease Classification System Using Convolutional Neural Network,” *IEEE Transactions on Instrumentation and Measurement*, vol. 69 pp.7125–7135, 2020 <https://doi.org/10.1109/TIM.2020.2977793>
- [7] S. Trivedy, M. Goyal, and A. Mukherjee, “Microphone based Smartphone enabled Spirometry Data Augmentation using Information Maximizing Generative Adversarial Network,” in *2020 IEEE International Instrumentation and Measurement Technology Conference*, pp. 1–6, 2020. <https://doi.org/10.1109/I2MTC43012.2020.9129308>
- [8] A. Kaplan *et al.*, “Artificial Intelligence/Machine Learning in Respiratory Medicine and Potential Role in Asthma and COPD Diagnosis,” *The Journal of Allergy and Clinical Immunology: In Practice*, 2021. <https://doi.org/10.1016/j.jaip.2021.02.014>
- [9] J. Whitlock, J. Sill, and S. Jain, “A-spiro: Towards continuous respiration monitoring,” *Smart Health*, vol. 15, p. 100105, 2020. <https://doi.org/10.1016/j.smhl.2019.10010>
- [10] R. Ahsan, M. Hamza, H. Sheeraz, “Design and Implementation of Digital Incentive Spirometer for Monitoring Lungs Health Status”, 17ES FYP, MUET Jamshoro, 2021.
- [11] M. Chu *et al.*, “Respiration Rate and Volume Measurements using Wearable Strain Sensors,” *Digital Medicine*, May 2019. <https://doi.org/10.1038/s41746-019-0083-3>.
- [12] A. Cesareo, E. Biffi, D. Cuesta-Frau, M. D’Angelo, and A. Aliverti, “A novel acquisition platform for long-term breathing frequency monitoring based on inertial measurement units,” *Medical & Biological Engineering & Computing*, vol. 58, May 2020. https://doi.org/10.1007/978-88-470-2916-3_5

**SOLUTION OF TWO-COMPONENT POPULATION BALANCE EQUATION FOR
SIMULTANEOUS GROWTH AND AGGREGATION BY ADOMIAN
DECOMPOSITION METHOD**

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Abstract

Many separation processes were modeled using the population balance equation. In literature several numerical methods were proposed to solve this complicated equation, because its analytical solutions are available in very few cases. In this work we used a semi-analytical method called the Adomian decomposition method to solve two-dimensional population balance equation involving growth and aggregation with assuming that the aggregation kernel is constant and the growth rates are linear, we got the number density function and the first four moments of particle size, its solutions were compared with existing exact solutions. The obtained results are very approximate to the analytical solution for number density function and moments. Adomian Decomposition Method is a powerful mathematical tool for solving two-component population balance equation.

Keywords: Population balance equations, aggregation, growth, Adomian Decomposition Method.

**DOES ECONOMIC POLICY UNCERTAINTY INFORMATION PASS ON THE
STOCK MARKET VOLATILITY**

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Abstract

This research examines the role of economic policy uncertainty (EPU) on the Pakistan stock market volatility using the GARCH–MIDAS model. The economic policy uncertainty indexes include the local EPU index for Pakistan and indexes for bilateral global partner countries US, China, and the UK. We find several outcomes. First, our out-of-sample findings show the US economic policy uncertainty index is a more powerful predictor of Pakistan stock market volatility. Second, the EPU index for the UK is also a valuable predictor to estimate the stock market volatility. Surprisingly new local EPU index for Pakistan and EPU index for China is not helpful for stock market volatility estimation. Moreover, we find the combination forecast information is also useful for volatility estimation. Further, we find evidence during the Covid-19 pandemic. We find identical findings even during the pandemic, the EPU index for the US is a more powerful predictor among all indexes, and EPU for the UK is also valuable for forecasting stock market volatility. Our findings are robust in alternative forecast horizons like two month and three estimation windows and alternative estimation method MCS test. The study provides valuable information to investors and policymakers. They must consider the global economic policy uncertainty in investment decisions and stock market volatility estimation. Also, during high uncertainty period, stock markets are more volatile, so to reduce the impact of uncertainty, the government and policymakers should consider global uncertainty.

Keywords: Economic policy uncertainty, Stock market volatility, GARCH-MIDAS Model

**THE MODERATING ROLE OF ENTERPRENEURIAL ORIENTATION IN THE
EFFECT OF ANTECEDENTS ON EXPORT PERFORMANCE OF TEXTILE AND
GARMENT EXPORTING ENTERPRISES IN ETHIOPIA**

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Abstract

The objective of this study is to examine managerial, organizational and environmental resources on export performance of Medium and large scale Textile and Garment Enterprises in Ethiopia. Data was collected from 252 Medium and Large scale Textile and Garment Enterprises managers in Ethiopia and then were analyzed by smart PLS-SEM 3 software and the findings of the study indicate a significant positive relationship between managerial resources, organizational resources, environmental capabilities and entrepreneurial orientation on export performance of Medium and Large scale Textile and Garment Enterprises. In addition, the results of the study validate that entrepreneurial orientation moderates the relationship between managerial resources, organizational resources and environmental capabilities on export performance of Medium and Large scale Textile and Garment enterprises in Ethiopia. This study implications for policy makers, government, and Medium and Large scale enterprises owner-managers to look at government support policy as it affects Medium and Large Scale Enterprises export performance by providing conducive environment for business operation success in international business.

Keywords: Textile and Garment Enterprises, Medium and Large Scale, Export Performance, Ethiopia

HOLISTIC MARKETING IN SENDING MESSAGES BY ARTS

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Abstract

The paper present theoretical and practical aspects of holistic marketing in sending messages by arts. Focus of the paper is on developing theoretical aspects of holistic marketing in sending messages by arts. The theoretical part of the paper is based on modern literature in the field of holistic marketing approach in arts. The key hypothesis of the paper is that holistic marketing is platform for arts sending messages, thoughts, ideas that otherwise could be unnoticed. In that way, it is important to improve strategies of holistic marketing, in order to raise awareness about arts messages and to support arts projects. The special aspect of the paper are strategies of holistic marketing as base for marketing strategies in arts institutions. In the empirical research the paper will present case studies about implementation of holistic marketing in sending messages by arts. The empirical research will include results of questionnaire research about perception of arts messages in public audience. The research in the paper will be qualitative and quantitative. The empirical research will analyze impact of experience marketing, emotional marketing and traditional social marketing strategies in raising awareness about arts messages. In the case studies the paper will present good examples of marketing in raising awareness about arts messages. The paper present modern ways of development of arts institutions. The paper will analyze impact of social media on raising awareness about arts messages. Presented case studies are: Museum Louvre, Museum Tate Modern, Exhibition "Loving Vincent", about work and life of Vincent Van Gogh, exhibition "500 years of genius", about work and life of Leonardo de Vinci, examples of impact of literature in arts messages, examples of impact of movies in arts messages, examples of opera, ballet and modern dance in arts messages and examples of impact of music in arts messages. The paper will present in-depth interviews with artists and arts managers about impact of social marketing in sending messages by arts.

Key words: Holistic marketing, marketing strategies, arts, arts messages.

**LINKAGES BETWEEN STOCK MARKETS IN SOUTHERN AFRICA CUSTOM
UNION BEFORE AND DURING COVID-19 PANDEMIC**

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Abstract

The nature of volatility linkage between international markets are important to successful risk management, market regulation and portfolio hedging strategy. This study employs correlation analysis and BEKK specification of multivariate Generalized Autoregressive Conditional Heteroscedasticity (MGARCH) model to evaluate the linkage between stock markets in Southern African Custom Union (SACU) before and during Covid-19 pandemic. Results from before-COVID-19-period suggests that Eswatini stock market is not related to any stock market in the SACU; Botswana and Namibia stock markets exhibit weak relationship; but South Africa and Namibia stock markets are strongly linked. Conversely, the results from COVID-19-pandemic-period evince very strong bidirectional volatility spillover between SACU stock markets. Overall, the study indicates existence of increased linkage between Botswana, Namibia and South Africa stock markets during the COVID-19 pandemic period. The results have important policy implications for investment policy-making and risk sharing opportunities in the SACU.

Key Words: regional stock market linkages, COVID-19 pandemic, South Africa Custom Union

TOWARDS THE DEVELOPMENT OF THE CONCEPT OF SUSTAINABLE
PROJECT MANAGEMENT

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Abstract

The goals of sustainable development are the answer to the problems of the modern world. The assumptions of the concept of sustainable development and the triple bottom line are becoming closer and closer to many organizations and support them in the development of longterm strategies. Additionally, modern companies decide to modify their existing organizational models and achieve goals through projects. There is a very dynamic development in the field of project management in terms of approaches and methodologies, certification systems, standards and models.

The main purpose of this paper is to present the results of in-depth literature analysis according to the concept of sustainability in project management and scientists recommendations for further research directions. The research concerned scientific articles published in the Scopus database over the last 10 years. The criteria for the selection of articles were keywords: "sustainable project management" and "sustainability in project management". The number of analyzed articles was 65. In-depth analysis included 22 most cited articles devoted to the issue of sustainability in project management.

The research results provided information on the main research areas that the authors of the analyzed papers dealt with. Among them, the following stand out in particular: sustainability in project management processes; project risk management in the light of sustainability; success factors in sustainable project management; role of the project manager in sustainable project management.

The author of the study, based on an in-depth analysis of keywords, main conclusions and further research directions, has formulated three areas in which research in the field of sustainable project management should be developed and expanded. Withse findings, it is suggested to conduct future research taking into account the organizational, methodological and problematic recommendations. The organizational ones mainly concern the research subject, the methodological ones refer to research methods and the selection of the research sample, while the problematic ones describe a wide range of topics that should be explored in the context of sustainable project management.

The study was financed from the subsidy granted to the Cracow University of Economic.

Keywords: sustainable project management, sustainability in project management, research directions.

**BREAKING GLASS-CEILING FOR WOMEN USING VERTICAL TIES: EVIDENCE
FROM INDIAN GARMENT MANUFACTURING ***

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Abstract

Large manufacturing factories in developing countries majorly rely on referrals for screening workers for managerial roles because the non-referral screening process is quite costly in real production time. Using Indian garment manufacturing factory setup, we theorize knowledge acquisition and signalling model to show that referral-based hiring creates barriers for historically disadvantaged groups. However, a separating equilibrium may exist where group with higher cost of establishing vertical ties signal their suitability. We test these predictions by using unique and novel data from Indian garment manufacturing factories where women acquire only 0-15% of monitoring roles and 60-90% of blue-collar jobs. We overcome data challenge by presenting existing intermediate managers with hypothetical situations and strategically priming gender identity to create a sample of employees with a higher probability of promotion. We include workers with lower probability of promotion through randomization at production line level to create a total sample of 1098 workers. We find that women are less likely to be referred for high-valued managerial roles but not for horizontal level promotions. In short run, women can break this 'glass ceiling' by engaging in informal interactions with a greater number of seniors (who are mostly men), i.e., having larger vertical networks. Cultural barriers like strict cross gender interaction make the cost of establishing vertical ties higher for women as compared to men and therefore it serves as a valid signal for suitable women. We further contest that only suitable women incur this cost as they have higher expected gains from vertical ties. Thus, management can devise specific policies where male intermediate managers specifically mentor more women workers to address gender disparity at managerial levels.

Keywords: workplace ties, gender, referrals, garment manufacturing, India

JEL Classification: D22, D91, M510, M540, Z130

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**THE STRATEGIC MANAGEMENT ISSUES AND CSR PRACTICES IN GEORGIA
DURING COVID PANDEMIC**

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Abstract

The concept of corporate social responsibility has been debated since the 1950s. Corporate social responsibility is an essential element of a company's strategy and it covers issues such as responsible relationships with employees, customers, and local communities as the fundamental idea of this concept is that business companies have a responsibility for their impact on society, the natural environment, and national economy.

It is obvious that the COVID-19 Pandemic has had important impacts on business companies and society _ this pandemic is putting CSR to the test, and many companies are changing models, products, and even services.

On the other hand, COVID-19 Pandemic represents not only an enormous challenge but also significant opportunities for companies. Many companies try to consider several critical issues in the field of strategic management and also make decisions on how to integrate CSR into the company's strategy. Although, the COVID-19 Pandemic has had a positive impact on business as it encourages change and diversification. Sustainability and social responsibility have gained a remarkable role in the strategic management of several companies.

The main goal of this article review is to identify the primary peculiarities of CSR in Georgia and analyze the main factors that influence CSR practices in Georgia during Covid Pandemic.

According to the empirical studies, the first most common determinant is organizational characteristics as the companies' level of CSR engagement depends on factors such as size and profitability _ larger companies are more likely to engage in CSR activities.

We can conclude that the implementation of CSR strategies could deliver benefits to the organizations by improving corporate image and reputation, consumer loyalty, and gaining a competitive advantage. However, it says challenging for companies to reshape their business models and develop CSR strategies in order to address a social issue, and also provide the company with some business benefits.

Keywords: strategic management, corporate social responsibility, sustainable development, COVID-19 Pandemic, Georgia.

INTRODUCTION

COVID 19 Pandemic is a big challenge for small and large companies in all industries. Companies face additional challenges and try to redesign business models and respond to

crises. On the other hand, looking at the positive impacts of Covid -19, there is pressure to enable more agile business management model and pay more attention to sustainable development goals (SDG).

A key factor for business management is the assessment of financial situation of companies. Nowadays, it is essential to monitor the liquidity crisis, which is closely linked to corporate crises. The role of strategic managers is to maintain the good financial performance of companies they showed in the past. In the current period, this will be relatively difficult because the loss of orders will certainly lead to reduction in sales and thus will lead to a reduction in the achieved profit of companies. MSMEs were struggling with shortages of raw material and machinery equipment underweight of transport disruptions, travel restrictions and reduced production activities of their international supplies. Reduced productive capacity and around 27% of MSMEs surveyed scaled down production due the lack of raw material and machine equipment, and another 11% suspended production altogether (UNECE, 2020).

IMPORTANCE OF STRATEGIC MANAGEMENT DURING CRISES

Strategic management is a relatively new concept in the field of management and therefore there are various differences in its theoretical and practical fields. Strategy is the result of an analytical and systematic process and the main issue is the adaptation and interaction of internal conditions with the external conditions of company (Mobin, F.A., Qanet, J., Nabeel, M.D., Abdi, R., 2021).

Strategic management involves the formulation and implementation of the major goals and initiatives taken by a company's top management on the behalf of owners, based on consideration of resources and assessment of internal and external environments in which the organization competes (Karthikeyan, c., 2020).

A strategy is typically a higher level, broad goal, without a lot of specifics. It is a long-term in nature. It provides the direction that organization wants to move towards to be more successful. New or revised strategies may be developed as a result of changes in the business environment, such as what happened during the Covid- 19 pandemic (Kennedy, R., 2020).

When an organization has a long-term purpose, articulated in clear goals and objectives, and these goals and objectives can be rolled up into a coherent plan of action, then we would say that organization has a strategy. Strategic management is the body of knowledge that answers questions about the development and implementation of good strategies. Companies Mission and vision statements play three critical roles:

- a) Introduce the purpose of the organization to stakeholders. Mission and vision provide a vehicle for communicating an organization's purpose and values to all key stakeholders. Stakeholders are those key parties who have some influence over the organization or stake in its future.
- b) Inform about strategy. Mission and vision create a target for strategy development. That is, one criterion of a good strategy is how well it helps the firm achieve its mission and vision. To better understand relationship among mission, vision, and strategy, it is helpful to visualize them collectively as a funnel. At the broadest part of funnel, you find inputs into the mission statement.
- c) develop the measurable goals and objectives by which to gauge the success of the organization's strategy. Mission and vision provide a high-level guide, and the strategy provides a specific guide, to the goals and objectives showing or failure of the strategy and satisfaction of the larger set of objectives stated in the mission (Carpenter, M., Bauer, T., Erdogan, B., 2012).

A well formulated business strategy is one that makes possible to build a competitive advantage over other firms during the crises and achieve sustainable development goals. In view of the fact that uncertainty and risk play an important role in the development of many companies. Thus, uncertainty and risk are treated as two of the key determinants of the activity of enterprises, regardless of their activity profile or size, and therefore they should be analyzed broadly in the context of strategic management and CSR (Jedunak, P., Bak, S., 2021).

SOCIAL RESPONSIBILITY AND BUSINESS ETHICS DURING CRISIS.

Managers can manage ethical lapses and social irresponsibility by being strong ethical leaders and by protecting employees who raise ethical issues. The example set by managers has a strong influence on whether employees behave ethically. Ethical leaders also are honest, share their values, stress important shared values, and use reward system appropriately. Managers can protect whistle-blowers (employees who raise ethical issues or concerns) by encouraging them to come forward, by setting up toll-free ethics hotlines, and by establishing a culture in which employees can complain and by seeking out opportunities to improve society by using practical, innovative, and sustainable approaches. Social entrepreneurs want to make the world a better place and have a driving passion to make that happen. Businesses can promote positive social change through corporate philanthropy and employee volunteering efforts (ERASMUS, 2015).

CSR has become a commonly used concept referring to the process by which organizations describe their commitment and contribution to society through the management of economic, social and environmental impacts of their operations. As a dynamic concept, CSR continues to grow in importance and significance of the context in which it occurs.

Over last decade, societal issues have been increasingly considered by various stakeholders when making decisions. In response, firms have started to implement CSR initiatives to meet society's demands. In fact, debates around CSR have been developed to focus more on its operationalization, motives and strategies than on concept itself. Actually, by definition CSR refers to the moral conviction according to which firms have a moral duty towards society in which they operate. In the light of moral perspective, CSR is therefore driven by intrinsic motives such as moral rules and personal values considering CSR as an end rather than mean (Hamza, S., Jarboui, A., 2020).

Already with clearer picture of what CSR is about, there are still some terms that needed to be defined in order to continue with the development of ideas. Companies should take account different perspectives according to their needs to take choosing appropriate strategies for it is necessary to know the different theories that help to understand the organization in its different edges. Since the efforts of CSR are often counterproductive for two reasons: first, independent on each other and second, companies are pressured to adopt social responsibility practices in a generic way without giving them an opportunity to adopt the practices in an organic way and more appropriate for their individual strategies (Ray, N., Bag, A., 2022).

During a critical period like the Covid 19 pandemic disaster filled with fear and uncertainty, the people worldwide are strongly committed to working together and supporting each other in every way possible; however, the business communities are not exceptional. They should endure various initiatives to help their employees, customers, and communities during this crisis period through the diversified CSR programs as they did before (Mahmud, A., Ding D., Hasan, M., 2021).

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CSR IN GEORGIA DURING COVID PANDEMIC**

Corporate Social Responsibility in Georgia is a relatively new area and form of a dialogue between the state, business, and society. In Georgia, CSR started coming into being only at the beginning of the 21st century. There are several networks and platforms in Georgia aimed to promote CSR development, uniting business and stakeholders.

- a. Global Compact Network Georgia (GCNG). Global Compact Network Georgia (GCNG) was the first official dialogue platform for business, investors, civil society, labor organizations, local government. Compact Network Georgia (GCNG). Is a local branch of UN Global Compact platform and aims to establish principles of human rights, labor, environmental-protection, and anti-corruption in the business sector and encourages business to take actions to advance societal goals. From 2020 to 2022 these extraordinary events made it easier for companies and countries to continue to deliver on our sustainability goals, in particular as a consequence of substantial reduction to our environmental impact. The Global Compact's The Risk Advisory Group rolled out their hybrid working policy and have visibility into what business practices will look like for the foreseeable future and challenge for 2022 will be to ensure that we continue to improve against the set of principles provided by the UN Global Compact (Global Compact, 2022).
- b. Global Pro Bono Network Georgia. Global Pro Bono Network was established in 2013. Currently, the network unites 57 organizations from 34 countries and keeps expanding each year. Members of Network meet annually at Global Pro Bono Network Summits aimed at sharing experience among Network members and planning action strategies. The Centre for Strategic Research and Development of Georgia joined the Global Pro Bono Network in 2016 (<https://probonogeorgia.ge/en/global-network>).
- c. American Chamber Of commerce in Georgia (AmCham). American Chamber Of commerce in Georgia (AmCham) is the largest international business chamber in Georgia with up 200 company members. AmCham's primary objective id to promote US-Georgia ties and the improvement of the business environment in Georgia. AmCham do this by working with government to help shape improvements in the business regulations, facilitating connections between Georgian and international investors and by supporting business and government links (<https://www.amcham.ge/committees.php?pg=3002>).
- d. ICC Georgia. The National Committee of the International Chamber of Commerce is the largest and most vocal global Business Association. It includes over 350 corporate and youth members and 27 business associations. The chamber was officially established in 2002 as the Georgian chapter of International Chamber of Commerce. Since taking office in early 2008, ICC Georgia's selected board of directors has been extremely active and dedicated to improving business and investment climate in country (<https://icc.ge/index.php/icc-georgia/>).

The study of "The influence of Covid 19 on Corporate Social Responsibility in the business sector in Georgia" was conducted by Innova LLC on behalf of Global Compact Network Georgia with the support from the Swedish Government and from the United States Agency for International Development (USAID) in the framework of the East-West Management Institutes (EWMI) ACCESS project. The study shows that the despite the challenges posed by the pandemic, the situation in terms of corporate social responsibility has not deteriorated significantly, furthermore, there is still small progress in this direction (Global Compact Network Georgia 2020).

In addition, it appears that the most companies operating in Georgia do not have a specific budget and separate structural units/managers allocated to corporate social responsibility. Exception being: large financial institutions, hotels, shopping malls, construction companies, and local branches of international companies (Global Compact Network Georgia 2020).

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Restrictions imposed in the beginning of Pandemic had a great impact on economics of country. Tourism, retail, transport and construction sectors were especially affected. Economy of Georgia has been reduced by 6,2% during 2020. The decrease of GDP, on its turn, has led to a reduction in the number of employees in affected sectors. Deterioration of labour rights, significant increase of discriminatory approaches and refusal to negotiate with employees have intensified social crisis (Georgian Trade Union, 2021).

The newest research “Protection of social and economic rights in Georgia” shows that one of the main challenges during the Covid Pandemic is an effective reflection of principles of human rights and freedoms in legal acts. This problem results in an unfavorable situation of the population in terms of rights, which is directly related to the social, economic and cultural life of population/society (Tavartkiladze, M., Phirtskelashvili, A., Shaburishvili, SH., 2022).

In addition, Covid Pandemic has brought to the surface already existing problems of the Georgian labour market and has become a trigger for large-scale violations of labour rights (Social Justice Centre, 2021).

CONCLUSION

Unfortunately, the Covid-19 Pandemic has hit the business companies hard, with unexpected effects and many of them have been forced to temporarily close, often falling into permanent closure due to local government policies and rules that restrict business activities.

According to the empirical studies, the first most common determinant is organizational characteristics as the companies' level of CSR engagement depends on factors such as size and profitability _ larger companies are more likely to engage in CSR activities.

We can conclude that the implementation of CSR strategies could deliver benefits to the organizations by improving corporate image and reputation, consumer loyalty, and gaining a competitive advantage. However, it says challenging for companies to reshape their business models and develop CSR strategies in order to address a social issue, and also provide the company with some business benefits. This is a challenging time for business companies in Georgia but as always with challenges come opportunities for even greater development.

REFERENCES

- Carpenter, M., Bauer, T., Erdogan, B., 2012. Management Principles.
ERASMUS + Strategic partnership for youth, 2015. Business Management and Organization.
Georgian Trade Union, 2021. Impact of Pandemic on the Labour Market and Employees Positions.
Global Compact, 2022. The Risk Advisory Group.
Global Compact Network Georgia 2020. “The influence of Covid-19 on corporate social responsibility in the business sector in Georgia”. Quotative Research.
Global Compact Network Georgia 2020. The influence of Covid-19 on corporate social responsibility in the business sector in Georgia”. Qualitive Research.
Jedunak, P., Bak, S., 2021. Risk Management in crisis. Winners and losers during the Covid-19 Pandemic.
Mahmud, A., Ding D., Hasan, M., 2021. “Corporate Social Responsibility: Business Responses to Coronavirus (COVID-19) Pandemic”, SAGE Open.
Mobin, F.A., Qanet, J., Nabeel, M.D., Abdi, R., 2021, “Comparative Study of Strategic

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EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

Management Schools (Prescriptive, Descriptive and Integrated)". Open journal of management

Kennedy, R., 2020, Strategic Management.

Karthikeyan, C., 2020. Advances in Strategic Management.

Ray, N., Bag, A., 2022. Business Management.

Social Justice Centre, 2021. Labour inspection service assessment.

Tavartkiladze, M., Phirtskelashvili, A., Shaburishvili, SH., 2022. "Protection of social and economic rights in Georgia". Quotative Research.

United National Economic Commission for Europe (UNECE), 2020. The impact of Covid-19 on trade and structural transformation in Georgia.

<https://probonogeorgia.ge/en/global-network>

<https://www.amcham.ge/committees.php?pg=3002>

<https://icc.ge/index.php/icc-georgia/>

ATTITUDES OF STUDENTS IN THE CONTEXT OF DIGITAL COMPETENCES
AND DISTANCE LEARNING

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Abstract

The Covid-19 pandemic has made distance learning the subject of many scientists. The development of information technology determines that students increasingly use tools and techniques that support the traditional learning process. Access to a computer and the Internet and the possibility of quick access to sources of knowledge influence the behavior and attitudes of young people towards education.

The aim of this paper is to present the results of research in the field of students' attitudes towards distance learning and digital competences. The presented research results are the result of scientific research conducted by the University of Economics in Krakow as part of the Regional Excellence Initiative program.

The main aim of the study was to evaluate the introduction of information technology-based tools to the education process. One of the aims of the detailed study was to investigate how students' attitudes are shaped in the following aspects: online courses, independent learning with the use of the Internet, the need for self-training and education in adulthood, preferences for placing teaching materials on the Internet, and assessing the impact of digitization on the economy.

In the analysis of the research results, students' answers to the questions concerning the above-mentioned aspects were taken into account. The survey was conducted at the turn of 2019 and 2021 among 310 high school students.

The results indicated that: 40% of the respondents did not like to use courses and trainings posted on the Internet; over 80% of respondents use the Internet for self-study; as many as 91% of students declare their willingness to educate and train in adulthood. Moreover, 63% of the respondents confirmed their preferences regarding the publication of learning materials on the Internet. It is also important that high school students see the positive impact of digitalisation on the economy.

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Keywords: students, high school, education, information technology, attitudes

WHERE ARE INDIAN WOMEN?

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Abstract

For the first time the fifth National Family and Health Survey (NFHS) in 2021 carried out by found India now has 1,020 women for every 1,000 men. India is one of the world's largest country where 1.4 billion people live and more than half of these are women. Hence women's participation should have an effect on India's development. This study would focus on women participation in education and female labour force participation. This study would also measure the role of women and their relationship with the Human Development Index (HDI). An effective resource allocation towards women might be the key for India to reach higher living standards. It is undeniably a question of real resource allocation because women in India don't enjoy the same freedoms and rights as men which will clearly affect the country's resource allocation and the HDI. For the research methodology this study would be using correlation between education in women and HDI in India with the help of SPSS programme. This study believes that female labor force participation has a negative effect on HDI according to my data. HDI would decrease when the female labor force participation increases. This study also shows that Female participation has a positive effect on HDI.

Keywords: Women, Development, Education, Labor force, HDI

**IMPACT OF HEALTH INDICATORS ON ECONOMIC GROWTH: APPLICATION
OF ARDL MODEL ON PAKISTAN'S DATA SET**

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Abstract

Health plays a vital role in the growth. The study examined the effect of health indicator on the growth of Pakistan. ARDL model is used to check the growth rate which is affected by the health by using the time series data of Pakistan from 1990 to 2017. Health indicator, fertility rate, life expectancy, foreign direct investment, and infant mortality rate are variables. Where the unit root is applied to check the stationarity of the model. consequences find a significant relationship between GDP, foreign direct investment, fertility rate and life expectancy in the short run, whereas mortality rate effected negatively to economic growth but have significant values. In the long run foreign direct investment (FDI) and fertility rate(FR) have significantly influenced the GDP. The results show that economic growth is positively stimulated by most of the health indicators. The study accomplishes that, nations can achieve a high level of economic growth by increasing wellbeing human capital.

Keywords: economic growth, Health expenditures, fertility rate, human capital, life expectancy, foreign direct investment, and infant mortality rate

**ANALYSIS OF THE PEDAGOGICAL EDUCATION QUALITY IN HIGHER
EDUCATION ON THE PROFESSIONAL TEACHER STANDARD BASIS**

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Summary

In order to differentiate the quality of teacher education in higher educational institutions, the "secondary school Teacher" areas of work specified in the "professional standard of a teacher" are guided. The number of hours (ESTS) of compulsory pedagogical disciplines and pedagogical practices studied in the specialties of the direction of education of the Kazakh national women's pedagogical University was calculated and verified. The subjects studied are selected from the working curriculum for educational programs of specialties on the University's website and are listed in the schedule. In addition, a comparative description of the compliance of training results in pedagogical disciplines with the professional standard is compiled and expert judgments are given.

Keywords: professional standard of a teacher, pedagogical education, pedagogical disciplines, professional activity of a teacher, examination of the quality of education

Түйін

Жоғары оқу орындарында педагогикалық білім берудің сапасын саралау мақсатында «Педагогтің кәсіби стандартында» көрсетілген «Орта мектеп мұғалімі» еңбек қызметінің бағыттары басшылыққа алынған. Қазақ Ұлттық қыздар педагогикалық университетінің білім бағыты мамандықтары бойынша оқылатын міндетті педагогикалық пәндер мен педагогикалық практикалардың сағат саны (ECTS) есептеліп, салыстырылған. Оқылатын пәндер мамандықтардың университет сайтындағы білім беру бағдарламалары бойынша жұмыс оқу жоспарынан алынып, кестеге түсірілген. Сонымен қатар, педагогикалық пәндер бойынша оқыту нәтижесінің кәсіби стандартпен сәйкестілігіне салыстырмалы сипаттама жасалып, сараптамалық пайымдаулар берілген.

Түйін сөздер: педагогтің кәсіби стандарты, педагогикалық білім, педагогикалық пәндер, педагогтің еңбек қызметі, білім сапасын сараптау

Резюме. В целях дифференциации качества педагогического образования в высших учебных заведениях руководствуются направлениями трудовой деятельности «Учитель средней школы», указанными в «профессиональном стандарте педагога». Подсчитано, сверено количество часов (ECTS) обязательных педагогических дисциплин и педагогических практик, изучаемых по специальностям направления образования Казахского национального женского педагогического университета. Изучаемые дисциплины выбраны из рабочего учебного плана по образовательным программам специальностей на сайте университета и занесены в график. Кроме того, составлена сравнительная характеристика соответствия результатов обучения по педагогическим дисциплинам профессиональному стандарту и даны экспертные суждения.

Ключевые слова: профессиональный стандарт педагога, педагогическое образование, педагогические дисциплины, трудовая деятельность педагога, экспертиза качества образования

INTRODUCTION

In addition to the Entrepreneurs National Chamber Board Chairman's Order of the Republic of Kazakhstan "Atameken" dated 8 June 2017 No. 133, the "Professional standard of a teacher"¹ [atameken.kz] was presented. "The professional standard of the teacher" is intended for the formation of educational programmes, including training of employees of educational organisations and certification of graduates, employees of educational organisations.

Pedagogical activity is not the influence of people on each other, it is their interaction. Therefore, the form of pedagogical activity is the pedagogical process, and the learner moves from a form of influence to a subject of activity. The "Professional standard of a teacher" emphasises the value of the teaching profession. It is also noted in the "classifier of training areas of higher and postgraduate education"² [adilet.zan.kz] and in "In the state mandatory standard of Higher Education"³ [online.zakon.kz] that the complexity of a teacher's work depends on his/her classification into a profession or occupation of the "human - human". Teaching is not a direct action of one person on another person but their interaction.

Therefore, the pedagogical process is considered as the form of action of a teacher, and a student or pupil passes from an object of action to a subject of action. Based on this, pedagogical professional values were defined: respect for the learner's personality, rights and freedoms; tolerance for different beliefs, worldviews and traditions; openness to multiculturalism; flexibility, adaptability, empathy; understanding the values of personality and language and communication; self-education, analytical and critical thinking skills; communication and language skills; cooperation skills, conflict-resolution skills.

MAIN PART

Having studied the "profession card" in the professional standard, we found out that in the professional work activity the acquired knowledge and skills are systematised in the speciality of education, for which the university acts as a secondary school teacher in pedagogical education. The scope of a teacher's work activity is wide, taking into account all fields of educational organisation, from kindergarten teacher to university lecturer and educational manager, the level of knowledge and business skills of teachers-specialists, personal and professional competences are regulated by the work activity. This has been formed into a special table.

¹ Professional standard of the teacher. - Atameken. atameken.kz › content › files PS Pedagog_kaz

² On approval of the Classifier of areas of training of personnel with higher and postgraduate education <http://adilet.zan.kz/rus/docs/V1800017565/info>

³ State mandatory standard of Higher Education (with amendments and additions from 05.05.2020))https://online.zakon.kz/Document/?doc_id=35617396#pos=0;99.19999694824219

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Table 1. Areas of work for "Secondary school teacher" in the professional teacher standard

PEDAGOGUE. SECONDARY SCHOOL TEACHER				
Level of professional education - bachelor, specialist				
WORK EXPERIENCE				
1) teaching	2) education	3)metadological	4) investigation	5) communication skills
disseminates learning information, teaches how to read independently	engages learners in a system of social values	provides methodological support for the educational process	the first time a person has a child, the second time he or she has a child	the following are examples of the following: the following
Capacity and skills				
Education				
Personal and professional competence				

After studying the experience of analyzing the quality of pedagogical education in higher education on the basis of professional standards of teachers, the Kazakh National Women's Pedagogical University, which has worked for many years, adjusted the number of hours of compulsory pedagogical disciplines and pedagogical practice (ECTS) preferred. Disciplines are taken from the working curriculum of educational specialties on the university website and tabulated. For comparative purposes, the number of pedagogical disciplines and pedagogical practice of each specialty and the semester in which it is taught were taken into account.

Table 2. Pedagogical disciplines and pedagogical practices in the field of education

No	Specialty	2- semester	3- semester	4- semester	5- semester	6- semester	7- semester
1	5B010600 – Music education 227 ECTS		Pedagogy (5 ECTS)			Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)
2	5B010800 – Physical education and sports 240 ECTS		Pedagogy (5 ECTS)	Pedagogy of physical education (3 ECTS)		Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)
3	5B01090 – Mathematics 248 ECTS		Management in education (3 ECTS) Pedagogy(5ECTS)	Тәрбие жұмысының теориясы мен әдістемесі (3 ECTS)		Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)
4	5B011000 – Physics 259 ECTS		Peagogy (5ECTS) Management in education (3ECTS)	Theory and methods of educational work (3ECTS)	N	Pedagogical internship (5 ECTS)	Pedagogical internship (3ECTS)
5	5B011100 informatics 253 ECTS		Pedagogy (5ECTS) Management in education (3ECTS)	Theory and methods of educational work (3ECTS)		Pedagogical internship (5 ECTS)	Pedagogical internship (3ECTS)
6	5B011900 – Foreign language: two foreign languages 240 ECTS	Pedagogy (5 ECTS)	Theory and methods of educational work (3ECTS)		Pedagogical internship (3 ECTS)	Pedagogical internship (3 ECTS)	

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7	5B012100- Kazakh language and literature in non-Kazakh language schools 240 ECTS			Theory and methods of educational work (3ECTS) Pedagogy (5ECTS) Management in education (3ECTS) Dimensional technologies of assessment (3ECTS)	Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)	
8	5B011700- Kazakh language and literature 222 ECTS			Theory and methods of educational work (3ECTS) Pedagogy (5ECTS) Management in education (3ECTS) Dimensional technologies of assessment (3ECTS)	Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)	
9	5B011800- Russian language and literature 259 ECTS			Pedagogy (5ECTS) Management in education (3ECTS) Theory and methods of educational work (3ECTS) Dimensional technologies of assessment (3ECTS)	Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)	
10	5B012200- Russian language and literature in non-Russian language schools 240 ECTS			Pedagogy (5ECTS) Management in education (3ECTS) Theory and methods of educational work (3ECTS) Dimensional technologies of assessment (3ECTS)	Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)	
11	5B011300- Biology 244 ECTS			Management in education (3ECTS) Dimensional technologies of assessment (3ECTS) Pedagogy (5ECTS) Theory and methods of educational work (3ECTS)		Pedagogical internship(5 ECTS)	Pedagogical internship(3 ECTS)
12	5B011200- Chemistry 252 ECTS			Management in education (3ECTS) Assessment technologies(3ECTS) Pedagogy (5ECTS) Theory and methodology of educational work (3ECTS)		Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)
13	5B011600- Geography 240 ECTS			Management in education (3ECTS) Assessment technologies (3ECTS) Pedagogy (5ECTS) Theory and methodology of educational work (3ECTS)		Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)
14	5B011400-			Management in		Pedagogical	Pedagogical

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	History 221 ECTS			education(3 ECTS) Assessment technologies (3 ECTS) Theory and methodology of educational work (3 ECTS) Pedagogy (5 ECTS)		internship (5 ECTS)	internship (3 ECTS)
15	5B012000- Professional education 225 ECTS		Pedagogical management in the professional education system (5 ECTS)	Pedagogy (3 ECTS) Professional pedagogy (5 ECTS)		Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)
16	5B010700-Art and technical drawing 221 ECTS			Assessment technologies (3 ECTS) Theory and methodology of educational work (3 ECTS) Management in education (3 ECTS) Pedagogy (5 ECTS)		Pedagogical internship (5 ECTS)	Pedagogical internship (3 ECTS)

4 years of bachelor's degree, the hours number allocated for pedagogical internship in the 8th semester – 8 ESTS. This is typical for all pedagogical specialties.

5B010600 – The total number of study hours in the Music Education specialty is 227 ECTS. Among these, only 5 ECTS (previously 3 credits) are taught "Pedagogy". A year-in the 8th semester, theoretical knowledge is acquired only in one discipline Pedagogy. Pedagogical internship – 5 ECTS in the 6th semester and 3 ECTS in the 7th semester.

In total, in the Physical Education and Sports specialty – 240 ECTS. Among these, the pedagogical disciplines taught are "Pedagogy" (5ESTS), "Physical Education Pedagogy" (3ECTS). Therefore, for pedagogical disciplines – 8 ECTS. Pedagogical internship – 5 ECTS in the 6th semester and 3 ECTS in the 7th semester.

For 5B01090 – Mathematics specialty (248 ECTS) and 5B011000 – Physics specialty (259 ECTS), 5B011100 – IT specialty (253 ECTS) taught pedagogical disciplines number – 3 (Management in education, Pedagogy, Theory and methodology of educational work), hours for the pedagogical disciplines – 11 ECTS.

Pedagogical disciplines hours for 5B011900 – Foreign language: two foreign languages majority (240 ECTS) – 8 ECTS. Pedagogy (5 ECTS), Theory and methodology of educational work (3 ECTS).

In 5B012000 – Professional education (225 ECTS) majority «Pedagogical management in Professional education» (5 ECTS), «Pedagogy» (3 ECTS), Professional pedagogy (5 ECTS) are taught. Total hours – 13 ECTS

In specialties 5B012100 – Kazakh language and literature in schools with non-Kazakh language of education (240 ECTS), 5B011700- Kazakh language and literature (222 ECTS), 5B011800 – Russian language and literature (259 ECTS), 5B012200 – Russian language and literature in schools with non-Russian language of education (240 ECTS), 5B011300 – Biology (244 ECTS), 5B011200 – Chemistry (252 ECTS), 5B011600 – Geography (240 ECTS), 5B011400 - History (221 ECTS), 5B010700 – Art and technical drawing (221 ECTS) taught – 4 disciplines: Management in education (3 ECTS), Assessment technologies (3 ECTS), Theory and methodology of educational work (3 ECTS), Pedagogy (5 ECTS), total given hours – 14 ECTS. It could be said thatfor these specialties there are given the most hours for the most pedagogical majorities.

Thus, the results of teaching these disciplines and content analysis of the student's knowledge, skills and abilities in the process of studying the discipline, knowledge and business skills in the professional standard are put in the table. The results of teaching pedagogical disciplines

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and the comparative characteristics of the teacher's work activity in the professional standard give us an opportunity to consider.

Table 3. Comparative characteristic of teaching pedagogical disciplines result in accordance with the professional standard

Discipline «Pedagogy»	
<p>Discipline characteristic: Pedagogy is a science about human education. The pedagogy course covers the future specialist professional competence, the main requirements and features for the personality formation of a new formation teacher. The education role in socio-cultural conditions, methodological foundations and methods of pedagogical research, and the activities of the pedagogical profession are considered. The comprehensive pedagogical process structure, the scientific basis of the Modern School Education content, upbringing essence and content, the family education basics, forms, methods and means of teaching, the innovative technologies content in the professional activity of teachers are comprehensively covered.</p>	
Education outcomes	Work experience
<p>A student during the discipline studying course: Knowledge: - understanding the goals and objectives of the discipline; - the main theoretical and pedagogical problems knowledge; - the discipline knowledge as a science and its form, methods of professional activity; - design and implementation of knowledge in setting pedagogical goals; - a science development knowledge, culture and art in modern society as pedagogical professional knowledge, skills and abilities, qualities and capacities. Skills: - modern problems analysis in education; - educational process diagnostics implementation based on the main characteristics of the class and forecasting its development; - readiness for independent creative activity; capacity to objectively evaluate the results obtained; ability to develop individual life strategies; leadership; legal norms and theories use in a specific practical situation; - capacity to see mistakes and shortcomings in the reasoning logic; - knowledge systematization, language and vocabulary development, adherence to the ethical values path; Acquiring: - acquiring the theoretical foundations of creative activity, knowledge in the creative psychology field, - implementation of innovative author's ideas, skills and abilities acquiring; - ability to apply ideas and concepts, build oral and written communication</p>	<p>Knowledge: - a special field theoretical concept in which the traditional rules of school didactics are integrated; - pedagogical goals methods conclude to design strategies and new models of the educational process; - methods and approaches used in the education for academic and professional purposes (for teachers working with multilingual programs). Capacity and skills: - independently develops pedagogical tasks; - uses teaching methods and approaches, which form the students skills and abilities; - independently develops basic and additional educational and methodological materials for classes; - independently prepare own digital educational resources; - independently develops achievement criteria for evaluating achievements together with students; - collects and develops materials, educational resources necessary for the integration of language and discipline in independent learning, including digital and original texts (for teachers working with multilingual programs).</p>
Management in education	
<p>Discipline characteristic: The discipline “Management in education” is aimed at improving the efficiency of the educational upbringing, educational and cognitive process and the entire education system, explaining the principles, methods, organizational forms and technological methods of management, pedagogical foundations of Management in accordance with modern requirements and identifying ways to implement them in the practice of modern general education school management.</p>	
Education outcomes	Work experience
<p>Student’s knowledge during the discipline taught: - educational management theoretical and methodological foundations, pedagogical management functions, laws, principles, methods, system-forming factors of pedagogical management, development history of the Management in education concept; - school management features based on consistency, humanity, competence, technological approaches; - fundamentals of the comprehensive pedagogical process management in the school; - knows the requirements for effective management of the school's teaching staff. Skills:</p>	<p>Education: - psychological foundations of professional communication and communication; - methods, cooperation types in the professional community, including in the network community; - interaction methods and types with various social groups (external knowledge stakeholders); - professional leadership fundamentals. Capacity and skills: - attracting independent students to the additional education system; - organizes interaction with the subjects of the educational process;</p>

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<ul style="list-style-type: none"> - practical application of the acquired theoretical knowledge in an educational institution; - implementation of diagnostic, analytical and project activities within the unified system of an educational institution; - design and implementation of various management services; - use the skills of consistency, humanity, humanity, competence and technological approach in the management of an educational institution; - assessment of the quality of management activities from the point of view of the holistic pedagogical process as an open pedagogical system; - participation in the methodological work of an educational institution using modern methods of assessing the quality of education, upbringing and development of students, analysis and evaluation of the effectiveness of the educational process, the use of methods to overcome the limitations of pedagogical management. <p>Acquiring:</p> <ul style="list-style-type: none"> - theoretical knowledge of pedagogical management in the field of education in accordance with modern requirements; - skills of analysis design and management of a holistic pedagogical process in the school; - skills of scientific research work; - skills of pedagogical communication; - skills of organizing subject-subject interaction of all participants of the pedagogical process; - skills of using the acquired knowledge in the course of professional practice, as well as in solving professional problems; flexibility and versatility in various situations related to the management of a holistic pedagogical process. 	<ul style="list-style-type: none"> - involves representatives of professional communities, law enforcement agencies, medical and social services, children's and youth movements, youth organizations, public and political parties, non-governmental organizations, etc. in the educational process. - in compliance with pedagogical tact, pedagogical ethics rules; - respects the personality of students; - adheres to a democratic style in communicating with students; - commitment to the highest social values, ideas of humanistic pedagogy; - introduction to the unified system of universal and national values; - discrimination, demonstrates the ability to resist any form of extremism; - provides pedagogical support to persons with special educational needs (children-oralmans, children-non-residents of kazakhstan, children of national minorities, gifted children, children with disabilities) ; - implements a multilingual approach in teaching and upbringing; - develops tolerance to a different way of life, a different culture; develops language competence, knowledge about culture; - promotes the development of a favorable educational environment for the cultural and linguistic needs of students. - can analyze your experience. - is responsible for the planning process to achieve effective school practice.
Theory and methodology of educational work	
<p>Discipline characteristic: it is aimed at studying the theoretical and methodological foundations of the educational process, the essence of education and its place in the educational process, issues of managing educational work in school, methods of setting educational goals, forming value relations in preparation for the norms of life, practical application of methods, forms and means of education, education of the culture of interethnic communication in support of state policy in the territory of education and education as a citizen of the Republic of Kazakhstan to ensure the constitutional rights of the student.</p>	
<p>Education outcomes</p> <p>Education:</p> <ul style="list-style-type: none"> - understanding the goals and objectives of the discipline; - availability of knowledge and skills to search for and solve theoretical and pedagogical problems. <p>Skill:</p> <ul style="list-style-type: none"> - interest in joint activities from the point of view of cooperation; - proficiency in pedagogical communication and teaching techniques; - ability to organize subject-subject interaction with all participants of the pedagogical process; - use of educational technologies in the educational space; - the ability to independently apply pedagogical knowledge in practice when solving problems. <p>Acquiring:</p> <ul style="list-style-type: none"> - creative self-training; - the ability to activate the cognitive activity of students at different stages of the lesson; - ability to conduct an individual conversation with students and parents and give an analysis. 	<p>Work experience</p> <p>Education:</p> <ul style="list-style-type: none"> - school pedagogy; pedagogical psychology; innovative technologies of education of school-age children; - educational potential of academic subjects (subject area); - Principles of unification of national values and content of education of independent Kazakhstan; - methods of forming students' positive self-esteem, interest in learning languages, civic identity and linguistic tolerance. <p>business and skills:</p> <ul style="list-style-type: none"> - in compliance with pedagogical tact, pedagogical ethics rules; - respects the personality of students; - adheres to a democratic style in communicating with students; - commitment to the highest social values, ideas of humanistic pedagogy; - introduction to the unified system of universal and national values; - discrimination, demonstrates the ability to resist any form of extremism; - provides pedagogical support to persons with special educational needs (children-repatriated Kazakh, children-non-residents of Kazakhstan, children of national minorities, gifted children, children with disabilities) ; - implements a multilingual approach in teaching and upbringing; - forms tolerance to a different way of life, a different culture; - develops language competence, knowledge of culture;

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	- promotes the development of a favorable educational environment for the cultural and linguistic needs of students.
Professional pedagogy	
Discipline characteristic: introduction to the conceptual categories of the discipline, characteristics of the scientific and theoretical foundations of professional pedagogy, orientation to the organization of innovative activities of a teacher-psychologist.	
Education outcomes	Work experience
Student's knowledge during the discipline taught: To know: the theory of the organization of the integral pedagogical process of professional education; the structure and principles of management of the system of professional education; Be able to: integrate the content, activities and mechanisms of pedagogical activity; adapt to their experience the interaction of various factors in pedagogical processes and systems. Own: - the ability to specify the research activity; - analysis and synthesis of pedagogical technologies in the educational space; - ownership of the means of measuring and assessing innovation.	Education: - fundamentals of the psychology of professional communication and communication; - methods and types of cooperation in the professional community, including in the network; - methods and forms of interaction with various social groups (stakeholders of external knowledge); - professional leadership fundamentals. Capacity and skills: - Expresses respect for the personality of the student and makes a positive contribution to the educational success of the student; - Understands the importance of friendly communication with colleagues in the learning process; - Is able to work in the pedagogical conditions of the school; - Is able to give feedback and make changes based on their own experience; - acts in accordance with constructive criticism and recommendations. - Has an understanding of the aspects of their professional development and a desire for continuous improvement. - Studies and evaluates school experience, uses research results and other evidence sources to improve the experience of their own and colleagues. - Collaborates with colleagues for professional development. - Able to work in a team, patiently perceives personal and cultural differences. - Able to communicate successfully and positively in the state and other languages. - Respects the personality of students.

Conclusion

In the course of learning more about the examination of quality teacher education in the University on the basis of the professional standard of the teacher systematic compulsory subjects studied at the General Department of the Kazakh national women's pedagogical University, summarized the knowledge and skills acquired on the basis of the description of subjects and learning outcomes. for the purpose of comparative examination in the professional standard, the criteria of business skills and knowledge specified in the professional standard were considered for teachers who attend secondary school teachers in these specialties.

The generalized education outcomes and performance indicators in the system of criteria table in the comparable professional standard show that the requirements for a secondary school teacher are more specific. Comparative analysis showed that the description of the disciplines taught at the Kazakh National Women's Pedagogical University and the results of education were obtained from the syllabuses of individual teachers. So, probably, due to the fact that I tried to write very little and more specifically, the indicators of the professional standard did not fall at all as I would like.

Based on the results of the examination, we conclude that the results of teaching disciplines taught at the university are based on the pedagogical professional values specified in this professional standard, requirements for work, criteria for business skills and knowledge.

References

1. Professional standard of the teacher. - Atameken. atameken.kz › content › files PS Pedagog_kaz
2. On approval of the Classifier of areas of training of personnel with higher and postgraduate education <http://adilet.zan.kz/rus/docs/V1800017565/info>
3. State mandatory standard of Higher Education (with amendments and additions from 05.05.2020))https://online.zakon.kz/Document/?doc_id=35617396#pos=0;99.19999694824219

REQUIREMENTS FOR TRANSITION AND CHANGING PLACE OF THE ISLAMIC
REPUBLIC OF IRAN AS THE NEW POWER OF EMERGENCE IN THE POST-
AMERICAN WORLD

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Abstract

By examining the thinkers in the process of power transition, it shows that the relative consensus on the gradual success of the United States in the international system is formed and the world has witnessed fundamental changes in the international power form and the world of power scene from the West to the east. The next time: Politics, economy and culture will be. In the late nineteenth century. The United States became the most powerful country in the world shortly after industrialization. Now the new change is happening and that is the transition of the power of the world from the west of the East. The most important feature is the gradual decline of the US position and the emergence of other actors in the form of new powers (China, Iran and ..). This research carried out in descriptive-analytic method. The basic question of this research is, how is the power and change in the position of the Islamic Republic of Iran as the new power of the emergence in the post-American world? In response, it should be said that the Islamic Republic of Iran should accept that the world has changed and as a new power of emergence in the east, in terms of equality in, the next time power of power, the policy, economy and culture will be promoted to the extent of the new powers. The conditions for changing its role and position, like China, provide new powers in the new form of emergence in international order. . Therefore, considering the importance of research, it is necessary to examine the conditions for realization and the change in the position of the Islamic Republic of Iran as the new power of emergence in the post-American world.

Key Words: Iran, the post-American world, new powers emerged, transition from the west to the east.

**MOTIVES FOR FOREIGN DIRECT INVESTMENTS IN GEORGIA AND THEIR
IMPACT ON THE ECONOMY**

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Abstract

In order to develop the appropriate strategy for attracting foreign direct investments and determining their impact on the country's economy, it is important to analyse the motivation of companies investing in the national economy.

This paper examines the strategic motives behind various investments in Georgia, whether they are aimed at overcoming the growing trade deficit in Georgia, as well as other important economic and social problems or not.

Based on data from the UNCTAD Contribution Index, we found out that almost half of Georgian exports are encouraged by investors. We analysed the dynamics of export performance of 115 Georgian companies after direct investments in 2018-2021. The results confirm that investors in Georgia have mainly focused on gaining the market share and improving business efficiency.

Domestic market oriented foreign direct investments does not play an important role in export growth in Georgia. They are mainly invested in real estate, tourism, financial and IT industries and positively affect the country's infrastructure, but lead to a slight increase in production and exports.

Resource-oriented foreign direct investment, which could also increase exports from the recipient country, has been low in Georgia in recent years and hasn't played a significant role in Georgia's export growth, but in general, resource-oriented investors are interested in reducing costs and increasing exports to third countries. As for market-oriented foreign direct investment, they could not play a significant role in increasing exports, since foreign direct investment are focused on the sale of products in the recipient country.

Based on the results of the study, we determined that it is necessary to attract efficiency oriented and resource oriented foreign direct investments to Georgia in order to overcome the growing deficit of the trade balance and encourage sustainable economic growth.

Keywords: Foreign Direct Investment, Efficiency Oriented Foreign Direct Investment, Resource Oriented Foreign Direct Investment.

THE IMPACT OF GENETICALLY MODIFIED ORGANISMS ON THE PROBLEM OF WORLD HUNGER

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Abstract

Modern life in the developed world brings great advances in medicine, biology as well as in industry, technology, etc. Progress is improving with constant development. In the countries of the underdeveloped world, basic conditions of survival are considered, e.g. how to provide food for the population to prevent hunger. As more and more people in the world are malnourished or hungry, in this article I highlight one possible solution to this problem, namely the introduction of genetically modified organisms into the food industry. To find out why this is one of the possible solutions, I focused on the factors that define genetically modified organisms as suitable for use in the food industry.

Keywords: genetically modified organisms, natural disasters, food industry, world hunger, the environment

INTRODUCTION

It is generally accepted that natural disasters are caused by nature itself, and indirectly also by man with his influences that create relationships for disasters. Natural phenomena that pose the greatest threat to people and the environment as a world are floods, droughts, landslides, fires, earthquakes and even a pandemic of infectious diseases (e.g. coronavirus disease named Covid-19). There are other natural phenomena that are also dangerous, but their occurrence is less common, i.e. avalanches, landslides, landslides, hailstorms and other weather disasters.

It is also true that the impacts that create relationships for natural disasters can also be identified. People with their negative attitude towards nature "contribute" a lot to natural disasters, so this kind of action must first be identified and managed as such. One such attitude of people towards nature is certainly the use of genetically modified organisms in the diet. Due to drought, floods and fires, it is becoming increasingly common in the world that crop / fruit / cereal yields are not achieving optimal results. To prevent such crop failures and reduce the use of pesticides, many scientists are convinced that this could be done using genetically modified organisms.

To date, several studies have been conducted worldwide on how the use of genetically modified organisms (hereinafter: GMOs) have a negative impact on human health and the environment (Buiatti et al., 2013; Launis, 2008; Koch, 2010). Séralini, Mesnage, Clair and others are convinced, both theoretically and practically, that the use of GMOs in everyday life is the right solution to prevent world hunger (Séralini et al., 2011; Wu, 2014: 151-162; National Geographic Society, 2020). The use of GMOs has so far been mainly dealt with by naturalists such as biologists, chemists, pharmacists, and little research has been conducted in the field of law, especially in relation to the right to health care (Husar, 2016; Erjavec et al., 2013; Šraj, 2017 ; Pandel et al., 2004; Meško Kuralt, 2021a).

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Both Slovenian and European Union law (hereinafter: EU law) stipulate that a GMO is an organism or microorganism whose genetic material is altered by processes that change this material differently than in natural conditions by crossing or recombination (human is excluded). Specifically, GMOs are those organisms or microorganisms that are obtained only by certain prescribed techniques or methods, which do not include techniques or methods of mutagenesis (i.e. a set of techniques that allow changing the genome of living species without introducing foreign Deoxyribonucleic acid - DNA¹ (Court of Justice of the European Union, 2019)).

Despite the current definition, the Court of Justice of the European Union - CJEU ruled in Case C-528/16² that organisms created by mutagenesis techniques are also GMOs. It follows from the decision of the CJEU that new ways of changing organisms, i.e. mutagenesis techniques or methods do not mean that these techniques or methods should be excluded from existing EU standards on GMOs (Meško Kuralt, 2018; Wasmer, 2019; Court of Justice of the European Union, 2019).

The use of GMOs is thus an interdisciplinary topic in everyday life. In order to ensure the safe use of GMOs, the minimum quality standards for the provision of adequate health care should be highlighted, as well as the (possible) legal consequences that may (may) arise. Under *Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC (hereinafter: Directive 2001/18)*, minimum standards are those which affect human health, with regard to the placing on the market of GMOs as a product or part of a product, or not placing them on the market or deliberately releasing GMOs for any purpose other than placing them on the market. (e.g. in cases it is about working with GMOs indoors, intended for research and educational purposes). Thus, before launching a deliberate release of GMOs, each user must submit a notification to the competent authority, submitting all technical documentation and submitting an environmental risk assessment, with all statutory annexes (6 (2) (a), (b) Article of Directive 2001/18). If approved, GMOs can be used for deliberate release in closed systems.

The legal consequences of minimum quality standards in relation to the provision of adequate healthcare are those that arise and those that arise, but cannot be expressed with certainty in science but with a degree of probability (e.g. in the field of GMOs, the existence of some legal consequences, as due to the short-term use of GMOs on the market, flights have not yet been proven with a degree of certainty, but information is nevertheless important for maintaining human health and the environment.

Finally, reducing world hunger is one of the key objectives of the 2030 Agenda (Office of the Government of the Republic of Slovenia for Development and European Cohesion Policy, 2020).

¹ It is a molecule that carries genetic information in all living organisms. DNA together with the molecule of ribonucleic acid - RNA belongs to the nucleic (nuclear) acids. The main role of the DNA molecule is to store essential biological information. The development of DNA function as it is known today took place from 1866 to 2001 (Anderluh, 2004).

² Despite the current definition, the CJEU ruled in this case that organisms created by mutagenesis techniques are also GMOs. It follows from the decision of the CJEU that new ways of changing organisms, i.e. mutagenesis techniques or methods do not mean that these techniques or methods should be excluded from existing EU standards on GMOs (Meško Kuralt, 2018; Wasmer, 2019; Court of Justice of the European Union, 2019). Moreover, according to this judgment, consumers have the right to know whether the food they eat has been produced with new plant breeding technologies – (hereinafter: NPBT). One of the ejections of such technologies is the Clustered Regularly Interspaced Short Palindromic Repeats - CRISPR system (a modern technology that defines the genetic code of a bacterium and its immune system; it is a system used to target and relatively easily change the genomes of living organisms man). Most NPBTs, however, cannot be distinguished from the natural mutations in the final product. This is particularly problematic when importing the finished product or food from countries where NPBT is used more frequently. As there are no identity labeling systems for such products or foods containing GMOs without labeling, this cannot be traced. Therefore, consumers cannot exercise their right to know what the final product or food contains (Purnhagen et al., 2019).

In order to determine the extent of GMO use or non-GMO use in the diet, this area needs to be thoroughly analyzed. In preparing my doctoral dissertation, an analysis of the legal consequences of the use or non-use of GMOs was performed, based on the methodology for determining the environmental risk assessment. The assessment thus includes the characteristics of GMOs and releases and the steps envisaged in advance to assess the risk to the environment. That methodology is set out in Annex II to Directive 2001/18. Based on the cabinet method, deductive and inductive method of work, I also divided the legal consequences of the use of GMOs or non-use of GMOs (i.e. positive and negative legal consequences, direct legal consequences).

RESULTATES AND DISCUSION

In general, the characteristics of GMOs and releases include a few detailed technical and scientific details regarding their characteristics, which are not discussed in this paper. The article focuses on the envisaged steps of assessing the risk of GMO use on humans and the environment. The central part of this paper is the analysis of the risk assessment of GMO use on humans and the environment, as it includes:

- characteristics of GMOs that may cause adverse effects (e.g. human, animal and plant diseases including allergenic and toxic effects; effects on the population dynamics of species in the recipient environment and the genetic diversity of each of these populations; effects on biogeochemistry or biogeochemical circulation, in particular the re-circulation of carbon and nitrogen through changes in the decomposition of organic matter in the soil);
- evaluating the possible consequences of any adverse effects, if any;
- evaluating the likelihood of occurrence of each identified potential adverse effect;
- an assessment of the risk of the likelihood of adverse effects occurring and the extent of the consequences, if any;
- the use of risk management strategies for the deliberate release or placing on the market of GMOs.

Based on the methodology, which determines the steps for the use of GMOs to assess the risk to humans and the environment, I have classified the legal consequences into positive and negative. It is an abstract level of analysis that has either negative or positive consequences. As the use of GMOs is a relatively new method of changing or obtaining products, it is not yet possible to define all the legal consequences, so they must be constantly monitored (measured and objectively reported to the public).

Table 1: Classification of the legal consequences of the use of GMOs for humans (source: author's work)

type/effect of the legal consequence of the use of GMOs	directly	indirectly
positive	/	greater competitiveness of products in the market; the availability of food products for most of the population, thereby reducing or eliminating world hunger; prolonging life (e.g. gene therapy or gene therapy)
negative	prohibition on obtaining a marketing authorization for GMOs or GMO products; withdrawal of the marketing authorization for GMOs or GMO products food shortages	world hunger; increasing poverty; the collapse of certain economic and agricultural activities; depletion of biodiversity or extinction of certain varieties or species

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As GMOs have been on the market for about three decades, no direct legal consequences have yet been detected, especially not scientifically proven ones. Nevertheless, it is assumed that the direct real consequences of GMO use are consequences that are tied to the individual and not consequences that would affect society as a whole (i.e. individual belief is key to recognizing the effects of GMO use; individual belief may be favorable or unfavorable to the use of GMOs, moreover, an individual's belief may be based on scientific evidence or on a personal belief that has an ideological or religious basis) (Table1).

However, the legal consequences of the use of GMOs have a unifying sign, as they link technology with the economy, all with the aim of improving the competitiveness of products for the consumer. Related otherwise, a poor harvest or poor yield in the market causes prices to rise (negative legal consequence). With the help of biotechnology, individual plant varieties can be changed to make them more drought resistant. In this way, crops³ and later products can be competitive again and, above all, accessible to the consumer (positive legal consequences).

Thus, the reduction of world hunger is one of the positive legal consequences of the use of GMOs. Directive 2001/18 does not define such legal consequences, but it is defined by Agenda 2030 (Office of the Government of the Republic of Slovenia for Development and European Cohesion Policy, 2020).

Reducing world hunger is one of the key objectives of the 2030 Agenda. More specifically, Objective 2 of the 2030 Agenda clearly states that the world should work to eradicate hunger by 2030, ensure food security and better nutrition, and promote sustainable agriculture (Office of the Government of the Republic of Slovenia for Development and European Cohesion Policy, 2020).

In order to prevent or limit disputes over the use of GMOs, Gakpo (2018) and Kuralt Meško (2021b) state that greater public awareness of genetic modification technology is therefore needed. This should be achieved by educating the public about the potential benefits and risks associated with biotechnology. He adds that GMO-producing countries (e.g. South Africa, Burkina Faso and Egypt) have benefited mainly in the last 15 years, in the form of improved crop productivity, food security and quality of life. The income of GMO-producing farmers has also increased significantly (Gakpo, 2018).

Negative legal consequences, e.g.: withdrawal of a product produced from GMOs; withdrawal of the GMO product; the withdrawal of the authorization for the production of products from/with GMOs, bring the need for additional research, in order to obtain the greatest possible benefits in the field of new technology. Such research, however, depends mainly on the funding of institutes/research units at national or international level.

Table 2: Classification of legal consequences of non-use of GMOs (source: author's work)

type/effect of the legal consequence of the non-use of GMOs	directly	indirectly
positive	impact of organic and integrated food	biodiversity important for a healthy environment
negative		a lack of food for the entire population; leading to increasing world hunger; increasing poverty

³ »The use of mutations to improve crops has been common since the 1950s; and over 2250 mutated varieties have been developed in over 50 countries, including France, Germany, Italy, the United Kingdom and the United State.« (Medialdea et al., 2018:84)

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However, the direct legal consequences of non-use of GMOs include legal consequences that allow worry-free organic and integrated farming, as the use of GMOs is not allowed. European Union Member States (hereinafter: EU MS) have the option of cultivating certain approved GMOs under the opt-out concept restricted or prohibited under certain conditions in its territory (Table 2).

More specifically, under Article 26b of *Directive (EU) 2015/412 of the European Parliament and of the Council of 11 March 2015 amending Directive 2001/18/EC as regards the possibility for the Member States to restrict or prohibit the cultivation of genetically modified organisms (GMOs) in their territory (hereinafter: Directive 2015/412)* EU MS have the option of adopting measures to restrict or prohibit the cultivation of GMOs or groups of GMOs, in all or part of their territory, which has already been approved in accordance with Part C of the *Directive 2015/412 or Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed (hereinafter: Regulation 1829/2003)*.

This can only be mentioned provided that these measures are in line with EU law and that the conditions for restricting or prohibiting cultivation are justified (the degree of justification depends on the objective pursued by the measure), proportionate (proportionality is assessed on the basis of whether the measures are used as a legitimate means of achieving the objective, whether they are as restrictive as possible in relation to the degree of urgency and whether they are in fact proportionate) and non-discriminatory. With regard to the provisions on customs cooperation between EU MS set out in the *Treaty on the Functioning of the European Union – (hereinafter: TFEU)*, quantitative restrictions on imports and exports are generally considered to be prohibited, as are all measures having equivalent effect (Articles 34 and 35 Treaty on the Functioning of the European Union).

CONCLUSION

According to Zilberman et al. (2018) genetic engineering is a tool that enables the accelerated breeding of new varieties that can help farmers and farming systems adapt to rapidly changing physical growth conditions. GMOs increase yields, reduce costs, reduce the burden on the land and reduce the carbon footprint of agriculture. Developing countries, especially poor farmers, benefit significantly from GMOs (Adenle, 2011; Gakpo, 2018).

Moreover, Wasmer (2019) points out that companies and research institutes dealing with GMOs face considerable legal uncertainty following the recent ECJ ruling. Although, in principle, the uncertainties associated with the GMO release application process can be resolved through procedural changes, this uncertainty cannot be resolved without a change in EU law relating to GMOs. However, any such solution requires the constructive cooperation of the European institutions and the EU Member States. If there are no changes in GMO legislation, Wasmer points out that a state of crisis may arise, namely that regulatory agencies will fight to enforce GMO regulation, international trade relations will be affected and European agriculture will lose the opportunity for sustainable innovation and employment. research and development will stop (Wasmer, 2019).

Given that the use of GMOs is a topic that directly and indirectly affects the health of humans, animals, plants and the environment, I believe that it is necessary to raise awareness of monitoring the occurrence of GMO use, through available information covering monitoring

plans either through press releases and access to such information, as provided for in Case T-33/16⁴.

As already stated in *the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (hereinafter: Aarhus Convention)* any current and future generation can contribute to the protection of the environment, in particular by living in an environment suitable for its health and well-being (Article 1 of the Aarhus Convention). In order to make an individual's life as high quality and environmentally friendly as possible, the individual is entitled to the right to access information, public participation in decision-making and access to legal protection in environmental matters (Meško Kuralt, 2021b: 248).

Such access to information and public participation in decision-making is already evident in judgments, such as judgment of the Administrative Court of the Republic of Slovenia, I U 1417/2019. In this case, it considered that non-governmental organizations have a legal (public) interest in participating (already) in the preliminary proceedings. In doing so, they are not required to demonstrate personal legal benefits if they demonstrate that the intervention could have a significant effect on the environment. Pursuant to Article 51.a of Environmental Protection Act, the non-governmental organization (hereinafter: NGO) was granted the right to participate in the preliminary environmental impact assessment procedure. This case is the first in Slovenia, i.e. this is a precedent by which an NGO has succeeded in proving that the provisions of the Aarhus Convention and European sectoral directives (e.g. Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment) need to be applied directly to the issue of NGO participation in the pre-litigation procedure.

Due to the current public health emergency in the world, the main interest is to develop and make available safe and effective drugs for the treatment or prevention of COVID-19 in the shortest possible time. To achieve this goal, the European Medicines Agency - EMA⁵ and the network of national competent authorities at EU level have taken a number of measures to encourage, support and accelerate the development of treatment and vaccines and the granting of marketing authorizations, e.g. *Regulation (EU) 2020/1043 of the European Parliament and of the Council of 15 July 2020 on the conduct of clinical trials with and supply of medicinal products for human use containing or consisting of genetically modified organisms intended to treat or prevent coronavirus disease (COVID-19) (hereinafter: Regulation 2020/1043)*.

Aware that the need for reliable clinical evidence will require multicenter clinical trials involving several Member States, the EU has taken several steps, including that clinical trials of medicinal products containing or consisting of GMOs may be carried out in EU. Thus, the main objective of Regulation 2020/1043 is to provide for a temporary derogation from EU legislation on GMOs (i. e. Article 5 (1-2) of Directive 2001/18) concerning medicinal products for the treatment or prevention of COVID-19 containing or consisting of GMOs.

⁴ In Case T-33/16, the CJEU ruled that the effects of GMOs on human or animal health fall within the field of the environment, so that NGOs have the right under Regulation 1367/2006, which requires EU institutions and bodies to implement their obligations under the Aarhus Convention, participate in decision-making on the placing on the market of foods containing GMOs. Moreover, the CJEU annulled a decision by which the Commission rejected an NGO's request to review decisions authorizing the placing on the market of foods, food ingredients and feed containing GM soy (Court of Justice of the European Union, 2019). The main purpose of the Aarhus Convention is thus to give rights to the public and to impose obligations on parties and public authorities regarding access to information and public participation and access to justice in environmental matters (Meško Kuralt, 2021b: 247). According to the Council Decision of 17 February 2005 on the conclusion of the Aarhus Convention, better public access to information and greater participation in proceedings are important means of raising public awareness of environmental issues and promoting better implementation and enforcement of environmental legislation, decision-making and access to justice.

⁵ Its main task is to provide a scientific assessment and to control and monitor the safety of medicines for human and veterinary use in the EU.

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As can be seen from the above, the presence of GMOs in the world is certainly an important topic that affects both directly and indirectly the individual. Even though EU MS have very strict legislation on the use of GMOs, as GMO approval procedures are based on the precautionary principle, it should be noted that the use of GMOs is expected to be increasingly present.

In the United States, Congress is expected to allocate a total of \$ 7.5 million to fund the Agricultural Biotechnology Education and Awareness Initiative. The project is intended to call on the US Food and Drug Administration - FDA to educate and raise awareness of the US public about agricultural biotechnology and food and animal feed ingredients derived from biotechnology. The FDA is currently working on this initiative in collaboration with the U.S. Department of Agriculture and the U.S. Environmental Protection Agency (The Food and Drug Administration, 2022).

If the use of GMOs in the food industry is present in the future, I believe that their consequences must be constantly monitored and reported. In the future, it will be necessary to transfer some responsibility for the legal consequences of the use of GMOs to the individual (i.e. greater autonomy of the individual). In order to get rid of the negative connotation of the use of GMOs, it is necessary to accelerate the educational effect in this area, which I recognize as great potential. Training on the use of GMOs would empower individuals about what a GMO is, what it represents and what it provides, why it is needed, where the dangers of using GMOs are, and so on. Empowerment of individuals in the field of GMO use should start in kindergarten, school, faculties and in the workplace.

REFERENCES

1. Adenle, A. A. (2011). Response to issues on GM agriculture in Africa: Are transgenic crops safe? *BMC Res Notes* 4, 388 [8. 4. 2021]. DOI: <https://doi.org/10.1186/1756-0500-4-388>
2. Administrative Court of the Republic of Slovenia, judgment I U 1417/2019 of 28. 7. 2020, ECLI:SI:UPRS:2020:I.U.1417.2019.10.
3. Anderluh, G. (2004). Fifty years of double helix [online] Available at: <https://kvarkadabra.net/2004/01/petdeset-let-dnk/> [8. 4. 2021].
4. Buiatti, M., Christou, P. & Pastore, G. (2013). The application of GMOs in agriculture and in food production for a better nutrition: two different scientific points of view. *Springer: Genes & Nutrition* (8), 255-270 [online] Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3639326> [8. 4. 2021].
5. Case C-528/16, Confédération paysanne, Réseau Semences Paysannes, Les Amis de la Terre France, Collectif vigilance OGM et Pesticides 16, Vigilance OG2M, CSFV 49, OGM: dangers, Vigilance OGM 33, Fédération Nature et Progrès vs. Premier ministre, Ministre de l'agriculture, de l'agroalimentaire et de la forêt ECLI:EU:C:2018:583.
6. Case T-33/16, TestBioTech proti Evropski Komisiji, ECLI:EU:T:2018/135.
7. Consolidated version of the Treaty on the Functioning of the European Union, *OJ C* 326, 26.10.2012, p. 47–390.
8. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (1998). Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters [online] Available at: [cep43e.pdf\(unece.org\)](http://cep43e.pdf(unece.org)) (9.3.2022).
9. Court of Justice of the European Union (2019) Annual Report 2018, Annual Review [online] Obtained on: https://curia.europa.eu/jcms/upload/docs/application/pdf/2019-06/20190650_ra_pan_sl_2019-06-06_09-48-23_42.pdf [9. 4. 2021].

10. Directive (EU) 2015/412 of the European Parliament and of the Council of 11 March 2015 amending Directive 2001/18/EC as regards the possibility for the Member States to restrict or prohibit the cultivation of genetically modified organisms (GMOs) in their territory, *OJ L 68*, 13.3.2015, p. 1–8.
11. Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC, *OJ L 106*, 17.4.2001, p. 1–39.
12. Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, *OJ L 26*, 28.1.2012, p. 1–21.
13. *Environmental Protection Act (ZVO-1)*, *Ur. l. RS*, no. 39/06 - UPB, 49/06-ZMetD, 66 / 06-odl.US, 33/07 - ZPNačrt, 57/08-ZFO-1A, 70 / 08,108 / 09,108 / 09-ZPNačrt-A, 48/12, 57 / 12.92 / 13.56 / 15.102 / 15.30 / 16.61 / 17-GZ, 21/18-ZNOrg and 84/18-ZIURKOE.
14. Erjavec, K., Uhan, S., Šuštar, V. J., Juvančič, L., Poler, K. M. & Zajc, J. (2013). Attitudes towards genetically modified organisms in Slovenia: between knowledge and myths. *Slovenian Journal of Public Health*, 52 (3), 201-209.
15. Food and Drug Administration (2022). Agricultural Biotechnology Education and Outreach Initiative [online] Available at: [Agricultural Biotechnology Education and Outreach Initiative | FDA](#) (9. 3. 2022).
16. Gakpo, J. O. (2018) African scientists confident GMO mosquitoes will be game changer in fight to control malaria. *Cornell Alliance for Science*. [online] Available at: <https://allianceforscience.cornell.edu/blog/2018/09/african-scientists-confident-gmo-mosquitoes-will-game-changer-fight-control-malaria/> [9. 4. 2021].
17. Husar, T. (2016). Consequences of the opt-out approach of GMOs in European Union legislation. Master's thesis. Faculty of Law. University of Maribor.
18. Koch, B. A. (2010). *Damage Caused by GMO-s: Comparative Analysis* [znanstvena monografija] Berlin: De Gruyter.
19. Launis, V. (2008). The Scope and Importance of Genetic Democracy. V: Launis, V., J Rääkkä, J. (ed.) *Genetic democracy: philosophical perspectives*. Springer. [online] Available at: <https://www.springer.com/gp/book/9781402062056> [9. 4. 2021].
20. Medialdea J. T, Ruiz J. A. P, García, C.F., Capilla, A.C., Martorell, J.C., Rodenas, J.B. (2018) Potential of science to address the hunger issue: Ecology, biotechnology, cattle breeding and the large pantry of the sea, *Journal of Innovation & Knowledge*, Volume 3, Issue 2, Pages 82-89, ISSN 2444-569X, <https://doi.org/10.1016/j.jik.2017.12.007>.
21. Meško Kuralt, K. (2021a). The Importance of labelling products whit GMO or non-GMO label. *Medicine, Law & Society*, 14 (1):43-76. DOI: <https://doi.org/10.18690/mls.14.1.43-76.2021>
22. Meško Kuralt, K. (2021b) Impact of (non) use of genetically modified organisms on the right to healthcare - comparative legal aspect (Doctoral dissertation) Faculty of Law, Univerza of Maribor, Maribor: Slovenia.
23. Meško Kuralt, K. (2018). The right to health care in the light of the use of genetically modified organisms, VII. International Doctoral Research Conference, Ljubljana: University of Primorska: European Law Faculty [online] Available at: https://www.evro-pf.si/media/website/2013/04/Zbornik_VI-DR_konf_30052018.pdf [9. 4. 2021].
24. National Geographic Society (2020). Are Genetically Modified Crops the Answer to World Hunger? [online] Available at: [Are Genetically Modified Crops the Answer to World Hunger? | National Geographic Society](#) (9. 3. 2022).
25. Office of the Government of the Republic of Slovenia for Development and European Cohesion Policy (2020). Sustainable Development Agenda 2030:13 [online] Available at: [Agenda za trajnostni razvoj 2030.doc \(live.com\)](#) (9.3.2022).

26. Pandel, M. R., Jevšnik, M. (2004). Genetically modified organisms in the diet. *Slovenian Nursing Review*, 38, 73-80.
27. Purnhagen, P. K. & Schebesta, H. (2019). Food Labelling for Consumers EU Law, Regulation and Policy Options, Policy Department for Citizens' Rights and Constitutional Affairs European Parliament, Heezen J (ur.) [online] Available at: [https://www.europarl.europa.eu/RegData/etudes/STUD/2019/608871/IPOL_STU\(2019\)608871_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2019/608871/IPOL_STU(2019)608871_EN.pdf) [9. 4. 2021].
28. Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed, *OJ L* 268, 18.10.2003, p. 1–23.
29. Regulation (EU) 2020/1043 of the European Parliament and of the Council of 15 July 2020 on the conduct of clinical trials with and supply of medicinal products for human use containing or consisting of genetically modified organisms intended to treat or prevent coronavirus disease (COVID-19), *OJ L* 231, 17.7.2020, p. 12–16.
30. Séralini, G. E., Mesnage, R., Clair, E. & Gress, S. (2011). Genetically modified crops safety assessments: present limits and possible improvements *Environmental Sciences Europe Bridging Science and Regulation at the Regional and European*. [online] Available at: <https://enveurope.springeropen.com/articles/10.1186/2190-4715-23-10> [9. 4. 2021].
31. Šraj, A. R. (2017). The impact of the transatlantic trade and investment agreement on the presence of genetically modified organisms in Slovenia. Master's thesis. Ljubljana: University of Ljubljana: Faculty of Administration [online] Available at: <https://repozitorij.uni-lj.si/IzpisGradiva.php?id=92383&lang=slv&prip=dkum:9384951:d4> [10. 5. 2020].
32. The Food and Drug Administration (2022). Agricultural Biotechnology [online] Available at: [Agricultural Biotechnology Education and Outreach Initiative | FDA](#) (10. 3. 2022).
33. Wasmer, M. (2019). Roads Forward for European GMO Policy—*Uncertainties in Wake of ECJ Judgment Have to be Mitigated by Regulatory Reform*. *Front. Bioeng. Biotechnol.* 7:132. DOI: 10.3389/fbioe.2019.00132
34. Wu, S. H., Ho, C. T., Nah, S. L., & Chau, C. F. (2014). Global hunger: a challenge to agricultural, food, and nutritional sciences. *Critical reviews in food science and nutrition*, 54(2), 151–162. <https://doi.org/10.1080/10408398.2011.578764>
35. Zilberman, D., Holland, T. G. & Trilnick, I. (2018). Agricultural GMOs—What We Know and Where Scientists Disagree. *Sustainability*, 10, 1514.

THE SPACES OF IDEOLOGY AND TECHNOLOGY IN CONFLICT
RESOLUTIONS

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Abstract

A striking feature of human beings is their creativity. The big problem is that the human being is creative for both good and bad social conducts. Because of this, human societies have a serious problem: they cannot predict what someone is going to do. But human groups organized in the form of sovereign states, can predict what one cannot do and also what one must do. What one cannot do is defined by a norm whose command is a *prohibition*. What one should do is defined by a norm whose command is a duty. It is, therefore, through norms that the law seeks to avoid conflicts. However, the rule is not exclusive to the law. Religious norms, for example, in the past, in homogeneous collectivities in which everyone followed the same religion, religious norms obtained the same result that currently obtains with legal norms. It happens, however, that nowadays the citizens of most countries follow different religious beliefs, which is why no religion can maintain social peace. In contemporary states, the solution to maintain social order is the adoption of a single system of norms that obliges everyone regardless of religion. It must necessarily be so because if an individual's conduct is disapproved by the religion he follows, it is enough for him to change his religion to no longer be disapproved. This single system of rules that would be binding on all citizens obviously refers to legal rules. Regardless of each country's system of government, legal norms are generated by a state body. This body can be multi-person or single-person in each country, but it will always be driven by a certain *ideological line*. Regardless of the ideology that inspires the Positive Law of each country, its norms prevent most conflicts between citizens and also conflicts between these citizens and the State, but do not prevent the emergence of conflicts between countries that adopt different ideological orientations. In the history of humanity, the emergence of ideologies is much older than the development of technologies, but both coexist in the same space and time, despite being two phenomena of absolutely different natures. Technologies are developed to solve anyone's problems without distinction. Ideologies are created to satisfy the particular views of the person or group that conceives them. Technologies bring people together, ideologies can distance and even rival people, groups and nations. Technology and ideology, in short, have different natures and peculiarities, but one cannot rashly and thoughtlessly conclude that ideologies would be inconvenient, harmful, pernicious or useless. Ideologies are inherent to the human mind and culture, they give originality to human social collectivities and, as long as they are lawful and used for equally lawful purposes, they are necessary and always welcome. What can already be anticipated is that a certain technology can be used for legal or illegal purposes, but no technology is illegal in its essence, the problem lies in the use that the human being makes of it. Ideologies, on the contrary, can be illicit in nature, such as, for example, an ideology of crime that would trivialize criminal conduct and consider the delinquent as a victim of society. Another evidence that spontaneously reveals itself is that the guiding ideology of the law of a nation, even if its content is debatable, manages to maintain the internal social order, however it will not avoid conflicts within the scope of International Law. This will be the case

because ideologies are at the origin of conflicts between nations, due to ideological divergences. Ideologies favor *subjectivity* and this makes them vulnerable to the most reprehensible goals of determined people. Technologies make possible the exercise of *objectivity* in its purest degree; an example of this is artificial intelligence. Despite the risks that pessimistic or ill-informed people fear, a state governed by artificial intelligence systems would be more efficient and less unfair than the current nations whose governments are guided by the huge number of ideologies that have invaded human societies. The objective of the present work is to objectively and impartially analyze the peculiarities of ideology and technology and to identify the spaces that each one should use as an efficient and effective instrument for conflict resolution.

Keywords: Technology, ideology, conflicts of interests, peaceful conflict resolution

INTRODUCTION

The present study is concerned with the search for the most objective and efficient means to resolve conflicts of interest. The social order must always be maintained on an objective and never a subjective basis. Conflicts always arise in relationships between at least two people, this is reason enough not to admit that the solution is based on only subjective impressions because it goes beyond the world of an isolated individual.

A striking feature of human beings is their creativity.

The big problem is that the human being is creative for both good and bad social conducts. Because of this, human societies have a serious problem: they cannot predict what someone is going to do.

But human groups organized in the form of sovereign states, can predict what one cannot do and also what one must do. What one cannot do is defined by a norm whose command is a *prohibition*. What one should do is defined by a norm whose command is a duty. It is, therefore, through norms that the law seeks to avoid conflicts.

However, the rule is not exclusive to the law. Religious norms, for example, in the past, in homogeneous collectivities in which everyone followed the same religion, religious norms obtained the same result that currently obtains with legal norms. It happens, however, that nowadays the citizens of most countries follow different religious beliefs, which is why no religion can maintain social peace.

In contemporary states, the solution to maintain social order is the adoption of a single system of norms that obliges everyone regardless of religion. It must necessarily be so because if an individual's conduct is disapproved by the religion he follows, it is enough for him to change his religion to no longer be disapproved. This single system of rules that would be binding on all citizens obviously refers to legal rules. Regardless of each country's system of government, legal norms are generated by a state body. This body can be multi-person or single-person in each country, but it will always be driven by a certain *ideological line*.

Regardless of the ideology that inspires the Positive Law of each country, its norms prevent most conflicts between citizens and also conflicts between these citizens and the State, but do not prevent the emergence of conflicts between countries that adopt different ideological orientations.

In the history of humanity, the emergence of ideologies is much older than the development of technologies, but both coexist in the same space and time, despite being two phenomena of absolutely different natures.

Technologies are developed to solve anyone's problems without distinction. Ideologies are created to satisfy the particular views of the person or group that conceives them.

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Technologies bring people together, ideologies can distance and even rival people, groups and nations. Technology and ideology, in short, have different natures and peculiarities, but one cannot rashly and thoughtlessly conclude that ideologies would be inconvenient, harmful, pernicious or useless.

Ideologies are inherent to the human mind and culture, they give originality to human social collectivities and, as long as they are lawful and used for equally lawful purposes, they are necessary and always welcome. What can already be anticipated is that a certain technology can be used for legal or illegal purposes, but no technology is illegal in its essence, the problem lies in the use that the human being makes of it.

Ideologies, on the contrary, can be illicit in nature, such as, for example, an ideology of crime that would trivialize criminal conduct and consider the delinquent as a victim of society.

Another evidence that spontaneously reveals itself is that the guiding ideology of the law of a nation, even if its content is debatable, manages to maintain the internal social order, however it will not avoid conflicts within the scope of International Law.

This will be the case because ideologies are at the origin of conflicts between nations, due to ideological divergences. Ideologies favor *subjectivity* and this makes them vulnerable to the most reprehensible goals of determined people. Technologies make possible the exercise of *objectivity* in its purest degree; an example of this is artificial intelligence.

Despite the risks that pessimistic or ill-informed people fear, a state governed by artificial intelligence systems would be more efficient and less unfair than the current nations whose governments are guided by the huge number of ideologies that have invaded human societies.

The objective of the present work is to objectively and impartially analyze the peculiarities of ideology and technology and to identify the spaces that each one should use as an efficient and effective instrument for conflict resolution.

Methods for resolving conflicts between more than two people can never be based on the approach that interests only one of the people involved, as this would be impartial and unfair.

The study will therefore depend on a careful analysis of the degree of objectivity that ideology and technology present.

Humans have been evolving for hundreds of thousands of years. In this long evolution, man has developed processes and created instruments designed to make it easier and faster to solve his concrete problems. It was from the simplest instruments like chipped stones to the most refined ones like the wheel. These procedures and inventions are part of the genotype of what are conventionally called techniques, and these in turn are the raw materials of the technologies. The most primitive techniques, obviously, were not derived from scientific knowledge. Nowadays, techniques are the practical applications of knowledge developed by a Science to solve concrete problems.

Science involves methodical and systematic study through experimentation, and the technique is materialized by the concrete application of knowledge provided by science, technology would be an applied Science, or even, the practical, efficient and progressively effective result of the Sciences and their respective techniques.

Technology has a life of its own, obviously not in the biological sense, but also not in its only logical scope, as it works and provides solutions and amenities without the human agent having provoked or even remembered them. Often, by the way, they are technologies that remind or alert the man about something that, concentrated in his routine, he would not remember. This is the case even with a simple automatic corrector that, even without the person even knowing they made a mistake, immediately suggests alternative terms, expressions or even phrases. Technology is not to be confused with the technique that is at the service of the human agent in its concrete activities, it is also at the service of science.

The usefulness and indispensability of technology for the concrete service of human needs, including the solution of conflicts of interests, is undeniable, but would ideology also play a relevant role in achieving the same ends? To answer this question, some characteristic and

other aspects of technology and ideology need to be remembered and examined objectively and impartially in terms of factors that the maintenance of social peace requires.

Some peculiarities of technology that distinguish it from technique have already been brought to the text. Many others can be mentioned here, but what deserves special attention is the fact that a technique is a means that, in order to fulfill its purpose, requires a subject, someone who employs it when he needs it. Technologies, on the contrary, are subject-independent, as they involve a complex of several resources, which can be activated spontaneously, without an individual being consciously managing it.

Artificial intelligence, for example, is a technology and, as such, it acts in our world without an agent, a physical person, needing to activate or manipulate it. This is a particularity that ideologies do not present.

Although artificial intelligence is questioned for not containing feeling, emotion or sensitivity, this peculiarity makes it more reliable, as it will not have positive or negative feelings such as greed, dishonesty, hatred and other absolutely undesirable ones.

Technologies, in short, are devoid of subjectivity, are objective, impersonal, impartial, have a purely logical and not a psychological nature.

Another aspect of technology, not the only one, but one of the most important, which would explain the numerous mentions made to the term technology in the text of the Constitution of the Federative Republic of Brazil, is its licit nature.

A technology can even be used for illicit purposes, but this illicitness is not inherent to it, as it originates in the mind of the human agent.

SUSCEPTIBILITY TO UNLAWFULNESS

Technologies are licit by essence, but not all ideologies. As ideology is the result of people's mental elaboration, it can be illicit from its conception. An example of this is the ideology of crime and others linked to it, such as those that favor the trivialization of certain illicit acts through the demonization of society and victimization of the criminal.

The primary source of technology is always Science. Ideology, on the other hand, has numerous possible sources and none of them is Science or any other coated with objectivity to the same degree as science.

The development of a technology requires financial resources, highly trained professionals and constant questioning to avoid failures during its future use. The creation of an ideology is free, its authorship is usually unknown and, if it fails in the future, there is no way to legally hold its creator responsible. It is not for the cost-pleasure, but for the utility, that people are always willing to buy new technologies. Ideologies, however, even if they are new, nobody wants them even for free, because the "consumer" who acquires them would not be protected by the rules that the acquirer of a technology has for this purpose.

Technologies are developed to solve anyone's problems without distinction. Ideologies are created to satisfy the particular views of the person or group that conceives them.

Technologies bring people together, ideologies can distance and even rival people, groups and nations.

Technology and ideology, in short, have different natures and peculiarities, but one cannot rashly and thoughtlessly conclude that ideologies would be inconvenient, harmful, pernicious or useless. Ideologies are inherent to the human mind and culture, they give color and originality to human social collectivities and, as long as they are lawful and used for equally lawful purposes, they are necessary and always welcome.

The foundations of technology are covered by an objective reliability that is not always present in the creation of an ideology, as technologies germinate from the efficiency and effectiveness of techniques. Techniques, in turn, by serving as a substrate for the development of new technologies, have already conquered their space in the general objective credibility,

since they result from the concrete application of knowledge sedimented by scientific methods, especially the constant self-questioning.

Self-questioning is an absolute exclusivity of science and, obviously, does not exist in any other field of human knowledge. Science that stopped questioning its own discoveries would become

obsolete and would die. The self-questioning of science that supports a technology, enhances its credibility and effectiveness. Nothing, and no one, develops if you don't question yourself.

Easily explained, therefore, the fact that there are numerous outdated or improved technologies and these two qualities are attributed by their own developers.

The admirers of an outdated technology will not insist on keeping it alive indefinitely, on the contrary, they will replace it with the new technology, because what they admire is the usefulness, efficiency and effectiveness of the technology and not the technology itself.

If Science, the source and foundation of all technologies, self-questions and challenges itself on objective grounds, on pain of disappearing, technology must likewise do so, and effectively it does so.

Technologies, and thus also ideologies, have their own autonomous existence, content and meaning. Consequently, if someone does not want, and chooses to despise, a certain ideology, no punishment or other undesirable consequence can be imposed, unless, of course, if the adoption of such ideology is subject to a legal normative command, as happens in countries where the observance of particular ideological dogmas constitutes, not at all democratic, command of cogent legal norm.

What we can safely conclude so far is that technologies and ideologies inhabit different worlds and moments. Technologies involve objective solutions to concrete (real) problems, and are as infallible as possible until the opportunity to apply them. Ideologies, on the other hand, involve subjective options, there are several available, it is enough to freely choose (without scientific basis or any other objectively sustainable), in addition, they were not subjected to the tests of questioning and objective sedimentation.

If, therefore, the objectives of sustainable development demand real and adequate solutions to the peculiarities of the problem to be solved, there is no way to understand that the solutions could be substantially ideological.

This conclusion, however, cannot be seen as adverse to ideology, it is linked to the contingencies inherent to the different worlds and moments of ideology and technology, given that technology has a substantial character in the concrete (real) necessary and adequate solution, while technology ideology has a circumstantial character and, as such, it will be unacceptable only if it prevents or corrupts the solution made possible by technology, as it is possible to perceive in the hypothesis object of the next paragraph.

Technology and ideology combine to serve as instruments for conflict resolution. Each one participates in this combination in the proportions necessary to ensure efficiency of the procedure and fair solutions.

This combination prints the unique style of each region, each culture, each human group, because while technology defines the content and form that, in order to ensure social peace, ideologies can never replace or distort them.

It is absolutely necessary to point out that under no circumstances could illicit ideologies be admitted, nor those that are considered superior and excluding any others. For the same reasons, ideologies that believe they are capable of solving all human problems should be removed.

Prior care regarding the acceptability of ideologies to resolve conflicts of interest has a circumstantial nature and, for this very reason, can be reduced to just two conditions: all must be lawful and not excluding other ideologies.

FUNGIBILITY OF IDEOLOGIES

Finally, for the solution of conflicts of interest, the ideological aspects are replaceable, the technologies irreplaceable. Irreplaceable because their performance is not simply circumstantial, but substantial; Technologies are the means and mechanism of solution in motion and processing.

Ideologies have a circumstantial character and must be limited to the space reserved for them by law, otherwise they will be illegal.

Ideologies are freely fungible. someone's simple and pure will is enough, although without a sustainable foundation on objective, logical bases.

Techniques, in turn, are replaced only when a new, more accurate, efficient and effective technique appears to solve problems that afflict human beings.

Technologies are not replaced by the simple unreflective will of someone. Unlike ideologies, technologies are infungible in the face of the simple and unfounded will of someone who just wants to satisfy their personal whims or those of their group.

The character of ideology, when participating in the creation and implementation of public policies, is circumstantial, hence the risk of invading the substance and making it illegal. The nature of technology is instrumental, therefore not threatening the content of conflict resolution.

Ideologies are conceived and developed in the universe of subjectivity. Technologies, in turn, are developed on an objective basis, under penalty of being inefficient and ineffective.

Technologies act in our world without the need for a human agent to activate it and direct its operation. Once programmed (currently, still by a human being of course), any technology has an autonomous and active existence. A simple alarm from a cell phone is a sufficient example of this. Ideologies have a more passive existence, being therefore more subject to mutations destined to immediately or in the future satisfy hidden personal interests. Technologies, even if illicitly used to satisfy interests of this nature, do not undergo mutations because they would not have scientific support.

All technology is born and develops in the light of science and thus, it is licit by essence, even if used for illicit purposes. Ideologies, however, are never born of science and may have one or more among several other probable sources, in addition, they are submitted to the mind and, therefore, to human free will, which is why they are not always lawful by nature.

Technologies do not fight each other, they are accommodated in the spaces of the universe of objectivity, efficiency and concretely proven effectiveness. Whenever two or more technologies serve as a means to achieve the same result, to solve the same problem, the criterion by which only one prevails, does not resort to force or persuasion, one simply succeeds the other(s) because their efficiency in conducting the means and their effectiveness in achieving results were proven to be superior.

Ideologies fight each other whenever they are totally or partially divergent. The result of this combat is the elimination of the one(s) whose adepts are weaker, and the survival of the one supported by the stronger group(s).

Technologies are not created and developed for free, the need for scientists, specialized technicians and financial resources often exceeds the capacity of countries alone. In addition, during its useful life, technology depends on the performance of highly qualified professionals and its success in obtaining effective results is conditioned to constant objective questioning. The creation of an ideology, in turn, is free, its author does not need to prove aptitude and efficiency, as it is often even unknown. If, moreover, the ideology later results in serious failures that cannot be characterized as illegal, its creator and its operators cannot be held legally responsible as there is no obligation to register or any other condition for the creation and use of an ideology.

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Technologies are tools for solving anyone's problems without any discrimination. Ideologies are born from the need to satisfy particular desires of those who conceive it or the group that creates it.

Technologies have among their objectives, to provide comfort, health, well-being, education, solutions to mitigate or eliminate the dangerousness or hardship of activities, as well as to alleviate or eliminate human suffering in any other situations, in addition to an infinity of other purposes. Ideologies can promise all this and more, but the effectiveness will always be uncertain.

Wars, revolutions and other undesirable situations, resulting in misery, suffering, mutilations and deaths, never result from a conflict between scientific discoveries, much less from technical or technological divergences. Tortures, shootings, beheadings and immolation at public stakes were never caused by scientific differences, but rather by differences between visions of the world, of man and of life. The elimination of such divergences of ideas was never done through scientific or minimally objective methods and the "clarification" was always done by the strongest.

Having made these considerations about the aspects that distinguish technologies and ideologies, we can now finally conclude that the natures and particularities are not always convergent, however, it will always be hasty and devoid of any basis to say that ideologies would be something negative or harmful and should be abolished from the civilized world. Ideologies have already fulfilled and continue to play an important role in the development of humanity. After all, as we had the opportunity to quote in this text, there are those who believe that the SDGs are also ideologies.

In achieving the goals of sustainable development, in short, technology and licit and non-excludable ideologies, despite their different and unmistakable peculiarities and essences, combine to improve and improve personal and social human conditions.

This combination of technology and ideology results in the definition of the particular touch and distinctive style of each human group. To obtain these results, technology takes care of the content, form and procedure without which the goals immanent to the SDGs would not be achieved. Although ideologies can never replace technologies to achieve the ends mentioned above, they are responsible for human touch and retouch. It is thanks to the peculiar human systems of ideas and visions of the world that SDGs such as quality education, gender equality, decent work and the reduction of inequalities, among others, will have their own configurations, contents and forms according to the individual and collective conceptions prevailing in each region or country.

In the field of sciences, the questions are always based on discoveries made in the world outside the human mind, which are either new or are the improvement caused by new and judicious observations. Discussions, even apparently scientific ones, do not survive if operated based only on opposing ideas without any proof.

These peculiarities of science inspire the use of expressions such as scientific proof or scientifically proven, especially in commercials to lend respect, strength, the appearance of undisputed, scientific truth, but they are only persuasion devices and not reasoning techniques, as they prove nothing. The same effect would never be obtained if the expressions were: ideological proof or ideological proof.

Ideologies rest on particular impressions of humanity and the world itself, which, without going through the objective and detailed investigations of the scientific method, normally choose, as unquestionable, means not always defensible on objective bases, in the search for an ideal of a social, religious nature, political or of any other nature, in order to attenuate or eliminate factors that had been accepted, or even tolerated, without opposition of resistance.

Although the method of ideologies is not to be confused with scientific rigor, it cannot be denied that there are ideologies whose pursuits, actions and reactions are not illicit, immoral, or excluding others whose ideals are opposed to them.

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Sciences are never born or developed exclusively from ideas, nor from particular aspirations of someone or a group. Furthermore, it would be unthinkable to maintain “scientific knowledge” and impose it by force, absolutely against the will or judgment of each one.

CONCLUSIONS

Disputes, revolutions, wars and the consequent sacrifices of human lives are not provoked by disagreements and discussions concerning scientific discoveries. In human history, people have been tortured, shot, guillotined or burned at public stakes, due to scientific disagreements, but because someone who does not give up his ideas and who has more strength, wants to eliminate ideas and, not infrequently, even discoveries. objective, scientific, of others.

Diverse sciences coexist and, in perfect balance, parity and harmony, complement each other. It is with the technical solutions supported by them and with the technologies derived from them.

Ideologies are more isolated, turned in on themselves.

Some may integrate small systems, but these are selective and never coherent with each other to the point of forming a large system that encompasses them all. Ideologies are always ready to fight each other and, if possible, eliminate the others.

Technologies do not fight each other, they only compete for space in the world of objectively proven effectiveness to achieve results desired by those who adopt it.

Furthermore, if the results promised by a certain technology are not obtained by its user, he is protected by law as a consumer, although he is really hypo sufficient in the face of ideologies that promise him and will never give him security, tranquility, happiness and other promises. assumed by most ideologies.

**PANDEMIC INDUCED WORK FROM HOME DISRUPTING NON WORK DOMAIN
ELEMENTS**

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Abstract

The pandemic-enforced work-from-home (WFH) arrangements since early 2020 have presented an unprecedented challenge for employees and the management. These new demands disrupt the work from home experience and their respective impact on employees' personal and work-related outcomes. As a result, this created a strong interdependent environment where personal and work life collide. Activities that were previously performed outside the home or at the workspace are now mostly performed inside the home (HO- home office) environments. This disruption has had a profound impact in the management of the home affairs and realigning priorities of the family members. Destabilizing factors that occur in this new hybrid environment include risk of overworking, workplace disconnect, difficulty in balancing responsibilities, inability to concentrate could be one of the most important factors for productivity during working from home which often can be disrupted by the home environment. The purpose of this study is to examine the factors that cause disruptions between the employee and their work life, as well as how this affects the personal domain of an employee. Various studies published in this area of research has been reviewed part of the literature review and the scholarly conversations are in line with the outcome of this qualitative study. It is evident that WFH or HO has had a negative impact on non-work domain elements, family time and personal factors.

Key Words: Home office, Productivity, Family, Personal Factors, Work Environment

**SOCIO-ECONOMIC IMPACT OF THE N-POWER SCHEME ON THE
BENEFICIARIES IN OKITIPUPA LOCAL GOVERNMENT AREA OF ONDO
STATE.**

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Abstract

This study critically appraises the implementation of N-power scheme and its' impacts on youth empowerment in Okitipupa Local government area of Ondo state, Nigeria. Specifically, the objective of the study was to identify challenges militating against the programmes in ensuring empowerment of youth in the study area and to proffer strategies that can address the challenges of the N-Power programmes for more effective youth empowerment in Nigeria. The study adopted survey research design while purposive and accidental samplings were used to select beneficiaries. Questionnaires were used to collect data as Key Informant Interviews were also used to compliment Questionnaire. The study found out that N-Power has only made little impact on the "saving culture" of the beneficiaries. Some challenges according to the opinions of the beneficiaries were, delay of monthly stipend payment, unpaid allowances and lack of teachers' training for most of the N-Tech beneficiaries. The study therefore concluded and recommended for budgetary provisions to be made by the Ondo State Government, decentralization of operational activities by the Federal Government to State level and in addition, prompt and timely payment of the stipends to beneficiaries of the programme by the Federal Government, teacher should also educate the N-Teach categories in other to bring about efficiency.

Keywords: Unemployment, Poverty, Empowerment, National Social Investment Programme, N-Power, Youth.

**CRITICAL FACTORS TO INNOVATIONS & BUSINESS START UP –
INTRODUCING & DESIGNING OUR FIRST CREATIVE IDEA.**

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Abstract

The presentation will focus on the following questions: What is creativity? How creative ideas emerge naturally & their motivations? Why is feedback crucial? What is different and unique about our creative idea? How do we write a convincing proposal to get your creative idea intrigued and approved? What do we do next?

Keywords: Innovations, Feedback, Competitors, Risk Management, Comfort Zone, Unique, Different.

DNA NANOTECHNOLOGY AND BIO-IMAGING

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Abstract

Late prenatal growth, early postnatal growth, and layering of the neocortical neurons (NC-Ns) play determining roles in the development of the cerebral cortex (CC). Here, we systematically explore the interactive role of neuronal surface receptors (NSRs) on cytoskeleton activation (CA) and the piconewton (pN) force generation (P-FG) and their influence on the proper development, growth, and functioning of neurons using a designed DNA nanomechanical device (DNA-NMD).

This DNA-NMD, functioning as a molecular tension probe (MTP), can be used to selectively bind the different NSRs (β -NGFR, Reelin, and Integrin) to mono-, bi-, and trispecifically activate the receptors on the NC-Ns surface for imaging and calculating the P-FG involved in various processes. Measurements *in vivo* on the brain of newly born Institute of Cancer Research mice (early postnatal) or *in vitro* after extracting neurons from the fetal brain of pregnant Institute of Cancer Research mice (late prenatal) reveal that there are augmented interactive roles of the β -NGFR with Integrin and Reelin receptors (RR) on the CA and P-FG, resulting in enhanced directional migration of the neuronal endings (M-NEs), layering, and the somal terminal translocation (S-TT) followed by early postnatal growth.

Keywords: Neocortical neurons (NC-Ns), Neuronal surface receptors (NSRs), Migration of the neuronal endings, Somal terminal translocation, DNA nanomechanical device, Trispecific activation/deactivation

**GUT DYSBIOSIS IN DOGS WITH SPINAL CORD INJURY: IMPACT OF
POLENOPLASMIN**

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Abstract

Background Studies have demonstrated the presence of gut dysbiosis (alterations in gut bacterial homeostasis) secondary to spinal cord injury in dogs. The dysbiosis is thought to impair recovery by decreasing the production of short-chain fatty acids which play a role in suppressing inflammation within the central nervous system.

Objective Therefore, targeting gut dysbiosis could have significant therapeutic value in the management of spinal cord injury. The purpose of this study is to determine if gut dysbiosis occurs in dogs with spinal cord injury. Another area of potential intervention interest is in situations of spinal injury where there is an urgent need to generate new neurons. To arrive at these observations, the authors examined how Polenoplasmin and diet solve paralysis in dogs.

Materials and methods The most common cause of spinal problems in dogs is trauma. We are currently assessing whether indoles can also stimulate formation of neurons in dogs with paralysis.

Results We found that gut microbes that metabolize tryptophan-an essential amino acid-secrete small molecules called indoles, which stimulate the development of new brain cells in dogs, also demonstrated that the indole-mediated signals elicit key regulatory factors known to be important for the formation of new neurons.

Conclusion This study is another intriguing piece of the puzzle highlighting the importance of lifestyle factors and diet.

In conclusion, the link between the health of the microbiome and the health of the brain shows how microorganisms in the gut solve paralysis. Gut microbe secreted molecule linked to formation of new nerve cells in paralysed dogs.

Keywords: intestinal dysbiosis, indoles, paralysed dog, Polenoplasmin

**EFFECT OF MHD BLOOD FLOW WITH VELOCITY, THERMAL AND
CONCENTRATION SLIP BOUNDARY LAYER**

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Abstract

In this paper the effect of thermal radiation, chemical reaction, and viscous dissipation on MHD blood flow with stretching capillary velocity, thermal, and concentration slips boundary layer has been studied. The nonlinear partial differential equations are converted into a set of dimensionless ordinary differential equations using similarity transformations. Numerical solutions are obtained using MATLAB code. The effect of physical parameters i.e., velocity, thermal and concentration slip, thermal buoyancy parameter, Eckert number on flow variables i.e., velocity, temperature and concentration have been discussed graphically. The following important results are obtained from the numerical results: an increment in both velocity slip and thermal buoyancy results in an increment of the velocity of blood flow in permeable capillary; the temperature of blood flow in the wall of permeable capillary increases as the values of Eckert number and thermal slip increases; as the values of concentration slip increases the concentration of the blood flow in permeable capillary increases.

Key words: Permeable capillary, velocity slip, thermal slip, concentration slip, viscous dissipation.

ISOLATION OF PLASTIC DEGRADING BACTERIA FROM DUMPSITES IN
LAGOS

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Abstract

Plastic pollution is a threat to the environment because of its slow degradation rate and high usage. The continuous accumulation of these synthetic plastic wastes poses an ever-increasing threat to animals, humans, and the environment, and the use of microorganisms to effectively degrade plastic waste can provide a solution to the problem of plastic pollution. The study aims to isolate plastic degrading microorganisms from soils. The soil samples used for this study were collected from dumpsites filled with plastic and plastic materials and the effectiveness of the degradation of plastic materials was studied over six (6) weeks in broth and agar culture under laboratory conditions by weight determination method. Physicochemical and microbiological analysis was carried out on the various soil samples using standard protocols. The biodegradation of polyethylene and polystyrene was done in-vitro using the microorganisms isolated from the soil. Microorganisms that were able to degrade a higher percentage of the plastic materials were; *Staphylococcus aureus*, *Streptococcus* sp, *Bacillus* sp and *Escherichia coli*. The total viable count for bacteria were within the range of 11.8×10^5 to 2.0×10^{10} CFU/g. *Staphylococcus aureus*, *Streptococcus* sp, *Bacillus* sp and *Micrococcus* sp degraded plastic up to 25%, 31.2%, 25% and 31.2% respectively. These isolates may be used to actively degrade plastics, thereby reducing the rate of plastic pollution in our ecosystem.

Keywords: Microbiological, physicochemical, vehicle tankers, water.

SYNTHESIS, ANTI-INFLAMMATORY ACTIVITY OF 3-AMINO 5-METHOXYL-2-METHYL QUINAZOLIN-4(3H)-ONE AN AMINO-6-METHOXYL-2-METHYL OF 4H-BENZO[D] [1,3]-OXAZINE-4-ONE

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Abstract

Quinazolinone derivatives represent one of the most active classes of compounds possessing a wide spectrum of biological activity. They are widely used in pharmaceuticals and agrochemicals.

The condensation of 2-amino-methyl-5-dimethoxybenzoate with acetic anhydride yielded the cyclic compound 2-methyl-5-substituted-1,3-benzo-oxazine-4-one which further produced a novel 2,3-disubstituted quinazolin-4-ones via the reaction with hydrazine hydrate. The compounds synthesized were unequivocally confirmed by means of Infrared, Nuclear Magnetic Resonance (^1H and ^{13}C), Gas chromatography-mass spectrophotometer and elemental analysis. The synthesized compounds were screened and evaluated pharmacologically for their in-vivo anti-inflammatory activity and the paw volume of each rat was measured before 1 h and after 3 h of carrageenan treatment with the help of a plethysmometer.

Compound 1 had anti-inflammatory activity of 89.03% and 88.03% at 20 mg/kg and 10 mg/kg respectively, while compound 2 had anti-inflammatory activity of 94.79% and 90.30% at 20 mg/kg and 10 mg/kg respectively. Compound 1 displayed a singlet signal at: δ 3.78 attributed to methoxy group and singlet at δ 3.68 which was due to methyl group. Also, ^1H NMR spectrum of compound 2 showed a characteristic signal at δ 2.56 (singlet) corresponding to methyl group and duplet at: δ 3.90 for methoxy group. For the IR spectra, Compound 1 was characterized by absence of ν NH_2 and presence of ν C-O stretch in 1101cm^{-1} region of the compound. Compound 2 showed the highest anti-inflammatory activity at 20 mg.kg of 94.79% compared to compound 1 and indomethacin. These compounds synthesized had a higher anti-inflammatory activity than indomethacin which is a standard anti-inflammatory drug. Compound 2 had a higher anti-inflammatory activity than Compound 1. The compounds synthesized had a higher anti-inflammatory activity than Indomethacin, a standard anti-inflammatory drug.

Keywords: Anti-inflammatory activity, Quinazoline-4(3H)-One, 6-methoxyl 2-methyl 4H-benzo[d] [1,3]-oxazine-4-One, Nucleophile, Synthesis, 3-Amino 6-methoxyl -2-Methyl

**DIFFERENCES BETWEEN LIVER ENZYMES IN HOSPITALIZED PATIENTS
WITH DELTA ANDOMICRON VARIANT OF SARS-CoV-2 IN CLINICAL
HOSPITAL BITOLA, MACEDONIA**

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Abstract

SARS-CoV-2 outbreak which caused by the severe acute respiratory syndrome, has rapidly spread over the world. SARS-CoV-2 can have multi-organ impact. Recent studies show that liver injury could be a manifestation of the disease, and that liver disease could also be related to a worse prognosis. The aim of this study was to evaluate the liver function in patients with Delta variant of SARS-CoV-2 and patients with Omicron variant of SARS-CoV-2.

Our study includes 60 adult patients, 20 females and 40 males with Covid 19 infection. They were hospitalized and treated in PHO Clinical Hospital Dr. Trifun Panovski Bitola, Macedonia in the period January 2021 to February 2022.

We separated patients in two groups – 30 patients (7 females, 23 males) with Delta variant of SARS-CoV-2 and 30 patients (13 females and 17 males) with Omicron variant of SARS-CoV-2.

Patients with Delta variant of SARS-CoV-2 were at age 33 – 87 ($66,4 \pm 14$), and patients with Omicron variant of SARS-CoV-2 were in age 17-88 ($62,3 \pm 17,5$).

We measured levels of ALT and AST in patients with Abbot Architect CI4100 analyzer.

Mean values of ALT was $60,36 \pm 32.2$ in patients with Delta variant of SARS-CoV-2 and 64.27 ± 43.9 in patients with Omicron variant of SARS-CoV-2 , $p = 0.6958$.

Mean values of AST was 34.66 ± 24.1 in patients with Delta variant of SARS-CoV-2 and 41.2 ± 51.8 in patients with Omicron variant of SARS-CoV-2, $p = 0.5336$.

We can conclude that patients with Omicron and Delta variant of SARS-CoV-2 have increased values of ALT. We did not find the statistically significant differences of liver enzymes in booth groups of patients with Delta variant of SARS-CoV-2 and patients with Omicron variant of SARS-CoV-2.

Keywords: ALT, AST, liver enzymes, Omicron variant of SARS-CoV-2 , Delta variant of SARS-CoV-2 , Macedonia

**UTILIZATION OF TRADITIONAL MEDICINE (HERBS) AS ALTERNATIVE
MEDICINE**

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Abstract

The use of traditional medicine is generally considered safer than the use of modern medicine. This is because traditional medicine has relatively fewer side effects than modern medicine. In addition, several things that encourage people to choose traditional medicine as an alternative treatment include economic problems, being more suitable with traditional medicine, and following the advice of neighbors who have used traditional medicine. treatment. In this study the method used is descriptive method. This research is a field research with qualitative research, namely procedures that produce descriptive data. The traditional treatment carried out by Grandma Yati in Kalanglundo Village is carried out using traditional medicine media, both from plants and animals. If the patient has recovered, a prayer or thanksgiving is held at Grandma Yati's house.

Keywords: Traditional medicine, alternative treatment

EVALUATION OF LARVICIDAL ACTIVITY, PHYTOCHEMICAL SCREENING
AND ISOLATION OF COMPOUND FROM *Indigofera nummulariifolia* LEAF
EXTRACT

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Abstract

Phytochemicals accumulate in different parts of plant such as in the roots, stems, leaves, flowers, fruits or seeds and are responsible for protecting the plant against microbial infection or infestation by pest and provide health benefit for humans. In the present study we aim to investigate the larvicidal activity of *Indigofera nummulariifolia* leaf extracts against *anopheles* mosquito larvae and to isolate compound from the active fraction. The phytochemical screening revealed the presence of alkaloids, carbohydrates, saponins, steroids, flavonoids, proteins diterpenes and triterpenes. The chloroform fractions of *I. Nummulariifolia* showed moderate larvicidal activity ($476.43 \mu\text{g}/\text{cm}^3$). Bioactivity-guided separation and purification led to the isolation of many fractions. Further purification, gave a coded compound (I.N-3) as a moderately active compound ($LC_{50} 712.42 \mu\text{g}/\text{cm}^3$). The characterization of coded compound (I.N-3) was conducted using $^1\text{H-NMR}$, $^{13}\text{C-NMR}$, and IR spectroscopy, the compound was suggested to be 2,3-bis[[*Z*]-octadec-9-enoyl]oxy]propyl (*Z*)-octadec-9-enoate. The coded compound I.N-3 was successfully isolated, characterized and found to be moderately toxic to the mosquito larvae. The phytochemical result obtain can serve as a guide for isolation of active compounds.

Keywords: phytochemical, larvicides, extraction

**A STUDY OF THE RESIDUAL INTERACTIONS OF COX AND ITS INHIBITORS
USING MOLECULAR DOCKING AND ADMET IN SILICO PREDICTIONS.**

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Abstract

In preclinical investigations, cyclooxygenase-2 (COX-2) stimulated the manufacture of prostaglandin E2 and was linked to tumor development, infiltration, and metastasis. COX-2 inhibitors have been found to be toxic. As a result, screening natural compounds derived from plants against COX-2 is of interest. COX-2 is recognized as a significant therapeutic target. Herbal remedies have traditionally been used to treat a variety of illnesses and symptoms. Similarly, the phytoconstituents in *Bauhinia variegata* have anti-cancer, anti-diabetic, anti-ulcer, anti-oxidant, nephroprotective, hepatoprotective, relaxing, and immunomodulatory activities. C1, C2, and C3 are three recently identified *Bauhinia variegata* phytoconstituents with unknown molecular interactions and activities. In this work, Chemosophia was used to screen the isolated compounds for potential biological activities, and it was discovered that they had a high likelihood of inhibiting COX-2. Furthermore, the crystal structure of the molecules bound to COX-2 was yet to be confirmed experimentally. As a result, the goal of this research was to identify the residues in the COX-2 binding interaction. To do so, author used molecular docking and the ADMET approach to determine binding modalities and oral bioavailability. The findings of this study will be useful in the development of new COX-2 inhibitors that are both effective and selective.

Keywords: COX-2, Molecular docking, ADMET

**ANALYTICAL STUDY OF SOME BIOMECHANICAL VARIABLES AND
ACHIEVEMENT OF FOOTPRINT IN DISCUS THROWING FOR APPLICANTS**

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Abstract

Motion analysis is one of the basic and effective sciences in the mathematical field, as this science is concerned with analyzing the movements of the athlete by applying mechanical laws and investing them during motion performance, The discus throwing event is one of the activities that require special physical specifications aimed at achieving the best achievements, and these physical characteristics include the explosive ability of the aiming and explosive arm of the two legs and the rapid strength of the two legs, the researcher must use modern equipment, It is also known that the value of scientific research depends on the type and accuracy of data, and from these devices (Dyna foot), which is a device for analysis in detecting the values of many variables of the amount of pressure, the exerting force, the time of contact and the extent of benefit from these variables in identifying errors and laying down dates And developing appropriate special exercises for it, The researcher used the descriptive and analytical approach to treat data and information related to the nature of the problem. And the causal method is in which the researcher tries to determine the cause of the differences in the behavior or state of a group of individuals, The researcher selected a sample of the four Iraqi champions in the discus throwing competition for the Iraqi champions, The researcher argued that the performance in discus throwing requires the integration of the continuous momentary force exertion in each of the legs and the discrete momentary force in the trunk and arms in order to achieve movement paths through the integration of thrust in the muscles of the working body parts.

Keyword: Motion analysis of sport

**WHAT WE LEARNT FROM STUDENTS' AND TEACHERS' FEEDBACK ON
HOME-BASED LEARNING**

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Abstract

When schools were closed nationwide in early 2021, Malaysian school students and teachers plunged into another wave of home-based learning which, despite its advantages, proved to be challenging for the students as well as for the teachers. In fact, the school closure was longer than the year the pandemic started which was 2020. Thus, this research was intended to explore students' home-based learning experience and teachers' opinions on the approach. The rationale of this study was to improve the school's approach in coping with the declining students' attendance as well as their lack of engagement in learning. The findings revealed that majority of the students and teachers preferred the combination of asynchronous and synchronous learning. It was also discovered that the students requested for more teachers' support and assistance throughout their learning while teachers wanted the students to take their study more seriously. Although home-based learning might continue to change and schools might permanently return to full face-to-face learning in the future, this research is still vital in providing insights that can help to improve teaching and learning process.

Keywords: home-based learning, asynchronous, synchronous

FROM NATURE TO CULTURE: THEORIZING COOKING AS A CULTURAL ACT

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Abstract

Exploring the concept of the culinary triangle proposed by the ethnologist Claude Levi-Strauss and his theory of culinary structuralism, we attempt to theorize food and the culinary practice as a cultural achievement the human beings have gained through years. It is believed that culinary culture is a part of the total culture, and it reflects the culture and the tradition which surrounds the total system. Taste comprises a surplus that directly breaks the cycle of appetite and repletion, of emptiness and fulfilment as well as that of memory and effect. Food is a matter of survival and in any culture, it is combined with many religious, political, secular, and social aspects and practices of a community. Food and drink are not part of the repertoire of traditional sensory learning and do not belong to the central themes of the construction of meaning. At best, they are part of the infrastructure of meaning and reason. This paper also attempts to study food and drink in traditional philosophy, we would like to discuss theories Plato, Aristotle, Kant, and others. This study looks at the philosophy of food and we consider food is as a cultural achievement rather than a natural process.

Key Words: Food Culture, Culinary Triangle, Claude Levi-Strauss, Culinary Structuralism, Culinary Practice, Food Habits

**MANY CHURCHES, MANY ETHNICITIES, ONE POOR COUNTRY: INSIGHTS
FROM RELIGIOUS MEDIA PERSPECTIVE**

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Abstract

This study explores religious media portrayal of development issues, from the establishments 1993 to 2021. It is done by considering the development content of two Ethiopian religious magazines (Hamer and Hintset). It involves qualitative content analysis of the magazine's 685 stories, and in-depth interviews of 6 experienced editors and columnists. Furthermore, it was found that most of the articles frequently narrated about a few differences of other and Christian sects instead of many similar development needs. It was indicated that the magazines focused on increasing numbers of new members instead of promoting the overall developments of the existing adherents. The result also showed that moral and economic development themes were presented inductively in Hamer, but deductively in Hintset. The findings of the present research demonstrate that even though development issue is still a keen topic in the Ethiopian religious media, its visibility of development types as a topic seems not to be even across time.

Keywords: Development, media, religious, Ethiopia, Christian

RECREATION MULTIMODAL MODELS IN NEWS DISCOURSE

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Abstract

Modern TV news discourse focuses not only on representing phenomena and on events of reality but also creates opportunities for the audience's recreation. Recreation function produced by different semantic codes is becoming an integral feature of news discourse, a tool for managing moods and public opinion. The article reveals the dominant multimodal models aimed at producing hedonistic, entertaining, leisure, escapist, creating a certain emotional and psychological tone, relaxation, stress relief functions. The study of the variety of these models of recreation determines the scientific novelty of the research. The major findings are as follows: 1) the dominant multimodal recreation models are revealed; 2) functions of verbal and non-verbal components of the models in question are stated and described. The first model is presented by a combination of communicative strategies *Describing behind-the-scene reality* + *Presenting social and physical space*. The viewer is given the opportunity to look/peek into a private space that is inaccessible in reality. Visualization of space creates a certain narrative, designed to complement the identity of the hero and / or captivate, attract attention, entertain the addressee. The key functions are: additive, parallel and complementary. The second model is represented by the combination of strategies *Informative* + *Displaying the festive space*. The space being one of the main world-modeling parameters is subjected to active transformation in news discourse. Reports and interviews are conducted against the backdrop of carefully selected locations, the festive decoration of which becomes dominant. The idea of *holiday/feast* is implemented in the presentation of business, social events.

Key words: television, news discourse, recreation, multimodality, communicative strategies

MARK TWAIN AND HIS INDIVIDUAL STYLE

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Abstract

Mark Twain is one of the brightest representatives of Western American literature of the 19th century, whose popularity has not faded up this day. The work of this writer covers various genres of literature, humor, philosophical fiction, satire, journalism, and therefore not only literary experts, but also linguists, translators and writers are greatly interested in his works. We also did not pass by the genius writing style of Mark Twain and set ourselves the goal of finding out who Mark Twain is in the eyes of readers and researchers. The scientific novelty of this work lies in the consideration of many works and articles regarding Mark Twain that have been published in recent years. This article studies style of Mark Twain from the standpoint of his individual personality and writing skills. Today, there is a tendency to translate Mark Twain's books into Kazakh through the Russian language, and therefore this study is of great practical importance for future translators who intend to translate Mark Twain from the original English into our native Kazakh language. The method of collecting and analyzing information serves as a research method. After analyzing the huge number of articles and works published about Mark Twain in recent years, we can conclude that with the appearance of Mark Twain personality in American literature, the era of romanticism ended and began the period of reflecting the real "American character" in American literature. The materials presented in this article will make a significant contribution to the explanation of the term individual style in the field of translation studies. The practical value of the work lies in the discovery of the creative essence of Mark Twain, which in turn will contribute to the correct representation of the writer in literary translations.

Keywords: Mark Twain, individual style, American character

**IMPACT OF THE COVID19 PANDEMIC ON THE INTERPERSONAL RELATIONS
AND LANGUAGE IN THE POLISH IT INDUSTRY**

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Abstract

Today virtual space has become a training ground on which individuals, communities and civilizations fight their wars. The Internet determines our life and controls it. Technological determinism (McLuhan, 1964) applies to all zones of social life. These processes were strongly revealed during the global COVID-19 pandemic, which began in Poland at the beginning of 2020 (2019 in the world). The pandemic showed how powerful the Internet is and how useful virtual space is. During a given crisis, virtual space allows interpersonal contacts, remote work, learning and uninterrupted continuity of social life. As an example of the fact that Internet and IT technologies at all, are significant tools of influence, could be involved an Elon Musk publication about the ecology of bitcoin production (Elon Musk tweet from May 13, 2021). In a few hours after it, bitcoin cryptocurrency price decreased by 20% which is \$11k less per unit.

Despite all the threats related to cyberspace, the time of the pandemic has just verified many judgments related to the usefulness of the Internet. It also influences and shapes modern languages. The constant development of IT corporations, virtualization and globalization of the contacts have resulted in the universalization of the language code, the displacement of the natural language in favor of English.

This scientific research provides a content analysis of interpersonal communication in terms of changes in the language code on the example of the Polish language and the community representing people working in the IT industry in Poland. The subject of the research reflects the issues of ecolinguistics, the degree of saturation of the national language with special borrowings during the COVID19 pandemic period.

Keywords: information technology (IT), covid19 pandemic, interpersonal communication, ecolinguistics, polish language, language code.

THE DYNAMICS OF ARTIFICIAL INTELLIGENCE (AI) ON PRINCIPAL'S
INSTRUCTIONAL DELIVERY

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Abstract

The approach to make smart devices or machines to learn, decide and work just as humans do have rapidly progressed over the years. It has been predicted that sooner or later these intelligent machines will over ride human capabilities. Artificial intelligence (AI), a subfield of computerized technology is designed to function in the areas of speech recognition, learning, planning and problem solving. This study is a content review on the application of AI on principal's instructional delivery. It is a telescopic view on the effective instructional delivery service of the school principal using AI techniques and the challenges encountered. Questionnaire instrument was administered on a total number of 100 respondents and collated using online Google form which were subjected to reliability analysis. The results of using artificial intelligence on principal's instructional delivery processes proved to have helped to reduce the trending challenges encountered by the school principal amidst other services rendered. In conclusion, recommendations were given to school managers and other stake holders in the field of education to promptly embrace the utilization of computerized technology for better service delivery.

Keyword: Dynamics, Artificial Intelligence, AI, School, Principal, Instruction.

Abstract

The approach to make smart devices or machines to learn, decide and work just as humans do have rapidly progressed over the years. It has been predicted that sooner or later these intelligent machines will over ride human capabilities. Artificial intelligence (AI), a subfield of computerized technology is designed to function in the areas of speech recognition, learning, planning and problem solving. This study is a content review on the application of AI on principal's instructional delivery. It is a telescopic view on the effective instructional delivery service of the school principal using AI techniques and the challenges encountered. Questionnaire instrument was administered on a total number of 100 respondents and collated using online Google form which were subjected to reliability analysis. The results of using artificial intelligence on principal's instructional delivery processes proved to have helped to reduce the trending challenges encountered by the school principal amidst other services rendered. In conclusion, recommendations were given to school managers and other stake holders in the field of education to promptly embrace the utilization of computerized technology for better service delivery.

Keyword: Dynamics, Artificial Intelligence, AI, School, Principal, Instruction.

Introduction

Intelligence is generally referred to as the ability to gather knowledge and utilize the knowledge to solve complex problems. In the world of today, machines are almost taken over human activities, i.e they simulate and improve on human abilities. This term is what is referred to as Artificial intelligence (AI). AI is a subfield of computer that embeds the creation of intelligent machines and software that work and react like humans do. AI have evolved overtime and cut across many disciplines. These smart machines are perfect imitator of man's way of life but are subtler in executing the copy rights.

In no doubt, AI is penetrated into every sector of human society including the fields of education. School administrators are generally known as principals. They are the key managers in school establishments. They provide strategic supervision and evaluation services within and outside the four walls of school settings. Principals ensures that they develop standardized curriculum, monitors student's achievement, assess teaching methods, encourage parent's involvement, administers budget and hire staff amongst other duties. These duties are core instructional services delivered by school principals.

Related Literatures

As Stated by Quah (2011), Instructional delivery services are roles of leaders that are directly related to teaching and learning processes which involves the interaction amongst student, teachers and the curriculum. According to Ahmed (2016) Instructional delivery practices include: framing school goals, communicating school goals, supervision and evaluation of instruction, coordination of the curriculum, monitoring of student's progress, providing incentives for students, providing incentives for teachers, protection of instructional time and promotion of professional development. Instructional delivery services of principals are directly linked to the creation of the conditions for teaching and learning optimization.

Both human Intelligence and that shown by animals possesses consciousness and emotions unlike that of machines. The term Artificial intelligence (AI) is the intelligence demonstrated by machines which is characterized with the absence of emotional attributes. John MsCarthy defined AI as "making a machine behave in ways that would be called intelligent if a human were so behaving" (McCarthy et al, 1955).

AI techniques and applications are widely used and continuously updated in so many fields (Pannu, 2015). It is an indisputable fact that AI has increasingly penetrated into the fields of education and obviously in school teaching - learning processes. It should be noted that AI initiative the creativity of students, stimulate their enthusiasm and continuously improve teaching and learning environments (Colchester et al, 2017; Yang & Bai, 2020).

Materials and Methods

Descriptive survey approach was used to obtain information about the school principal, types of instructional services performed by school principal, concept of Artificial intelligence (AI) and its techniques. Questionnaire instrument was administered on a total number of 100 respondents and collated using online Google form which were subjected to reliability analysis. This was done within the space of two weeks. Questionnaire instruments were validated and considered reliable using content validity approach. Chronbach' Alpha Reliability index of 0.78 was achieved.

Results and Discussion

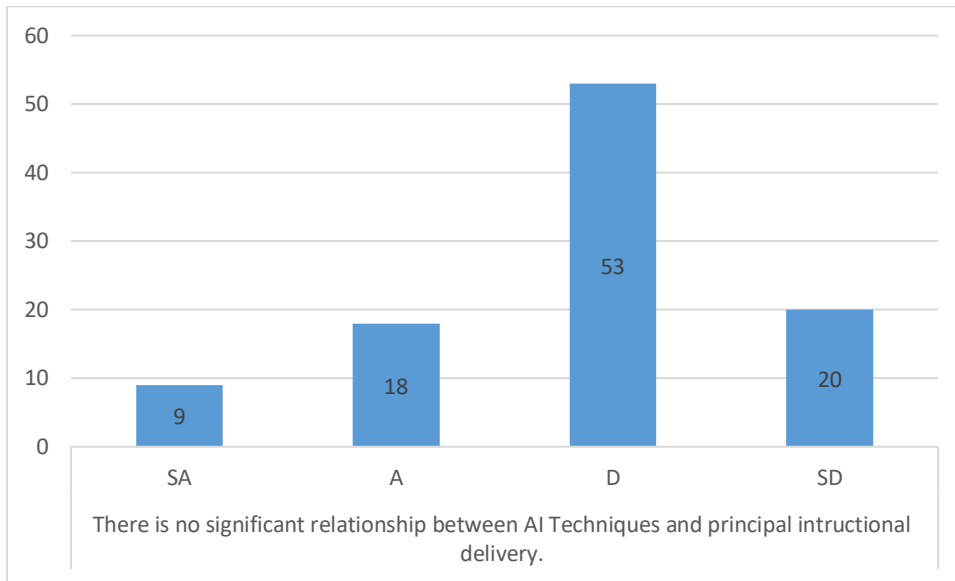


Fig. 1: Analysis Table 1

Discussion 1

From the Analysis as deduced from the response of respondents in Fig.1 AI's role in analysis, communication, assessment and evaluation have proven to be of high significant. It is therefore inferred that AI Techniques and Applications are very helpful to the school principal and invariably useful in the areas of supervision and evaluation of students and staff.

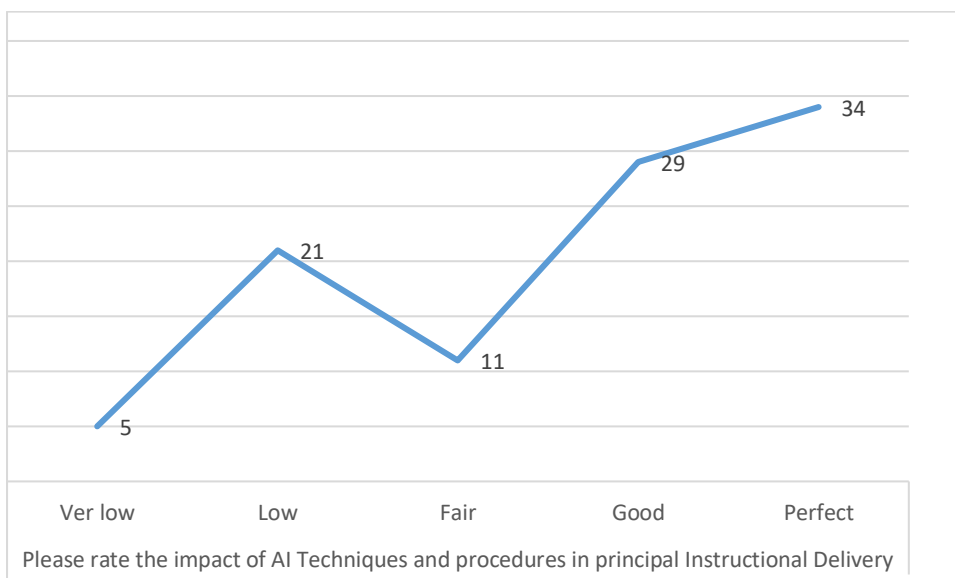


Fig. 2: Analysis Table 2

Discussion 2

The chart drafted from the replies of the respondents in Fig.2 depict that AI Applications help to aid the effective performance of school principal instructional services. Time and Distance are no hurdles in school if AI techniques are employed. For example, students are provided with access to learning from any location and at ANY TIME.

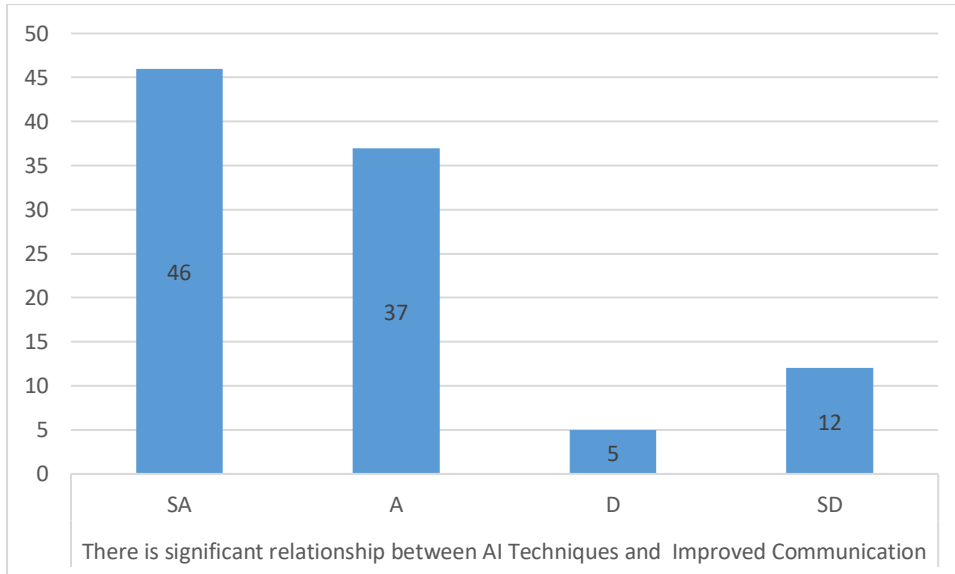


Fig. 3: Analysis Chart 3

Discussion 3

The results of information used to sketch the graph in Fig.3 show that AI applications are used to communicate individually with staff and student according to their need and level of understanding unlike the conventional methods used by school principals. Learners are able to remotely access and learning at will and at any time.

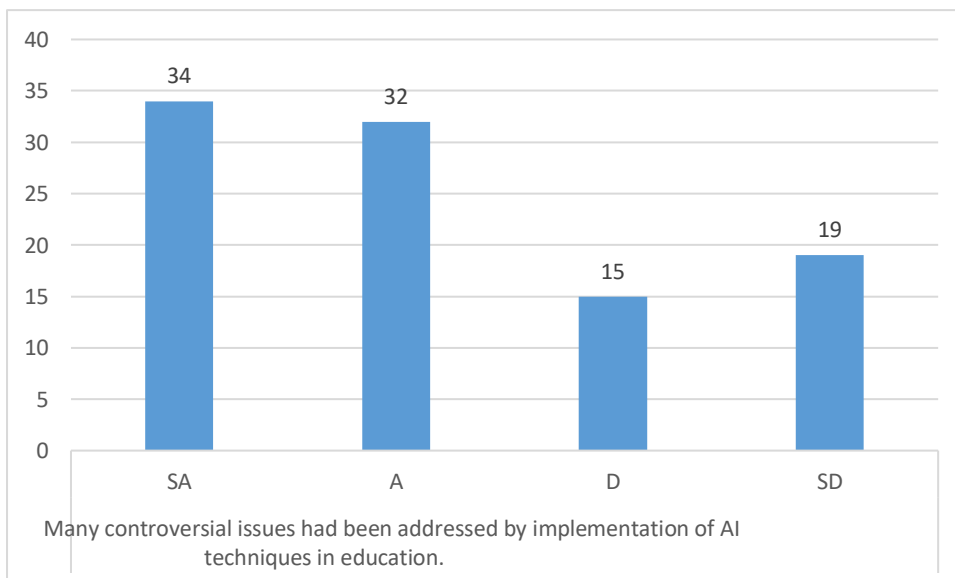


Fig. 4: Analysis Table 4

Discussion 4

School principals are said to be confronted with so many controversial and energy-sapping issues which are complex to handle viz Access to content, classrooms, lack of expert teacher and many more. The Down time during COVID-19 pandemic is a vivid example of such scenario. Artificial Intelligent Application (AIA) have provision for the solutions of such challenges.

CONCLUSION

The findings of this study are proofs that Artificial Intelligence (AI) have great impact in the fields of education and its application have equally benefited school principals as aids to enhance efficient and effective performance of core instructional responsibilities. Consequently, Artificial Intelligent Applications (AIA) have also helped to reduce trending challenges encountered by school principals in areas like facility and resource management, admission and examination management, Supervision and Evaluation of staff and Students.

RECOMMENDATION

The following recommendations were given based on the finding of this study:

1. School managers and other stake holders in the field of education should promptly embrace the utilization of computerized technology for better service delivery.
2. School managers should organize in-service training for both student and staff to acquaint them with Artificial Intelligent Applications (AIA) and relevant technological knowledge.

REFERENCE LIST

- Ahmed, K.A. (2016). Instructional leadership practices in secondary schools of Assosa zone, Ethiopia. *International Journal of Advanced Multidisciplinary Research and Review*, 4(7),192-05.
- Colchester, K., Hagra, H., Alhazzawi, D., & Aldabbagh, G. (2017). A Survey of Artificial Intelligence Techniques Employed for Adaptive Educational Systems within E-Learning Platforms. *Journal of Artificial Intelligence and Soft Computing Research*, 7(1), 47–64.
- De Gruyter Open Ltd.
- McCarthy, J.; Minsky, M.L.; Rochester, N.; Shannon, C.E. A proposal for the Dartmouth summer research project on artificial intelligence. *AI Mag.* **1955**, 27, 12–14.
- Pannu, A. (2015). Artificial Intelligence and its Application in Different Areas. *International Journal of Engineering and Innovative Technology*, 4(10), 79–84.
- Quah, C.S. (2011). Instructional leadership among principals of secondary schools in Malaysia. *International Research Journals*, 2(12), 1784-1800.
- Russell, S.J.; Norvig, P. *Artificial Intelligence: A Modern Approach*, 2nd ed.; Prentice Hall: Upper Saddle River, NJ, USA, 2003; ISBN 0-13-790395-2.
- Yang, S., & Bai, H. (2020). The integration design of artificial intelligence and normal students' Education. *Journal of Physics: Conference Series*, 1453(1), 012090.

CLASSIFICATION OF PUNS AND TRANSLATION TECHNIQUES

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Abstract

The purpose of this article is to analyze the classifications of puns and, based on this, to define techniques for translation. In most theoretical works, there is a classification at three levels, such as phonetic, lexical and phraseological. Phraseological puns are an integral part of the study of puns, firstly, because phraseological units have their own phraseological peculiarities, secondly, because of their frequent use, thirdly, phraseological pun does not exclude the presence of lexical units. Lexical puns, in turn, are based on the polysemy, creating the basis for a word-play. Words that contain the same root, homonymy, antonymy can also be the basis for a pun. Puns always set an interesting task for the translator, however, if the above types of lexical puns do not cause great difficulties in translation, then the author's neologism or occasionalism is a rather difficult task. The methodological basis of the Article are the ideas/concepts of the system-subjective method of analyzing a fictional work. After analyzing the translations of the examples of puns we took, we can conclude that the translators preferred to recreate the pun, or keep one of the elements of the original, which ensured an adequate translation of the original text and same communicative effect. The omission of puns and its transmission in a non-punning form turned out to be less useful in translation. Analysis of the form and content of puns in the text of the translation and the original - i.e. Comparison of the original and the translated text establishes certain relationships and helps to reveal the internal mechanism of translation, to reveal the train of thought when translating puns, and to detect changes in word form and content in such a translation.

Keywords: Lexical puns, phraseological puns, occasionalism, recreation

**MICROPLASTICS, NANOPLASTICS IN FISHERY PRODUCTS AND THEIR
DETECTION, IDENTIFICATION AND QUANTIFICATION METHODS**

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Abstract

Nowadays plastic materials are available in almost every aspect of our everyday life. While their benefits are undeniable, the widespread use of plastic materials will ultimately lead to the inevitable result of their accumulation in the environment. It is estimated that the global production of plastics currently exceeds 320 million tonnes per year, over 40% of which is used as single-use packaging, resulting in plastic waste. Additionally, production of plastics is expected to continue to increase in the upcoming future and by the year 2025, production levels are anticipated to be doubled. Microplastics can be defined as plastic particles with the longest dimensional measure of 5 mm or less. Accordingly, nanoplastics can also be defined as plastic particles with the longest dimensional measure of 100 nanometers (nm) or less. Primary micro- and nanoplastics are plastic items that are manufactured within the mentioned size range. Secondary micro- and nanoplastics on the other hand are particles that are the result of the degradation and fragmentation of larger plastic items. The ingestion of microplastics by aquatic creatures has been documented in different scientific studies. It has been found that over 220 different species are exposed to the ingestion of microplastic contaminants, 58 percent of which are commercially targeted species like shellfish (bivalves and crustaceans) and fishes. Organisms across many trophic levels may be exposed directly to microplastic contaminants present in the environment (water or sediment), whereas the ingestion of prey items, which have previously ingested microplastics, by predators may also represent an indirect source of contamination through trophic transfer. In this review, we aim to address the raising issue of microplastic and nanoplastic contamination, especially in the aquatic environment and in seafood. Additionally, methods used for the analysis and characterization of these contaminants will also be discussed.

Keywords: Microplastics, Nanoplastics, Food Safety, Seafood

INTRODUCTION

Ever since the 1800s, when they were first developed, plastics have profited multiple manufacturing fields such as transportation, health and products conservation and contributed in boosting the digital era and are presently becoming an integral component of everyday life. Whether its bundling and wrapping, construction and development, transportation, prescription and healthcare, sports and relaxation, hardware, cultivation and husbandry, design and industrial production or money, there is almost not a single feature of society where plastics are not used. Thanks to plastics, technological advancements, design solutions, improvements in environmental performance and financial savings are facilitated. In the matter of fact, plastics have made our lives more convenient, safer, and more pleasurable because of their practical features (such as low face-value expense ignoring external costs, sturdiness, resilience, damage tolerance and electrical and heat insulation). However, when this quality is combined with poor waste management, then ecological contamination may occur on the surface, in rivers, lakes and groundwaters and in the sea. When subjected to outer influences, such as the sunlight's ultraviolet radiation and high temperatures, plastic materials will deteriorate gradually and

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slowly overtime. This deterioration of the plastic material will lead to its break down into smaller size ranges, going down from macroscopic to microscopic, and ultimately reaching the currently undetectable nanoplastics (Lusher et al., 2017a).

Microplastics can be defined as particles with dimensions less than 5 mm. This definition was accepted in practical terms because it is viewed that numerous aquatic organisms ingest their prey under this size range. It is possible to divide microplastics into two main groups: primary and secondary. On the one hand we have plastic particles manufactured with a diameter less than 5 mm, which are referred to as primary microplastics. These comprise (1) pre-production resin pellets, which are utilized as constituents in the production of plastics and have a diameter of typically 3-5 mm and; (2) microbeads used in the cosmetic industry; and (3) abrasive blasting beads. On the other hand, we have secondary microplastics, which result from breaking and weathering of larger plastic items in the ecosystem (GESAMP, 2015).

According to the internationally accepted definition of nanomaterials, a material with any external dimension in the nanoscale or having internal structure or surface structure in the nanoscale, with dimensions ranging from 1 nanometer (nm) to 100 nm, can be defined as nanoplastics (EFSA, 2016). Just like microplastics, nanoplastics can also be either primary or secondary. Primary nanoplastics are designed in the nano size range to be used for different industrial purposes. Like smaller primary microplastics, wastewater treatment plants will not retain primary nanoplastics and as a result, they will infiltrate the aquatic environment (GESAMP, 2015). Moreover, microplastic waste can be fragmented or weathered, resulting in secondary nanoplastics (Andrady, 2011; Koelmans et al., 2015). Additionally, it has been shown that some hydrocarbon-degrading microorganisms flourish on plastic litter in the oceans. Consequently, microbial degradation could possibly play a role in the formation of secondary nanoplastics (Zettler et al., 2013). The continuous disintegration of microplastics into nanoplastics may still occur, as shown by the size distribution of plastics floating in the oceans (Cózar et al., 2014). Finally, because manufactured nanoplastics are employed in a wide range of industrial operations, they will eventually end up in the environment (GESAMP, 2015). Different particle sizes of marine plastic litter and their sources and examples are summarized in Table 1 (Lusher et al., 2017a).

Table 1. Different sizes of marine plastic debris and their common sources (Lusher et al., 2017a)

Size category of marine debris	Particle dimension				
	Nano: less than 0.1 micrometer	Micro: less than 5 millimeters	Meso: less than 2.5 centimeters	Macro: less than 1 meter	Mega: more than 1 meter
Source	Primary nanoplastics Secondary fragmentation of microplastics	Primary microplastics Secondary microplastics, disintegration of bigger plastic materials	Direct and indirect: including fragmentation	Direct: items lost during marine activities	Direct: abandoned gears Indirect: land-based waste
Examples	PRIMARY: Industrial applications such as pharmacology and equipment used in the healthcare industry SECONDARY: microplastic fragments	Primary: Resin pellets Secondary: fragments and fibres	Plastic scrap like bottle caps	Plastic packages, plastic bags, balloons and fishing equipment	Abandoned fishing nets and traps, ropes, boat hulls, and other fishing equipment, plastic films from agriculture

Raising seafood consumption worldwide has been tied to the continuously increasing world's population. In order to meet the consumer demand for fish and shellfish products, aquaculture was created and production methods have evolved to keep up with the market's growth. In

2014, with a first-sale value of 160.2 billion US dollars, global animal aquaculture production totaled 73.8 million tonnes live weight (FAO, 2016).

From primitive rope cultures to modern cage farming, fish and bivalves can be cultivated in a variety of methods. Wrapping and shipping of seafood, ropes, floats, fish crates and boxes, fish cages, pond liners, fish feeders, and fish tanks all utilize hardware and equipment containing plastic products. Buoyant plastics help in keeping aquaculture structures (which are mainly made of plastic) afloat, while lines and ropes (mostly made of non-buoyant plastic materials) keep them in place. Ranging from modest home devices and equipment to extremely complex technical installations, plastic materials may be utilized for cages, nets, ropes, lines, and buoys in a variety of applications. Plastics are usually preferred to other materials because they are a low-cost, long-lasting product that is easy to obtain and requires low maintenance (Lusher et al., 2017a).

In this review article, it is aimed to shed the light on the rising problem of plastic pollution worldwide, especially in the aquatic ecosystem and in seafood. Scientific methods used for the analysis and detection of plastic pollutants in environmental samples will also be discussed.

PLASTIC POLLUTION

Plastics have accumulated in natural ecosystems as a result of excessive manufacturing and consumption, which bears negative consequences for biota and the economy. The rapid growth in human population is directly linked to the production of plastics and the accumulation of plastic debris. While it is anticipated to surpass 9 billion by 2050, human population has risen from over 3.1 billion in 1961 to about 7.3 billion in 2015. Both the marketplace for plastics products, as well as the desire for sustainable fishery and aquaculture commodities, are going to be driven by the needs of this rising population. In 2010, mishandled plastic debris generated by coastal countries accounted for about 275 million tonnes of the 2.5 billion tonnes of solid litter generated worldwide, with estimates that 4.8 million tonnes to 12.7 million tonnes of this plastic debris ended up in the oceans (Jambeck et al., 2015). To limit the implications and repercussions of plastic and microplastic contamination in marine and aquatic environments, proper and effective waste management solutions are required. As a consequence of the environmental deterioration of currently present inventories and the upcoming manufacture of plastic products, it is very likely that we will witness a rise in microplastic pollution in the near future (Lusher et al., 2017a). The increase of worldwide production of plastic materials (including synthetic fibers) between 2010 and 2015 is shown in Figure 1 (Lusher et al., 2017a).

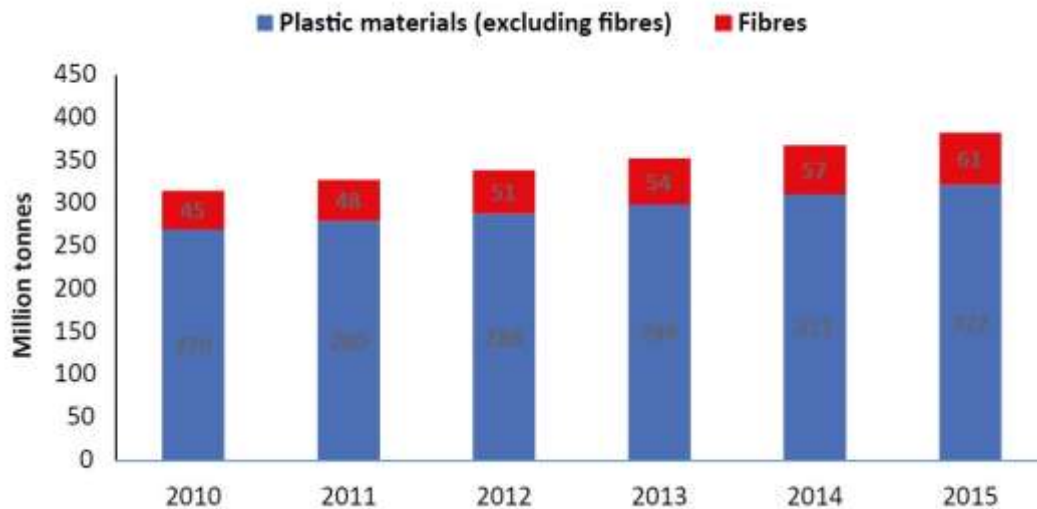


Figure 1. Worldwide plastic production in million tonnes (Lusher et al., 2017a)

In 61 out of 105 countries that already have statistics and data (58%), plastics now account for roughly 10% of solid litter by mass (Hoorweg and Bhada-Tata, 2012). Plastics can be dumped into landfills, recycled, burnt (with or without power production), lost by mistake or discarded purposefully. With the exception of burnt debris, it is expected that all plastic polymers manufactured since the commencement of mass plastic production have persisted in the ecosystem intact or in fragmented form. Plastic debris may bypass waste streams, invade the ecosystem and finally reach the sea if improperly managed. Since 1990, the amount of recycled plastics has increased each year, although it still lags behind other commodities such as paper (58%) and steel and iron (70-90%) (WEF, 2016).

In order to regulate the waste stream of large plastic products, several treatment strategies were applied. Dumping sites, burning, energy recovery and recycling are all examples of currently used solid waste management plans (Bernardo et al., 2016). Nevertheless, it may not be possible to recycle all plastic waste, which could be due to a lack of waste treatment options. In Europe in 2014, 25.8 million tonnes of post-consumer litter were deposited in recognized waste streams, 29.7% of which was salvaged through recycling, 39.5% through energy recovery (both totaling 69.2%), and 30.8% was dumped in landfills. Of the 78 million tonnes of plastic packaging products produced worldwide in 2013, 14% was recycled, 14% was burnt, 40% was dumped into landfills and 32% was released into the environment (WEF, 2016). Recycling is typically recognized as the preferred method among the numerous other waste treatment options. Then recycling provides value to discarded items instead of letting them go to waste. Different countries have different waste management strategies; some dump most of their litter in landfills, while others prioritize recycling and energy production. This, nevertheless, demands specialized and exorbitant separation infrastructure, which is increasingly scarce in the developing world. It is estimated that 5 out of 192 countries are responsible for over half of the unmanaged plastic debris (Jambeck et al., 2015).

MICROPLASTICS IN AQUACULTURE AND SEAFOOD

Microplastics can impact species from different trophic levels, and exposure can happen in a variety of ways. The most probable method of interaction between microplastics and other species is by ingestion. Then the compact size of microplastics can render them indistinct and harder to recognize when compared to real prey, or they could be mistakenly swallowed during the filter feeding process (Lusher, 2015). Microplastic ingestion is common in suspension feeders like mussels (Avio et al., 2015). These ingestion tendencies are due to the

animal's lack of ability to distinguish between microplastics and food. In the matter of fact, according to research findings, microplastics in aquatic habitats develop a dimethyl sulfide fingerprint, which serves as a keystone odorant in marine food webs. This suggests that some marine creatures may even deliberately seek out and consume microplastics (Savoca et al., 2016).

During a study done on wild and commercial mussels taken from Belgian coastlines and three Belgian supermarkets, microscopic synthetic fibers with a size range of 200 μm to 1,500 μm were discovered. The most prevalent size category was between 1,000 μm and 1,500 μm . The colors of the fibers were yellow, translucent, transparent, red, green, black, orange, purple and blue. Total microplastics per gram of mussel ranged from 0.26 to 0.51 fibers. Fisheries operations were linked to a higher incidence of orange color fibers at quaysides (De Witte et al., 2014).

Nine species of Chinese commercial bivalves were discovered to have high levels of microplastics, varying from 2.1 to 10.5 particles per gram. The particle size range was between 5 and 5,000 micrometers, with 60% of the microplastics falling between 5 and 250 micrometers. The bivalves' tissue contained a variety of microplastic shapes, including fibers, fragments, and pellets. The most frequent microplastics were fibers, which made up more than 50% of all microplastics in most situations (Li et al., 2015).

In Turkey, the issue of plastic contamination has received growing attention in recent years and some studies were done about the prevalence of microplastics in seafood. In the year 2020, Gundogdu et al. researched the prevalence of microplastics in ready-to-eat stuffed mussel samples collected from 41 different restaurants in 5 cities. In this study, chemical digestion, density separation, microscopic inspection and Raman spectroscopy methods were used for microplastic detection. The average microplastic amount in stuffed mussels was determined as 0.6 ± 0.1 microplastic/mussel. The highest level of microplastics amongst the five cities was detected in Istanbul with 0.9 ± 0.1 microplastic/mussel, and the lowest level in Bodrum (0.3 ± 0.1 microplastic/mussel). The detected microplastics were classified as fibers 62.7% and fragments 37.3% (Gundogdu et al., 2020).

Microplastic contamination of mussels gathered along Turkey's coastlines was investigated in a study done in 2020 by Gedik and Eryasar. In this study, mussels were collected from 23 various locations throughout the Turkish shores of the Black Sea, Sea of Marmara and Aegean Sea. The mussel samples were subjected to chemical digestion using H_2O_2 and the resulting microplastics were inspected with a stereomicroscope and characterized using Fourier transform infrared spectrometry (FT-IR) technique. Microplastic particles were detected in 48% of the samples. The average prevalence of microplastics was 0.69 item per mussel and 0.23 item per gram of soft tissue. Fragments were the most common microplastic shape (67.6%), preceded by fibers (28.4%) and films (4.05%). The most prevalent size range was less than 0.5 mm (26.58%). FT-IR revealed 12 distinct polymer types, with PET (32.9%), PP (28.4%) and PE (19.4%) accounting for 80% of the total microplastics discovered. In Turkey, the annual average exposure quantity for mussel consumers was calculated to be 1918 MPs item/year (Gedik and Eryasar, 2020).

In another study, microplastics were measured in edible wild mussel samples, grooved carpet shell samples and water samples collected from Izmir Bay in the Aegean Sea in Western Turkey. In the 60 mussel samples analyzed, a total amount of 1682 microplastics was detected from two sampling stations: 895 microplastics from Karsiyaka (Station 1) and 787 microplastics from Gulbahce (Station 2). Water samples from station 1 were found to contain 545 microplastics, whereas water samples from the second station contained a much higher amount with 1287 microplastics. This difference between the two stations was contributed to Cigli Wastewater Treatment Plant located near the first sampling station (Yozukmaz, 2021).

So far there has been no unanimity in the scientific community regarding standardized methods for sampling and detection of microplastics in food samples. Making sure that specimens are not polluted with microplastics from the air, garments, instruments or chemical solutions to be used during the analysis is one of the most important aspects in the accuracy of the analytical findings. Limiting exposure to air as much as possible (e.g., by covering of laboratory bottles, beakers and sampling equipment), filtering water and solutions to be used during the analysis and meticulous cleaning of equipment are all examples of measures taken to prevent contamination (De Witte et al., 2014; Liebezeit and Liebezeit, 2013, 2014; Lusher et al., 2013; Sanchez et al., 2014; Van Cauwenberghe and Janssen, 2014). Contamination has also been avoided by using air flow cabinets (Foekema et al., 2013; Van Cauwenberghe and Janssen, 2014). Procedural blanks are required to make sure that the findings are of high analytical quality. Procedural blanks without sample matter were treated parallel to samples and received the same treatment in several investigations (EFSA, 2016).

Studies done about microplastics in food and seafood usually include three main steps: (1) extraction and breakdown of organic matter; (2) identification and measurement (enumeration) of microplastics in the sample and (3) characterization of the plastic and determination of polymer type (EFSA, 2016). Breakdown and decomposition of the organic matter can be used for the recovery of microplastics from foods. Numerous techniques have been suggested. Mussels (Mathalon and Hill, 2014), honey and sugar (Liebezeit and Liebezeit, 2013) have all been subjected to 30 percent H₂O₂ digestion. The digestive tracts of various fish species have been fully dissolved using 10% KOH (Foekema et al., 2013). Multiple studies have found using 10% KOH to be the best and most reliable choice for sample digestion (Hermsen et al., 2018; Karami et al., 2017; Lusher et al., 2017a, 2017b).

It is also possible to utilize density separation to be able to separate plastic particles from organic material. When there are considerable quantities of inorganic materials (like sand and bone) which haven't been completely digested, then saturated salt solutions, such as sodium chloride (NaCl), may enable the isolation of less dense components. The European Union's Marine Strategy Framework Directive (MSFD) has advised density separation. Although NaCl is preferred since it is affordable and safe, it may however cause denser particles (>1.2 g cm⁻³) to be underestimated. Alternative solutions to NaCl, such as zinc chloride (ZnCl₂) and sodium iodide (NaI), have been suggested (Horton et al., 2017). Because of the high density of these solutions, they can float high-density plastics like polyvinyl chloride (PVC) (Lusher et al., 2017a).

Usually and almost in every study, a visual evaluation step of the separated microplastics is included to detect and isolate them from other elements (like animal parts, metals or sand). This can be done with or without the use of a microscope. Dissection or stereomicroscopes were employed in numerous research (Claessens et al., 2013; Devriese et al., 2015; Lusher et al., 2013). When using microscopy, the detectable size limit is lower (in the low micrometer range) (Hidalgo-Ruz et al., 2012). Scanning electron microscopy approaches have also been applied, with the help of which it was possible to detect much smaller particles (Fries et al., 2013; Murray and Cowie, 2011).

Simple techniques for characterizing the plastic material have already been employed, like the "hot point test", which involves using a preheated needle to see if the plastic melts and leaves a mark (De Witte et al., 2014; Devriese et al., 2015). However, for the accurate characterization and identification of the plastic polymer types, usually more advanced and complex techniques are utilized (e.g., FT-IR or Raman spectroscopy). Using infrared spectroscopy, chemical substances can be distinguished based on their vibrational frequencies. Polymers are made up of a number of different functional groups that are repeated in a periodic pattern and linked to a carbon backbone. The large number of

conceivable pairings of these constituent components, on the other hand, leads to an infinite number of variables. Different polymers, such as polyethylene and polypropylene, as well as additives, can then be distinguished (Renner et al., 2017). Raman spectroscopy arises as an instrument with distinctive attributes for the evaluation of microplastics. This technique not only surpasses the issue of varied media background in just about all scenarios, but can also be applied to a broad variety of particle sizes down to 1 μm with existing equipment, and offers a reliable method for the characterization of the sample's chemical composition. In comparison to Infrared absorption spectroscopy, Raman spectroscopy has a number of advantages. In general, Raman spectroscopy offers broader spectrum range, superior resolution and less water interference (Ribeiro-Claro et al., 2017). There are multiple destructive approaches that can be used to detect potential plastic contaminants in a specimen such as: Pyrolysis–Gas Chromatography combined with Mass Spectroscopy (Pyr-GC-MS), high temperature gel-permeation chromatography (HT-GPC) with Infrared detection, SEM–EDS and thermo-extraction and desorption coupled with GC/MS. Raman and FT-IR spectroscopies, on the other hand, are preferable since they are non-destructive and complementing techniques, as Raman passive molecule vibrations can be FT-IR active and conversely. Although Raman has a superior spatial resolution (down to 1 μm) than FT-IR (10 μm) (Lenz et al., 2015) FT-IR is still preferred for identifying fibers since Raman investigations have not proven to be effective for specifically this type of microplastic (Lusher et al., 2017a).

Nanoplastic identification in food is complicated due to the reduced resolution or contrast between nanoplastics and the food matrix, which makes microscopic approaches ineffective. Consequently, visualization using electron microscopy, a common method for detecting nanoplastics based on their size, would almost always necessitate the effective extraction of the nanoplastics from the specimen (EFSA, 2016). There are currently no available methods for the assessment of nanoplastics in food. The general analytical procedure that is utilized for nanomaterials is likely to be suitable. Extraction of nanoplastics from the food matrix, accompanied by size based extraction and determination, preferably comprising identification and quantification, would be required for this technique (Rossi et al., 2014). Chemical digestion (by using methods comparable to those already utilized for microplastics) or enzymatic digestion could be used to extract nanoplastics from food. Provided nanoplastics have been successfully recovered, size-based discrimination can be done using extraction techniques such as ultrafiltration, hydrodynamic chromatography (HDC) and flow field fractionation (FFF) (EFSA, 2016).

CONCLUSION

In parallel to the continuously raising plastic production levels and with the ongoing degradation of plastic debris, it is only to be expected that the issue of micro- and nanoplastic contamination will grow bigger in the foreseeable future. Nanoplastics are generated when microplastics are fragmented, and they can also come from particles utilized in industrial operations. Despite the fact that nanoplastics may raise serious issues, the evidence required to conduct a comprehensive food safety risk assessment of nanoplastics in seafood is insufficient. Human consumption of microplastics and nanoplastics as a result of eating seafood is poorly quantified. With the inevitable rise in micro- and nanoplastics in the coming future due to the decomposition of plastic materials already in the environment, as well as future inputs, it is time for the scientific community to raise up to the task and take its responsibility for developing well-established, recognized, and unified methods for the efficient identification and determination of these contaminants in the environment. Furthermore, it is crucial to raise the awareness of the appropriate authorities and consumers

of the problem of micro- and nanoplastics and how they may affect different aspects of our current and future lives.

REFERENCES

- Andrady AL 2011. Microplastics in the marine environment. *Marine Pollution Bulletin*, 62(8), 1596–1605.
- Avio CG, Gorbi S, Milan M, Benedetti M, Fattorini D, d'Errico G, Pauletto M, Bargelloni L, Regoli F 2015. Pollutants bioavailability and toxicological risk from microplastics to marine mussels. *Environmental Pollution*, 198, 211–222.
- Bernardo CA, Simões CL, Pinto LMC 2016. Environmental and economic life cycle analysis of plastic waste management options. A review. *AIP Conference Proceedings*, 1779(1), 140001.
- Claessens M, Van Cauwenberghe L, Vandegehuchte MB, Janssen CR 2013. New techniques for the detection of microplastics in sediments and field collected organisms. *Marine Pollution Bulletin*, 70(1–2), 227–233.
- Cózar A, Echevarría F, González-Gordillo JI, Irigoien X, Úbeda B, Hernández-León S, Palma ÁT, Navarro S, García-de-Lomas J, Ruiz A 2014. Plastic debris in the open ocean. *Proceedings of the National Academy of Sciences*, 111(28), 10239–10244.
- De Witte B, Devriese L, Bekaert K, Hoffman S, Vandermeersch G, Cooreman K, Robbens J 2014. Quality assessment of the blue mussel (*Mytilus edulis*): Comparison between commercial and wild types. *Marine Pollution Bulletin*, 85(1), 146–155.
- Devriese LI, Van der Meulen MD, Maes T, Bekaert K, Paul-Pont I, Frère L, Robbens J, Vethaak AD 2015. Microplastic contamination in brown shrimp (*Crangon crangon*, Linnaeus 1758) from coastal waters of the Southern North Sea and Channel area. *Marine Pollution Bulletin*, 98(1–2), 179–187.
- EFSA, Panel on Contamination in the Food Chain 2016. Presence of microplastics and nanoplastics in food, with particular focus on seafood. *Efsa Journal*, 14(6), e04501.
- FAO, State of World Fisheries and Aquaculture 2016. *Contributing to food security and nutrition for all*. FAO Rome, Italy.
- Foekema EM, De Gruijter C, Mergia MT, van Franeker JA, Murk AJ, Koelmans AA 2013. Plastic in north sea fish. *Environmental Science & Technology*, 47(15), 8818–8824.
- Fries E, Dekiff JH, Willmeyer J, Nuelle M-T, Ebert M, Remy D 2013. Identification of polymer types and additives in marine microplastic particles using pyrolysis-GC/MS and scanning electron microscopy. *Environmental Science: Processes & Impacts*, 15(10), 1949–1956.
- Gedik K, Eryasar AR 2020. Microplastic pollution profile of Mediterranean mussels (*Mytilus galloprovincialis*) collected along the Turkish coasts. *Chemosphere*, 260, 127570.
- GESAMP 2015. “Sources, fate and effects of microplastics in the marine environment: global assessment” (Kershaw, P. J., ed.). (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 90, 96 p.
- Gundogdu S, Çevik C, Ataş NT 2020. Stuffed with microplastics: Microplastic occurrence in traditional stuffed mussels sold in the Turkish market. *Food Bioscience*, 37, 100715.
- Hermesen E, Mintenig SM, Besseling E, Koelmans AA 2018. Quality criteria for the analysis of microplastic in biota samples: a critical review. *Environmental Science & Technology*, 52(18), 10230–10240.
- Hidalgo-Ruz V, Gutow L, Thompson RC, Thiel M 2012. Microplastics in the marine environment: a review of the methods used for identification and quantification. *Environmental Science & Technology*, 46(6), 3060–3075.
- Hoornweg D, Bhada-Tata P 2012. *What a waste: a global review of solid waste management*.
- Horton AA, Svendsen C, Williams RJ, Spurgeon DJ, Lahive E 2017. Large microplastic

- particles in sediments of tributaries of the River Thames, UK—Abundance, sources and methods for effective quantification. *Marine Pollution Bulletin*, 114(1), 218–226.
- Jambeck JR, Geyer R, Wilcox C, Siegler TR, Perryman M, Andrady A, Narayan R, Law KL 2015. Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768–771.
- Karami A, Golieskardi A, Choo CK, Romano N, Ho Y Bin, Salamatinia B 2017. A high-performance protocol for extraction of microplastics in fish. *Science of the Total Environment*, 578, 485–494.
- Koelmans AA, Besseling E, Shim WJ 2015. Nanoplastics in the aquatic environment. Critical review. *Marine Anthropogenic Litter*, 325–340.
- Lenz R, Enders K, Stedmon CA, Mackenzie DMA, Nielsen TG 2015. A critical assessment of visual identification of marine microplastic using Raman spectroscopy for analysis improvement. *Marine Pollution Bulletin*, 100(1), 82–91.
- Li J, Yang D, Li L, Jabeen K, Shi H 2015. Microplastics in commercial bivalves from China. *Environmental Pollution*, 207, 190–195.
- Liebezeit G, Liebezeit E 2013. Non-pollen particulates in honey and sugar. *Food Additives & Contaminants: Part A*, 30(12), 2136–2140.
- Liebezeit G, Liebezeit E 2014. Synthetic particles as contaminants in German beers. *Food Additives & Contaminants: Part A*, 31(9), 1574–1578.
- Lusher A 2015. Microplastics in the marine environment: distribution, interactions and effects. In *Marine anthropogenic litter* (pp. 245–307). Springer, Cham.
- Lusher AL, Hollman PCH, Mendoza-Hill JJ 2017a. *Microplastics in fisheries and aquaculture: status of knowledge on their occurrence and implications for aquatic organisms and food safety*. FAO Fisheries and Aquaculture Technical Paper. No. 615. Rome, Italy.
- Lusher AL, Welden NA, Sobral P, Cole M 2017b. *Sampling, isolating and identifying microplastics ingested by fish and invertebrates*. *Anal Methods* 9: 1346–1360.
- Lusher AL, Mchugh M, Thompson RC 2013. Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel. *Marine Pollution Bulletin*, 67(1–2), 94–99.
- Mathalon A, Hill P 2014. Microplastic fibers in the intertidal ecosystem surrounding Halifax Harbor, Nova Scotia. *Marine Pollution Bulletin*, 81(1), 69–79.
- Murray F, Cowie PR 2011. Plastic contamination in the decapod crustacean *Nephrops norvegicus* (Linnaeus, 1758). *Marine Pollution Bulletin*, 62(6), 1207–1217.
- Renner G, Schmidt TC, Schram J 2017. Characterization and quantification of microplastics by infrared spectroscopy. In *Comprehensive Analytical Chemistry* (Vol. 75, pp. 67–118). Elsevier.
- Ribeiro-Claro P, Nolasco MM, Araújo C 2017. Characterization of microplastics by Raman spectroscopy. *Comprehensive Analytical Chemistry*, 75, 119–151.
- Rossi M, Cubadda F, Dini L, Terranova ML, Aureli F, Sorbo A, Passeri D 2014. Scientific basis of nanotechnology, implications for the food sector and future trends. *Trends in Food Science & Technology*, 40(2), 127–148.
- Sanchez W, Bender C, Porcher J-M 2014. Wild gudgeons (*Gobio gobio*) from French rivers are contaminated by microplastics: preliminary study and first evidence. *Environmental Research*, 128, 98–100.
- Savoca MS, Wohlfeil ME, Ebeler SE, Nevitt GA 2016. Marine plastic debris emits a keystone infochemical for olfactory foraging seabirds. *Science Advances*, 2(11), e1600395.
- Van Cauwenberghe L, Janssen CR 2014. Microplastics in bivalves cultured for human consumption. *Environmental Pollution*, 193, 65–70.
- WEF, World Economic Forum 2016. *The New Plastics Economy- Rethinking the future of plastics*. Available at:
www3.weforum.org/docs/WEF_The_New_Plastics_Economy.%0Apdf
- Yozukmaz A 2021. Investigation of microplastics in edible wild mussels from İzmir Bay

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(Aegean Sea, Western Turkey): A risk assessment for the consumers. *Marine Pollution Bulletin*, 171, 112733.

Zettler ER, Mincer TJ, Amaral-Zettler LA 2013. Life in the “plastisphere”: microbial communities on plastic marine debris. *Environmental Science & Technology*, 47(13), 7137–7146.

**ASSESSMENT OF CLIMATE CHANGE AWARENESS AT THE LOCAL LEVEL:
THE EXAMPLE OF ANKARA**

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Abstract

Environmental problems have become one of the most discussed, awaiting solutions and a subject that closely concerns all humanity. It is seen as an important step in the solution of problems that individuals develop awareness on this issue and take precautions accordingly. The main purpose of this study is to examine the awareness at the local level for climate change, which is a global problem. In this study, the effects of socio-economic differences on individual and social awareness of climate change, the trust in policies to combat climate change, and the views on the actors that are effective in local policies are evaluated. The aim of this study is to reveal the relationship between the environmental awareness of municipal personnel and the personal measures they take as an individual contribution to reduce environmental problems. In this context, the study is based on a process in which being aware of environmental problems is a premise, it is necessary to create environmental awareness beyond that, and thus, developing personal measures to protect the environment during the action phase is considered as a result. The survey conducted on 150 municipal personnel in Ankara District is expected to contribute to the process of creating policies for combating climate change at the local level by defining the personnel's perspective on climate change policies and their awareness on climate change.

Keywords: Climate change, awareness, local policies

GREEN ECONOMY AS A MATTER OF STRATEGIC MEASURE

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Abstract

The primary goal of this paper is to demonstrate how economic growth and the green economy are addressed in various strategic frameworks. The green economy is an issue of measure, whereas economic development based on liberal capitalism serves a structural purpose. The transformation/deformation in the natural structure of the eco-system in recent decades has given rise to doubts about the sustainability of the current production-consumption relationship. Ecological devastation following industrialization created a limited political impact, based on time, distance, communication facilities, and public perception. Although it was first brought to the agenda in the 1960s, the critical ecological approach, which started in the 1990s, has been adopted by different economic-political approaches. According to the report published by the Worldwide Fund for Nature 2020, natural habitats have declined by two thirds since the 1970s. This is among the proofs showing that economic and social progress cannot be achieved at the expense of the natural environment. Therefore, institutions determining the structural framework of the global economy, such as the World Bank, IMF and the EU, adopt the green economic perspective in order to prevent the balance between economy and ecology from a complete deterioration. However, this perspective does not completely overlook the high economic growth expectation and high consumption targets persisting in the process of industrial and technological revolution in the matter of economic growth pressure. The pressures due to the growth and persistence of capitalism and the "monopoly" of the north, which spread from the northern hemisphere to the south in the 20th and 21st centuries, have become off the table. Moreover, the "negative productivity" problem in industrial countries has scaled down its pressure on the economic structure thanks to the technology revolution. Directing investments to technologically based economic instruments demonstrates that the target is economic growth and marginal productivity. Consequently, the potential growth volume of the economy has not lost its momentum over ecosystem imbalances, regardless of great crisis periods.

Keywords: Green economy, Economic Growth, Industrialization

EVALUATION OF THE EFFECT OF STEM CELL THERAPY ON INFERTILITY

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Abstract

Infertility is defined as the inability to conceive or to continue the pregnancy, despite having unprotected sexual intercourse at least twice a week for a year and at least twice a week. In developing countries, infertility is largely due to infection of the genital tract as a result of sexually transmitted diseases, postpartum or postpartum infection, or pelvic tuberculosis. Many recent studies have demonstrated the therapeutic effects of mesenchymal stem cells (MSC) in different disease models. Many studies have been conducted to determine the effects of MSCs in the treatment of ovarian failure, due to their differentiation capacity and paracrine action characteristics. In infertility and in vitro fertilization research and treatment, intrauterine treatment of fetal metabolic diseases with stem cells is possible. Fetal stem cells, which are transferred from fetus to mother by microchimerism, help prevent tissue damage in the mother. It is seen that the spermatogonial stem cells of autologous and allogeneic testicular cell suspension, which were reproduced in vitro to increase and permanently ensure male fertility, were transplanted into the rhesus monkey testis, resulting in the formation of cells belonging to the spermatogenetic series. Thus, as a result of the application of stem cell therapy in infertility, there is a significant treatment aspect for both men and women and provides fertility.

Keywords: infertility, stem cells, treatment methods.

INTRODUCTION

The most important problem in men who cannot have children is the cases of primary gonadal insufficiency in which there is no or insufficient germ cell production in the testicles. In this article, current developments in embryonic stem cells (EC), induced pluripotent stem cells (iPS), and other stem cell sources in men with primary gonadal failure are examined under the literature data. Infertility is encountered in approximately 10-15% of married couples. About 7% of them have azoospermia. The problem in nonobstructive azoospermia (NOA) is often the number and quality of haploid spermatid or spermatozoa cells. On the basis of this, genetic factors in the form of single gene mutations or chromosomal defects lie. However, recent studies highlight that if there is no genetic anomaly, stem cell therapy may be a hope in the treatment of male factor infertility (1). The most important feature of spermatogonial stem cells is that they are the only cell group that carries genetic material to the next generations.

These are cells that have the potential to self-replicate under the support of Sertoli cells, extracellular matrix and peritubular myoid cells. Recent studies have also shown that spermatogenesis can be sustained in rats when testicular tissue is retransplanted into the testis after incubation in the laboratory (2). In this sense, spermatids that have completed their meiosis can be obtained from spermatocytes in vitro. Indeed, it has been demonstrated morphologically and biochemically that rat testis cell suspension can transform into spermatocytes and then spermatids when incubated for 4 days (3). After the spermatogonia are isolated and treated with TERT in mice, they can differentiate into round spermatids in the SCF medium. However, the problem here is whether the spermatids that develop from the spermatogonia will give functional results. Recently, studies have begun on the arrangement of 3D cell culture systems in order to create a microenvironment or niche that can feed haploid cells within the seminiferous tubules under in vitro conditions (4). In more recent studies, a new organ culture system that can support spermatogenesis from start to finish has been developed, improved to spermatid level in serum-free medium in newborn mouse testicular tissue, and successful fertilization trials have been made with ROSI/ICSI, and even offspring have been delivered. It has been shown in recent years that human spermatogonial stem cells (SSCs) can mature under laboratory conditions and fertilize the oocyte (5). When spermatogonia taken from testes in a group of men with undescended testicles were incubated in a medium containing retinoic acid and SCF (stem cell factor), development was achieved up to spermatids that had completed meiosis. Completion of meiosis was demonstrated by the increase of SCP3-, MLH1-, and CREST positive cells in culture medium. When these cells were injected into mouse oocytes, it was observed that the 2-cell embryo stage was reached.

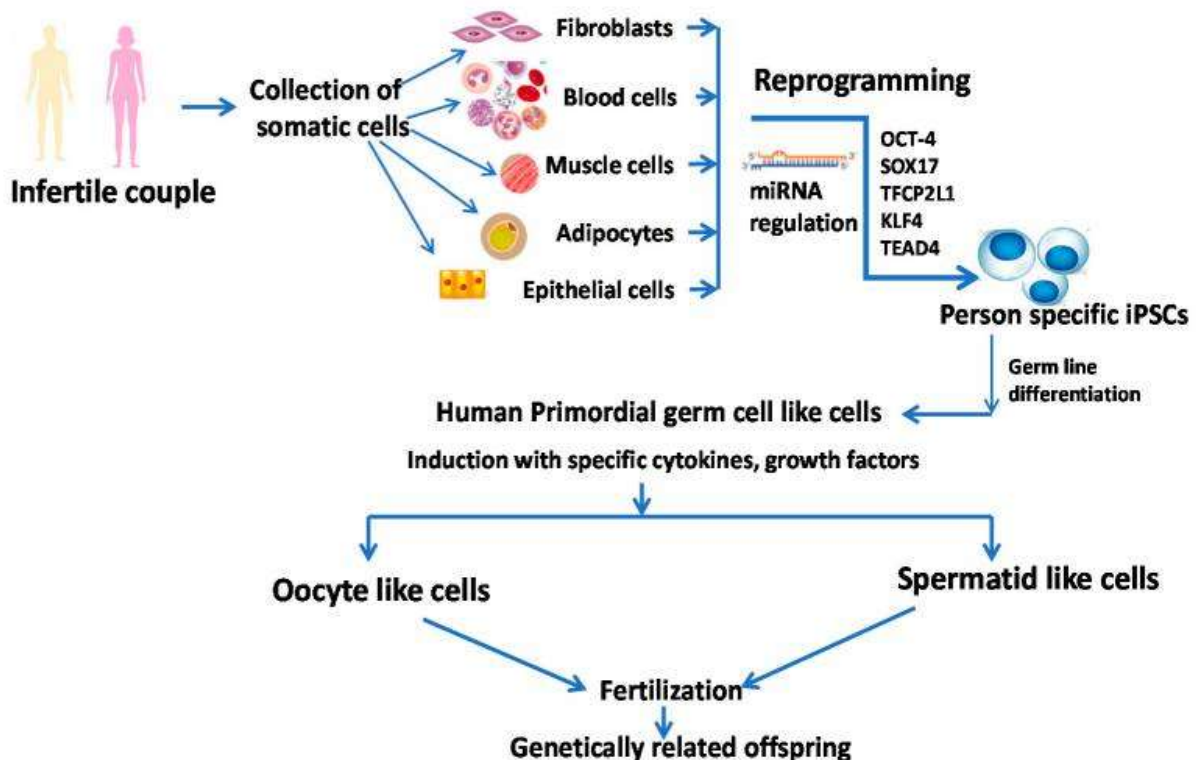


Figure 1. The role of stem cells in the generation of patient-specific gamete cells. (6)

The fact that SSCs have gained fertilization capacity in vivo increases the prospects for future treatment of patients with NOA. The most recent example of treatments that provide clinical pregnancy in humans with the use of early-stage germ cells is the birth of healthy children with the application of ROSI using spermatids determined to be haploid in character by sperm FISH staining. Indeed, 14 healthy births have been reported in this way (7).

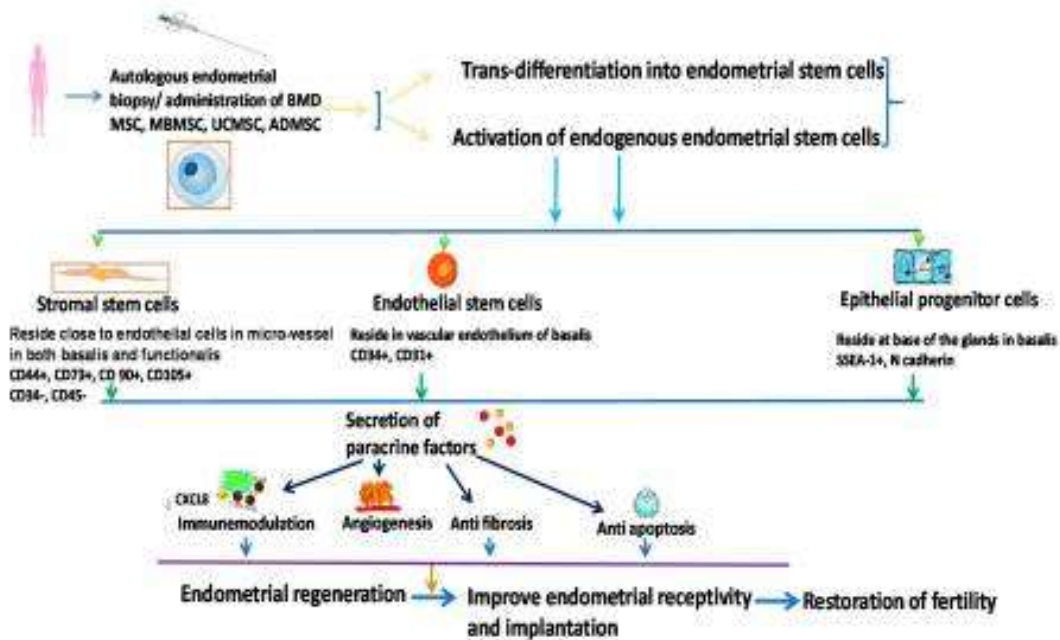


Figure 2. The mechanistic explanation of stem cell therapy for restoration of fertility via endometrial regeneration; BMDMSC: Bone-marrow-derived mesenchymal stem cell; MB MSC: menstrual blood mesenchymal stem cell; UC MSC: umbilical cord mesenchymal stem cell; ADMSC: adipose-tissue-derived mesenchymal stem cell; CXCL: C-X-C motif chemokine ligand; SSEA-1: Stage-specific embryonic antigen-1; CD: Cluster of differentiation (8).

In any case, the differentiation of SSC cells into mature male germ cells in vitro has not reached a high efficiency and practical application until now. In addition to supporting SSC cells in vitro and in 3D culture environment, in vivo germ cell development by transplantation of SSC cells or testicular cells has found a more successful clinical application area 21. The main problem in this application is to obtain pure spermatogonia.

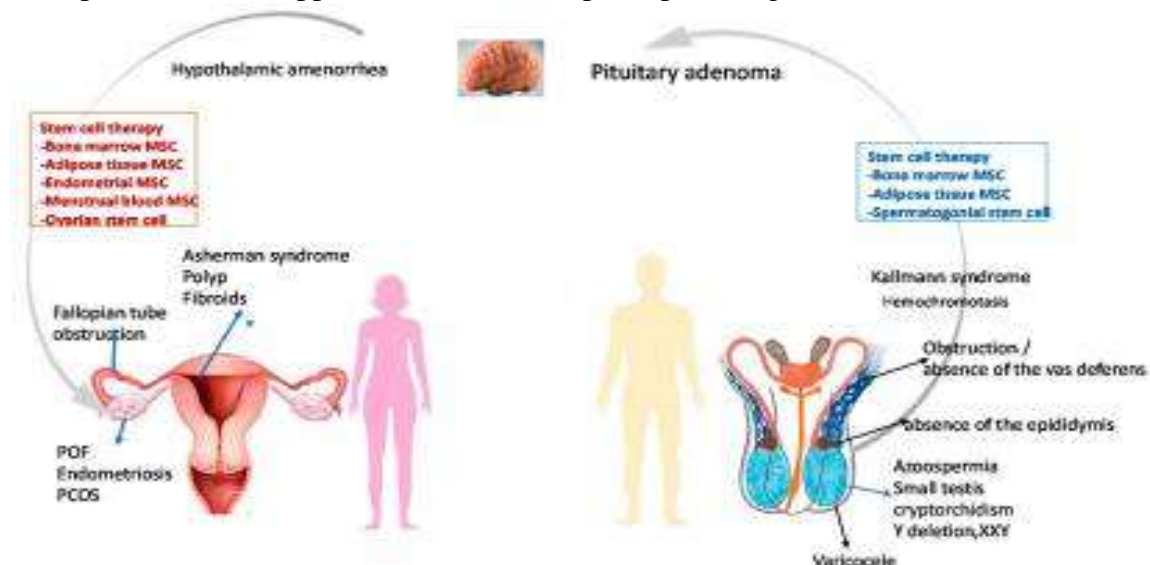


Figure 3: Some probable causes of infertility in male and female POF: premature ovarian failure, PCOS: Polycystic ovarian syndrome, XXY: Klinefelter syndrome, MSC: Mesenchymal stem cell (11).

Generally, pure spermatogonium type A recovery rates are between 0.3% and 30% when different techniques and working conditions are taken into account. Transplantation of testicular tissue or tissue samples treated in culture media may be more promising instead of SSC transplantation. Because in this way, support cells in which sperm cells develop can also be used. When testicular tissue samples obtained from newborn mice, pigs and goats are

transferred under the skin, spermatogenesis can be completed and even healthy offspring can be born (9). I wonder if the testicular tissue in humans was transplanted into the testicles of other animals, could similar spermatogenesis stages be achieved? In this way, xenograft transplants of prepubertal male testicular tissues suggest that spermatogenesis can continue for 4–12 months (10).

CONCLUSION

Although infertility continues to be very common around the world, it creates a very serious emotional stress for couples who want to be parents. Therefore, early intervention to eliminate this serious situation will be very beneficial for couples. With the developing technology, very successful results have been obtained in IVF treatment. Stem cell therapy is widely used in medicine and has an important place in infertility treatment. It has an important place in spermatogonia and egg cells, thanks to the ability of the stem cell to renew itself and to transform into many cells. In line with the studies, it has been emphasized that the stem cell contributes significantly to infertility and will have a great importance with the developing technology.

References

1. Hou J, Yang S, Yang H, Liu Y, Liu Y, Hai Y, et al. Generation of male differentiated germ cells from various types of stem cells. *Reproduction*. 2014;147(6):R179-88.
2. Sato T, Katagiri K, Yokonishi T, Kubota Y, Inoue K, Ogonuki N, et al. In vitro production of fertile sperm from murine spermatogonial stem cell lines. *Nat Commun*. 2011;2:472.
3. Staub C, Hue D, Nicolle JC, Perrard-Sapori MH, Segretain D, Durand P. The whole meiotic process can occur in vitro in untransformed rat spermatogenic cells. *Exp Cell Res*. 2000;260(1):85-95.
4. Lee JH, Kim HJ, Kim H, Lee SJ, Gye MC. In vitro spermatogenesis by three-dimensional culture of rat testicular cells in collagen gel matrix. *Biomaterials*. 2006;27(14):2845-53.
5. Yang S, Ping P, Ma M, Li P, Tian R, Yang H, et al. Generation of haploid spermatids with fertilization and development capacity from human spermatogonial stem cells of cryptorchid patients. *Stem Cell Reports*. 2014;3(4):663-75.
6. Mohamed SA, Shalaby SM, Abdelaziz M, Brakta S, Hill WD, Ismail N, et al. Human Mesenchymal Stem Cells Partially Reverse Infertility in Chemotherapy-Induced Ovarian Failure. *Reprod Sci*. 2018;25(1):51-63.
7. Tanaka A, Nagayoshi M, Takemoto Y, Tanaka I, Kusunoki H, Watanabe S, et al. Fourteen babies born after round spermatid injection into human oocytes. *Proc Natl Acad Sci U S A*. 2015;112(47):14629-34.
8. de Miguel-Gómez L, López-Martínez S, Francés-Herrero E, Rodríguez-Eguren A, Pellicer A, Cervelló I. Stem Cells and the Endometrium: From the Discovery of Adult Stem Cells to Pre-Clinical Models. *Cells*. 2021;10(3).
9. Schlatt S, Honaramooz A, Boiani M, Schöler HR, Dobrinski I. Progeny from sperm obtained after ectopic grafting of neonatal mouse testes. *Biol Reprod*. 2003;68(6):2331-5.
10. Geens M, De Block G, Goossens E, Frederickx V, Van Steirteghem A, Tournaye H. Spermatogonial survival after grafting human testicular tissue to immunodeficient mice. *Hum Reprod*. 2006;21(2):390-6.
11. Lindsay T.J., Vitrikas K. Evaluation and treatment of infertility. *Am. Fam. Physician*. 2015;91:308–314.

**HISTOPATHOLOGICAL AND IMMUNOHISTOCHEMICAL EXAMINATION OF
CHANGES IN THE BLADDER IN SPINAL CORD INJURY**

Işılay Sezen ERMİŞ

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Abstract

The most common urological complications associated with spinal cord injury are urinary tract infection, urinary tract dysfunction and bladder dysfunction. In this study, it was aimed to show the dysfunction occurring in the bladder tissue after spinal cord injury by histopathological and immunohistochemical methods.

Twenty Wistar Albino rats were categorized as control and SCI groups. At T7-T9 vertebrae, a steel rod was dropped from 10 cm to create a spinal cord injury under anesthesia. Rats were decapitated. Tissues were fixed in a 10 % formalin solution and embedded in paraffin blocks for histopathologic examination. 4-6 µm thick sections were obtained and stained with H-E. Remaining were immunostained with ADAMTS-4 antibody.

In the SCI group, degeneration in urinary bladder epithelial cells, an increase in fibrosis, dilatation and congestion in blood vessels, and hyperplastic endothelial cells were observed. In the SCI group, ADAMTS-4 positive expression was observed in degenerated cells in bladder epithelial cells. Moreover, ADAMTS-4 expression was increased in inflammatory and vascular endothelial cells.

It has been observed that the structural integrity of the bladder epithelial cells is lost due to spinal cord damage, and the urination feature is significantly interrupted by the increase in inflammation and the formation of bladder dysfunction.

Keywords: Histopathology, spinal cord, immunohistochemical examination

INTRODUCTION

After spinal cord injury, loss of function is observed in some organs and systems due to neurological damage in patients. The urogenital problems of patients with spinal cord injury bring along urinary system disorders and sexual problems. In post-traumatic suprasacral lesions, both storage and excretion functions are impaired by severing the connections between the pontine micturition center and the sacral voiding plexus. It has been reported that bladder contraction continues through reflex activity in suprasacral lesions, since the stimuli that cause the contraction of the detrusor muscle of the bladder originate from the S2-4

segments (1). After the spinal injury period, suprasacral or infrasacral type bladder dysfunction occurs depending on the level of injury.

ADAMTS-4 (a type 4 thrombospondin motif disintegrin and metalloproteinase) is a metalloprotein capable of degrading chondroitin sulfate proteoglycans leading to cartilage destruction during arthritis or neuroplasticity during spinal cord injury (2). In a study in mice, ADAMTS-4 was reported to promote neurodegeneration and increase neuromuscular dysfunctions in a model of perineuronal deterioration, amyotrophic lateral sclerosis (ALS), accelerated (3). shows that this is not limited to proteolysis of the extracellular matrix (ECM). It was recently described that ADAMTS-4 regulates the expression and release of neurotrophic factors in cultures of microglia or astrocyte (4).

The most common urological complications associated with spinal cord injury are urinary tract infection, urinary tract dysfunction and bladder dysfunction. In this study, it was aimed to show the dysfunction occurring in the bladder tissue after spinal cord injury by histopathological and immunohistochemical methods

Material and Methods

In this study, Wistar male rats weighing 280-300 grams were used. The rats were housed individually in suitable cages, at a temperature of $22 \pm 2^{\circ}\text{C}$ and in 12 hours of dark, 12 hours of light. Animals were fed with standard laboratory food and water. The animals were anesthetized with intraperitoneally 3 mg/kg xylazine (Rompun 2%; Bayer) and 90 mg/kg Ketamine HCl (Ketalar; Eczacıbaşı-Warner Lambert). The rats were incised in the midline between T5 and T12 vertebrae, and the paravertebral muscles were pushed aside to expose the laminae. Later, at T7-T8-T9 vertebrae, laminectomy was performed and a steel rod 3 mm in diameter and 10 g in weight was dropped from 10 cm to create a spinal cord injury. (8) The control group was given the same dose of saline. Twenty Wistar Albino rats were divided into 2 groups with 10 in each: (1) Control Group (no trauma was induced in these rats. Only placebo saline was applied) (3). SCI Group (the rats in this group were traumatized as described above. Sections of the bladder were taken 6 weeks after the trauma.

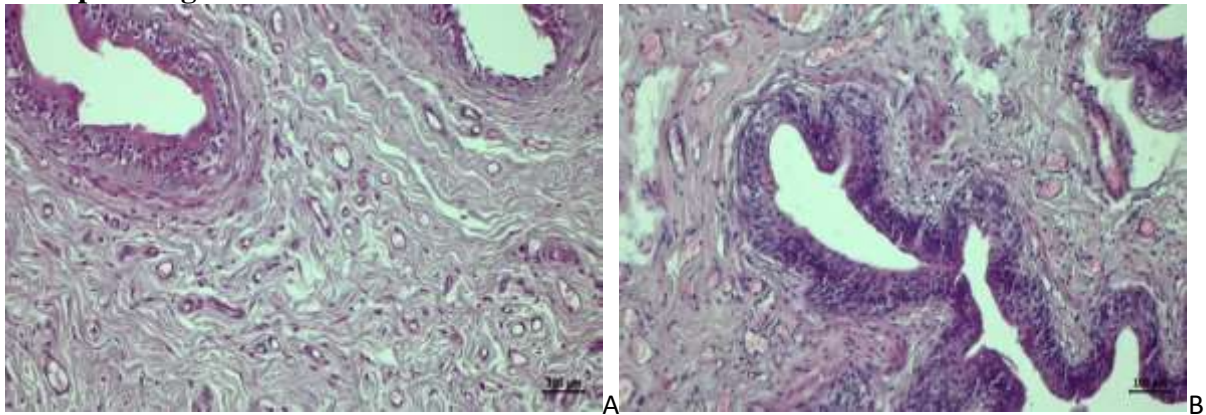
For the histological examination, urinary bladder tissues were fixed in 10% formaldehyde solution, post-fixed in 70% alcohol, and embedded in paraffin wax. The sections were stained with Hematoxylin-Eosin.

Immunohistochemical staining

Antigen retrieval was done in microwave for 3min x90°C. They were subjected to a heating process in a microwave oven at 700 watts in a citrate buffer (pH 6) solution for proteolysis. Sections were washed in 3x6 min PBS and incubated with hydrogen peroxide Hydrogen peroxide (H_2O_2) + 27ml methanol) for 20 min. Sections were washed in 3x6 min PBS min and blocked with Ultra V Block for 10 min. After draining, primary antibody was directly applied to sections distinctly ADAMTS-4 monoclonal antibody 1:100). Sections were incubated and left overnight at 4°C. Sections were washed in 3x5 min PBS and then incubated with Biotinylated Secondary Antibody for 20 min. After washing with PBS, Streptavidin Peroxidase was applied to sections for 15 min. Sections were washed in 3x6 min PBS and DAB were applied to sections up to 10 min. Slides showing reaction was stopped in PBS. Counter staining was done with Harris's Haematoxylin for 40 sec, dehydrated through ascending alcohol and cleared in xylene., Hematoxylin stained Slides were mounted with Entellan and examined under light microscope (Zeiss, Germany)

RESULT

Histopathologic Examination



In the control group, the crustal cells on the surface of the bladder epithelium extend towards the enlarged lumen, the basement membrane appears normal, and the mitotic activity of stem cells increases towards the dense lumen.

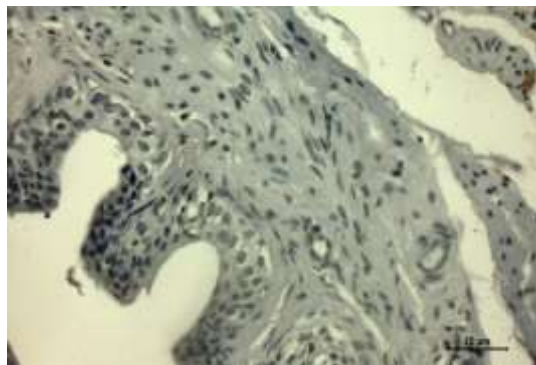
The fibroelastic connective tissue fibers in the lamina propria are arranged parallel to each other in bundles and there are solitary connective tissue cells between them. The lumens of the small blood vessels have regular endothelial cells in a flat appearance, the muscle fibers are arranged as parallel fibers in a circular and longitudinal structure(Figure-1A).

In the spinal cord injury group, integrity was impaired in the basement membrane under the bladder epithelium, degeneration in stem cells, pycnosis in nuclei and apoptotic changes were observed. Eosinophilic areas with hyperplasia were seen in the apical cells. Mononuclear cell infiltration under the basal lamina, dilatation and congestion in the blood vessels in the lamina propria, free-dispersed erythrocyte infiltration where fibroelastic fibers were found, and degenerative changes in the musculature of the muscular layer were observed(Figure-1B).

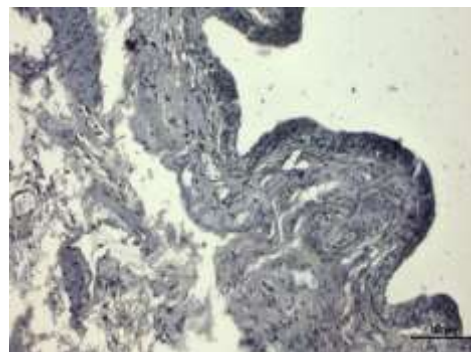
Immunohistochemical Examination

When the immunoactivity of the control group was examined, moderate ADAMTS-4 expression was observed in the cells located in the apical of the bladder epithelium, while weak ADAMTS-4 expression was observed in the stem cells. Negative ADAMTS-4 expression was observed in cells and muscle cells.

When the immune activity in spinal cord injury was examined, an increase in ADAMTS-4 expression in apoptotic cells in the bladder epithelium, inflammatory cells under the basement membrane, and ADAMTS-4 expression in cells around degenerated connective tissue fibers and muscle bundles were evaluated as positive.



Kontrol group



Spinal cord injury group

DISCUSSION

Spinal cord injury (SCI) is the most common cause of neurogenic bladder dysfunction. Spinal cord damage affects many organ functions and is considered among the neurogenic causes that lead to loss of bladder function and impaired voiding function. Depending on the severity of the damage, neurogenic bladder low or hyper detrusor activity varies.

The pathophysiology of SCI is a highly complex process with neurological lesions, diseases, and bladder and sphincter. Compérat et al. reported neurogenic inflammatory infiltration, edema, and fibrosis in the bladder wall (5). Janzen et al (6) found severe fibrosis in the lamina propria and muscularis, hyalinization in the wall, dysregulation of smooth muscle cells with leiomyomatous-like hyperplasia, and chronic inflammatory increase in the neurogenic bladder (7). Yaris et al. reported that 4 weeks after spinal injury, degeneration of cells in the transitional epithelial layer, thinning of the epithelium, increase in fibrotic tissue in the connective tissue, mild deterioration in muscle tissue, excessive expansion and congestion in blood vessels, and hyperplasia in endothelial cells (8). They stated that urine storage, muscle reflex and functional functions may change due to cellular degeneration and muscle dysregulation in the bladder. Although similar results were observed after a week in our study, the increase in the inflammation signal caused the acceleration of the apoptotic effect, and the dysfunction in the bladder became more pronounced. . ADAMTS-4 has been reported to have a beneficial effect on neuroplasticity and the subsequent functional outcome of injured rats after SCI or neuroinflammation after ischemic stroke in mice, while it has been reported to accelerate neurodegeneration and clinical manifestations of neuromuscular dysfunctions in ALS in mice (4). ADAMTS-4 has been shown to shed light on its great utility in neuroplasticity and neuroinflammation during acute CNS injuries and, conversely, its neurodegenerative effect during a chronic neurodegenerative disease. In our study, it was observed that the degenerative effect and inflammation in the epithelium due to spinal cord damage in the bladder increased and ADAMTS-4 activity increased and triggered the apoptotic process.

CONCLUSION

It has been observed that the structural integrity of the bladder epithelial cells is lost due to spinal cord damage, and the urination feature is significantly interrupted by the increase in inflammation and the formation of bladder dysfunction.

REFERENCES

1. AYKANAT C, ASLAN B, ASLAN Y. Omurilik Yaralanmalı Hastalarda Ürogenital Sorunlar ve Tedavileri. *Türk Nöroşirürji Dergisi*. 2020;30(3):492-500.
2. Hamel MG, Ajmo JM, Leonardo CC, Zuo F, Sandy JD, Gottschall PE. Multimodal signaling by the ADAMTSs (a disintegrin and metalloproteinase with thrombospondin motifs) promotes neurite extension. *Exp Neurol*. 2008;210(2):428-40.
3. Lemarchant S, Pomeschik Y, Kidin I, Kärkkäinen V, Valonen P, Lehtonen S, et al. ADAMTS-4 promotes neurodegeneration in a mouse model of amyotrophic lateral sclerosis. *Mol Neurodegener*. 2016;11:10.
4. Lemarchant S, Pruvost M, Hébert M, Gauberti M, Hommet Y, Briens A, et al. tPA promotes ADAMTS-4-induced CSPG degradation, thereby enhancing neuroplasticity following spinal cord injury. *Neurobiol Dis*. 2014;66:28-42.
5. Jeong SJ, Cho SY, Oh SJ. Spinal cord/brain injury and the neurogenic bladder. *Urol Clin North Am*. 2010;37(4):537-46.
6. Compérat E, Reitz A, Delcourt A, Capron F, Denys P, Chartier-Kastler E. Histologic features in the urinary bladder wall affected from neurogenic overactivity--a comparison of

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inflammation, oedema and fibrosis with and without injection of botulinum toxin type A. *Eur Urol.* 2006;50(5):1058-64.

7. Janzen J, Soni BM. Microscopic findings in a neurogenic bladder caused by myelomeningocele. *Spinal Cord.* 2005;43(1):65-6.

8. Yaris M, Deveci E. Changes in the Bladder After Spinal Cord Injury and Expression of VEGF and APAF-1. *ANALYTICAL AND QUANTITATIVE CYTOPATHOLOGY AND HISTOPATHOLOGY.* 2021;43(3):137-42.

DEVELOPING TRAINING MODEL AND ITS COMPONENTS IN BIOLOGY TEACHING

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Abstract

A systematic approach allows the study of the learning process to be built in accordance with the principles of dialectics, such as universal interaction and the development of the world. This approach is based on the systematic study of objects. In this case, the learning process should be considered as a specific object.

Four main components of any technique have been identified:

- 1) strategy - the methodology used in solving tasks;
- 2) tactics - methodological principles for achieving results;
- 3) logic - a consistent action that can be concluded;
- 4) technique - the activity itself to achieve the result.

In addition, the development methodology of education in biology will cover a content component, including the content of biological knowledge that contributes to intellectual development.

The following tasks are set from the interaction of developmental training and education:

1. Formation and development of natural-scientific thinking.
2. Development of schoolchildren's independence.
3. Mastering the methods of biological cognition.

When solving these problems in developmental training in biology, that is, for the organization of developmental training, it is necessary to rely on the most optimal methods, methodological techniques, starting positions based on tools. Principles of motivation, problem-solving, the principle of special formation of methods of mental activity, the principle of independence, the principle of stages, the principle of individualization are defined as such principles.

Key words: strategy, tactics, logic, natural-scientific thinking, biological cognition

BİOLOGİYANIN TƏDRİSİNDƏ İMKİŞAFETDİRİCİ TƏLİM MODELİ VƏ ONUN KOMPONENTLƏRİ

Özet

Sistematik yanaşma, təlim prosesinin öyrənilməsini universal qarşılıqlı əlaqə və dünyanın inkişafı kimi dialektikanın prinsiplərinə uyğun şəkildə qurmağa imkan verir. Bu yanaşma, obyektlərin sistem olaraq öyrənilməsinə əsaslanır. Bu vəziyyətdə təlim prosesi müəyyən bir obyekt kimi qəbul edilməlidir.

Hər hansı bir texnikanın dörd əsas komponenti müəyyənləşdirilmişdir:

- 1) strategiya – tapşırıqlar həllində istifadə olunan metodika;
- 2) taktika – nəticələri əldə etmək üçün metodik prinsiplər;
- 3) məntiq – nəticəyə gətirilə bilən ardıcıl fəaliyyət;
- 4) texnika – nəticə əldə etmək üçün fəaliyyətin özü.

Bundan əlavə, biologiyada təhsilin inkişaf metodologiyası, zehni inkişafa töhfə verən bioloji biliklərin məzmunu da daxil olmaqla bir məzmun komponentini əhatə edəcəkdir.

İnkişafetdirici təlim ilə təhsilin qarşılıqlı əlaqəsindən aşağıdakı vəzifələr irəli sürülür:

1. Təbii-elmi düşüncə tərzinin formalaşması və inkişafı.
2. Məktəblilərin müstəqilliyinin inkişafı.
3. Bioloji idrak metodlarına yiyələnmək.

Biologiyada inkişafetdirici təlimdə bu problemləri həll edilərkən, yəni inkişafetdirici təlimin təşkili üçün ən optimal metodlara, metodik texnikaya, vasitələrə əsaslanan başlanğıc mövqelərinə etibar etmək lazımdır. Motivasiya prinsipləri, problemlilik, əqli fəaliyyət metodlarının xüsusi formalaşma prinsipi, müstəqillik prinsipi, mərhələlər prinsipi, fərdiləşdirmə prinsipi bu cür prinsiplər kimi müəyyən edilmişdir.

Açar sözlər: strategiya, taktika, məntiq, təbii-elmi düşüncə, bioloji idrak

GİRİŞ

Sistematik yanaşma, təlim prosesinin öyrənilməsini universal qarşılıqlı əlaqə və dünyanın inkişafı kimi dialektikanın prinsiplərinə uyğun şəkildə qurmağa imkan verir. Bu yanaşma, obyektlərin sistem olaraq öyrənilməsinə əsaslanır. Bu vəziyyətdə təlim prosesi müəyyən bir obyekt kimi qəbul edilməlidir.

Titova E.V. hər hansı bir texnikanın dörd əsas komponentini müəyyənləşdirib:

- 1) strategiya – tapşırıqlar həllində istifadə olunan metodika ;
- 2) taktika – nəticələri əldə etmək üçün metodik prinsiplər;
- 3) məntiq – nəticəyə gətirilə bilən ardıcıl fəaliyyət
- 4) texnika nəticə əldə etmək üçün fəaliyyətin özü

Bundan əlavə, biologiyada təhsilin inkişaf metodologiyası, zehni inkişafa töhfə verən bioloji biliklərin məzmunu da daxil olmaqla bir məzmun komponentini əhatə edəcəkdir.

İnkişafetdirici təlim ilə bioloji təhsilin qarşılıqlı əlaqəsindən ümumi biologiyada inkişaf təhsilinin aşağıdakı vəzifələri irəli sürülür:

1. Təbii-elmi düşüncə tərzinin formalaşması və inkişafı.
2. Məktəblilərin müstəqilliyinin inkişafı.
3. Bioloji idrak metodlarına yiyələnmək.

Biologiyada inkişafetdirici təlimdə bu problemləri həll edilərkən, yəni inkişafetdirici təlimin təşkili üçün ən optimal metodlara, metodik texnikaya, vasitələrə əsaslanan başlanğıc mövqelərinə etibar etmək lazımdır. Motivasiya prinsipləri, problemlilik, əqli fəaliyyət metodlarının xüsusi formalaşma prinsipi, müstəqillik prinsipi, mərhələlər prinsipi, fərdiləşdirmə prinsipi bu cür prinsiplər kimi müəyyən edilmişdir.

Motivasiya prinsipi.

Bu prinsip inkişafetdirici təlimin hər bir şagird üçün şəxsən mənalı olmasını nəzərdə tutur. Motiv, şagirdin təhsil işinin müəyyən aspektlərinə yönəlməsidir, şagirdin ona daxili münasibəti ilə əlaqələndirilir.

Problemlilik prinsipi.

Bu prinsip şagirdlərin yeni biliklərə yiyələnməsini tapşırıq-problem şəklində ifadə olunan problemlili vəziyyətlərin nisbətən müstəqil həlli zamanı həyata keçirildiyini nəzərdə tutur. Problemlili vəziyyət, bir şagirdin ona verilən üsullarla tapşırığı yerinə yetirə bilməməsi ilə əlaqədar olaraq onda yaranan intellektual çətinlikidir. Belə bir tapşırığın icrası prosesində ortaya çıxan, mövzu, tapşırığı yerinə yetirmə üsulları və ya şərtləri haqqında yeni məlumatların tapılmasını tələb edən müəyyən bir zehni vəziyyəti xarakterizə edir.

Zehni fəaliyyət metodlarının xüsusi formalaşması prinsipi.

Bu prinsip, şagirdlərdə zehni fəaliyyət metodlarının xüsusi şəkildə formalaşdırılması (xüsusi metod və vasitələrlə ümumi bioloji biliklər əsasında) olması zəruriliyinə əsaslanır.

Zehni fəaliyyət metodu müəyyən bir zümərənin problemlərinin həllinə tabe olan, zehində baş verən hərəkətlər məcmusu kimi başa düşülür.

Zehni inkişafın göstəricilərindən biri bir texnikanı müstəqil olaraq yeni obyektlərə köçürmək, onu digər zehni fəaliyyət texnikalarına daxil etmək qabiliyyətidir.

Müstəqillik prinsipi.

Bu prinsip təhsilin inkişafında yeni biliklərin əldə edilməsində müstəqil fəaliyyətin aparıcı rolunu əks etdirir. İnkişaf etdirmə təhsili zamanı müstəqillik dərəcəsi təşəbbüskarlıqla ifadə olunmalı, işə yeni elementlər gətirmə bacarığı, işi düzgün planlaşdırma və təşkil etmə bacarığı və çətinliklərin öhdəsindən öz gücü ilə gəlmə qabiliyyəti göstərilməlidir.

Mərhələlərin prinsipi.

Bu prinsip inkişaf təliminin mərhələli şəkildə tədrisən daha mürəkkəb hala gətirilməsini və hər bir təlim subyektinin fərdi nailiyyətlərinə yönəldilməsini nəzərdə tutur. İnkişaf etdirmə təhsili zamanı problem-idrak tapşırıqlarının mürəkkəbliyi tədrisən artır; müstəqil iş getdikcə daha da mürəkkəbləşir.

Fərdiləşdirmə prinsipi.

Bu prinsip, öyrənmənin hər bir tələbəyə ayrı-ayrılıqda yönəldilməsi və fərdi xüsusiyyətləri nəzərə alaraq müstəqil düşüncə tərzini, düşüncə tərzini inkişafına töhfə verməsi halında inkişaf edə biləcəyini nəzərdə tutur. Məktəblilərdəki fərdi fərqlər təhsil fəaliyyətinin fərdiləşdirilməsinin əsasını təşkil edir [6].

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<i>Tapşırıq növü</i>	<i>Tapşırıqların əsas xüsusiyyətləri</i>	<i>Nümunə</i>
Problemləli vəziyyət	Elmi həqiqətlər arasındakı ziddiyyət və ya köhnə biliklə yeni faktlar arasındakı ziddiyyət	Sukkulent bitkilərdə ağzıqlar gündüz (istidə) bağlanmalıdır, lakin günorta (ışıqda) fotosintez baş verir və ağzıqlar vasitəsilə qaz mübadiləsi lazımdır.
I. Qismən axtarış tapşırığı	Tapşırıq özündə bir problemi əks etdirir və həll yolları qismən göstərilir.	Orta iqlim qurşağı bitkilərinin və sukkulent bitkilərdəki fotosintez prosesi arasındakı fərq nə olmalıdır, əgər sonunculardakı ağzıqlar gündüz (istidə) bağlanır və qaz mübadiləsi yalnız gecə baş verə bilər. Sukkulent bitkilərin fotosintezedicitoxumalarında hansı uyğunlaşmalar yarana bilər?
II. Problemləli axtarış tapşırıqları.	Hipotez irəli sürərək tapşırığın göstərdiyi problemi müstəqil həll etmək lazımdır.	Səhra bitkilərində - sukkulentlərdə - gündüz ağzıqlar bağlanır, bu da suyun həddindən artıq buxarlanmasının qarşısını alır. Fotosintez prosesinin bu bitkilərdə necə baş verdiyini izah edən bir fərziyyə irəli sürün. Bu fərziyyə necə yoxlanıla bilər?
III. Tədqiqat tapşırıqları	Tapşırıq yalnız faktı özündə əks edir. Problemin axtarışı və həll yolları şagirdlər tərəfindən müstəqil şəkildə həyata keçirilir	Səhra bitkilərində - sukkulentlərdə fotosintez prosesi orta iqlim qurşağı bitkilərindəkindən fərqlənir. Sizcə nə üçün? Bu necə baş verir?

<u>Yaşayış mühiti</u>	<u>Tənəffüs orqanları</u>	<u>Heyvanlar</u>
Quru, su	dəri, ağ ciyərlər	salamandra, balıq-ılan, qurbağa, siren, ağac qurbağası, kərtənkələ, tısbağa, timsah.

Digər şagirdlər 4 qrup müəyyən etdilər:

<u>Yaşayış mühiti</u>	<u>Tənəffüs orqanları</u>	<u>Suda-quruda yaşayanlar</u>	<u>Digər heyvanlar</u>
Quru	dəri	balıq-ılan	salamandra
Su	ağciyərlər		triton, siren

Bəzi şagirdlər isə anlayışları 6 qrupa böldülər:

<u>Yaşayış mühiti</u>	<u>Tənəffüs orqanları</u>	<u>Ayaqsız amfibilər</u>	<u>Quyruqlu amfibilər</u>	<u>Quyruqsuz amfibilər</u>	<u>Digər heyvanlar</u>
Quru	dəri	balıq-ılan	salamandra	qurbağa	kərtənkələ
Su	ağciyərlər		triton, siren	ağac qurbağası	timsah, tısbağa

Şagirdlərlə birlikdə altıncı qrup heyvanların amfibiyyəyə aid olmadığı, bugünkü dərstdə nəzərdən keçiriləcək sürünənlər sinfinin nümayəndələri olduğu qənaətinə gəlinir.

Nəticə:

- qruplaşdırma texnikasından istifadə şagirdlərin intellektual qabiliyyətlərinin, məntiqi düşüncəsinin inkişafına kömək edir;
- hər bir şagirdlərin uğurlu bir fəaliyyətdən məmnunluğu var (hər şey özlüyündə haqlıdır)
- təlimin keyfiyyətində yüksəliş baş verir.

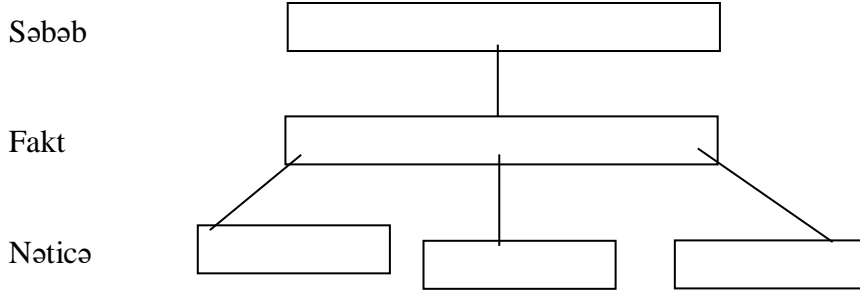
2.Məntiqi cədvəllər.

Məqsəd: məntiqi düşüncənin, intellektual qabiliyyətlərin inkişafı.

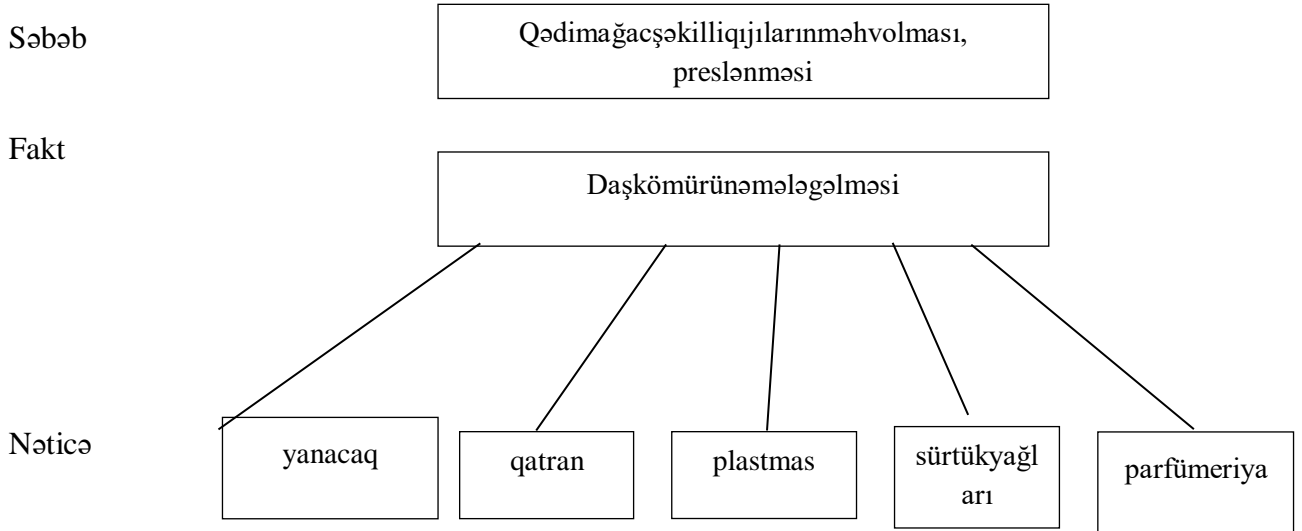
2.Məntiqi cədvəllər.

Biologiya dərslərində məntiqi düşünməyi, yalnız təbiətin fenomenini deyil, səbəbini, nəticələrini də görməyi öyrədən məntiqi cədvəllərdən istifadə edirik. Məntiqi cədvəllər müxtəlif hadisələri öyrənmək, təbiət obyektləri arasında oxşar və fərqli cəhətləri tapmaq üçün istifadə olunur.

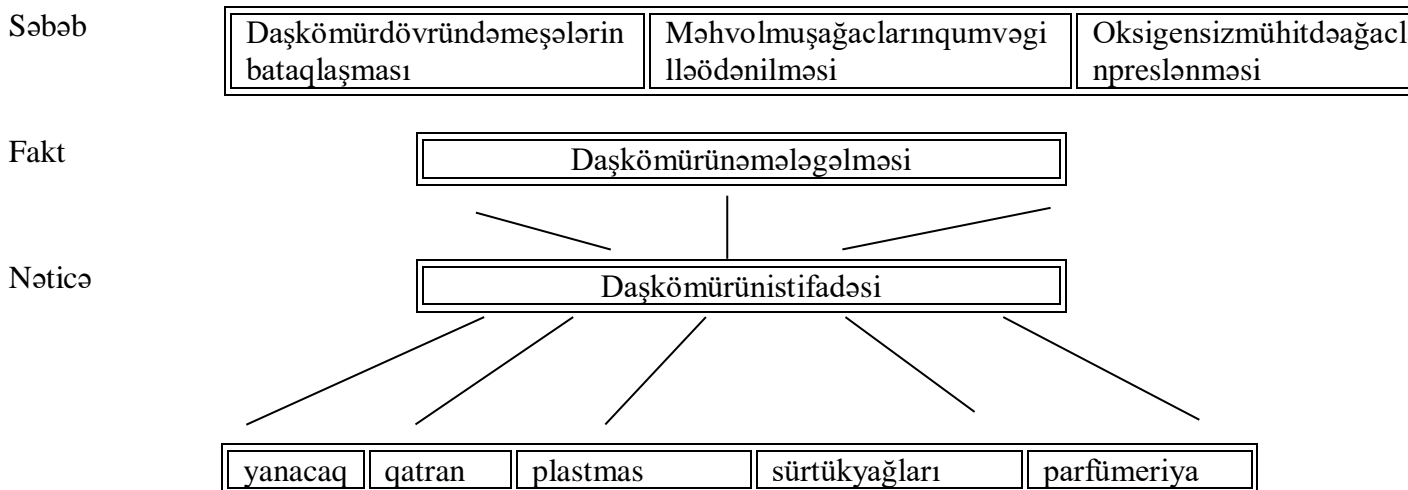
3. Səbəb-nəticə xarakterli məntiq cədvəli:



Məsələn, 6 sinifdə "Qijikimilər" mövzunu öyrənərkən uşaqlar kömürün yaranma səbəblərini öyrənirlər, insan həyatındakı əhəmiyyətini göstəririlər. Bəzi şagirdlər kömür əmələ gəlməsinin ümumi bir səbəbini göstəririlər.



Digər şagirdlər, əlavə ədəbiyyat istifadə edərək, cədvəl müəkkəbləşdirir, daşkömür əmələ gəlməsinin bir neçə səbəbini göstəririlər.



a. Digər nümunə. «Kub» məntiqi cədvəli

Kubun 6 tərəfi var. Şagirdlərxəyalənkubuatırvəcədvəldəkisuallaracavabverir.Məsələn: 7-ci

		5. Tətbiq et (necəistifadətməkolar)	
1.Təsvir edin (necəgörünür)	2. Müqayisəedin (nəyəbənzəyir)	3. Assosiasiyayarət	4. Təhlil et (necəyaranıb)
		6. Özrəyinibildir (+, -)	

sinifdə “Məməlilərin sinir sistemi”

mövzusunun öyrənmərkəncədvəlinköməyiiləneyronuxarakterizəedirlər.

1. Neyronu təsvir edərkən onun cismi və çıxıntılara sahib olduğu qeyd edilir: dendritlər və aksonlar.
2. Hörumçək, ləkə, dəniz ulduzu ilə müqayisə etdilər.
3. Şagirdlər sinir hüceyrələrinin membranlarından ötürülən elektrik siqnalı ilə bağlı bir assosiasiya yaratdılar.
4. Neyronun əmələ gəlməsini təhlil edərkən, şagirdlər bunun üzvi aləmin uzun təkamülü zamanı meydana gələn sinir toxumasının əsas hissəsi olduğunu qeyd etdilər.
5. Tətbiq haqqında danışarkən, şagirdlər neyronların böyük əhəmiyyətini göstərdilər, çünki bədən xarici və daxili mühitindən orqanların işinə nəzarət etmək üçün lazım olan siqnalları alır, aparır və işləyirlər; neyronsuz, sinir toxumasız həyatımızın mümkün olmadığı qənaətinə gəldilər.
6. Şagirdlər neyronların sinir toxumalarının ayrılmaz hissəsi kimi əhəmiyyəti barədə fikirlərini bildirdilər.

Nəticə:

- məntiqi cədvəllərin istifadəsi mövzunun mahiyyətini, öyrənilən materialda səbəb-nəticə əlaqələrini və qarşılıqlı əlaqələrini qurmağa imkan verir;
- şagirdlərin düşüncə tərzini, təhsil problemini həll edərkən diqqətlik qabiliyyətini inkişaf etdirir;
- şagirdlərin şəxsi keyfiyyətlərini inkişaf etdirir: məqsədyönlülük, mütəşəkkillik, müstəqillik.

Biologiyanın tədrisinin müxtəlif mərhələlərində şagirdlərin inkişafetdirici fəaliyyətlərinin əsası kimi analiz, sintez, müqayisə, müşahidə, ümumiləşdirmə, səbəb-nəticə əlaqələrinin müəyyənləşdirilməsi kimi məntiqi üsulların öyrənilməsinə müəllimlər tərəfindən xüsusi diqqət verilməlidir.

Müəllim şagirdlərin inkişafetdirici fəaliyyətlərini artırma bilən zəka oyunlarına məntiqi cədvəllərdən, yaradıcı tapşırıqlardan, zəka oyunlarından və s. geniş istifadə etməlidir.

İSTİFADƏ EDİLMİŞ ƏDƏBİYYAT:

1. Abdullayeva T.Q. Yeni inkişafetdirici təlim üsulu kimi layihələrin hazırlanmasında şagird fəaliyyətinin təşkili // ADPU xəbərləri. Təbiət elmləri seriyası, 2013, №3, səh.319-321.
2. İbrahimova X.Q. Biologiyanın tədrisində fəal təlim metodlarının tətbiqi yolları. Bakı, 2015, səh.172.
3. Tağıyev İ.T. Biologiyanın tədrisində effektiv təlim texnologiyalarından istifadə // Pedaqoji Universitetin xəbərləri, 2020, №1, səh. 256-260.
4. Давыдов В.В. Проблемы развивающего обучения. М., 2006
5. Кабанова-Меллер Е.Н. К проблеме развивающего обучения.//География в школе. 2012, № 1.

MEASURING THE FINANCIAL FAILURE OF COMPANIES IN THE WHOLESALE
RETAIL SECTOR TRADED ON BORSA ISTANBUL

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Abstract

In a globalized world, companies are interconnected like chain rings. If one of the chain rings has problems, it will cause the chain to break. Companies for countries' economics are interconnected like chains and the success of companies is extremely important for countries' economics to fulfill their financial qualifications. Economic and political fluctuations pose problems in the financial and real economy. These problems have an important share in the financial failures of the companies. It is very important to predict and determine the financial failure. There are many methods used to measure the risk of financial failure. In this study; financial analysis methods of the financial performances of 5 companies operating in the manufacturing sector traded on the İstanbul Stock Exchange were analyzed using the Altman Z-score model and the Springate S-score model. In the study, the possibilities of bankruptcy were tried to be determined by using the Altman Z-score method, Altman Z-score public enterprises model and Springate methods of the data in the balance sheets and income tables of the companies in 2020-2010. Companies' Altman Z-score, Altman Z-score public manufacturing enterprises model and Springate values compare the numerical values of the probability of the financial failure and the company's positive rumors in the uncertain and risky area.

Keywords: Financial Failure, İstanbul Stock Exchange, Manufacturing Sector, Altman Z-score Model, Springate Score Model.

Gel Code : G01, G17, G32

Özet

Globelleşen dünyada, firmalar birbirine zincir halkaları gibi bağlıdır. Zincir halkalarından birinde sorun olursa zincirin kopmasına neden olur. Ülke ekonomileri için firmalar birbirlerine zincirler gibi bağlıdır ve firmaların başarılı olması finansal yeterliliklerini yerine getirmeleri ülke ekonomileri açısından son derece önemlidir. Ekonomik ve siyasi dalgalanmalar finansal ve reel ekonomide sorunlar doğurmaktadır. Bu sorunlar firmaların finansal başarısızlıklarında önemli bir paya sahiptir. Finansal başarısızlığın önceden tahmin edilip belirlenmesi çok büyük önem arz etmektedir. Finansal başarısızlık riskinin ölçülmesinde kullanılan birçok yöntem vardır.

Bu çalışmada; Borsa İstanbul'da İşlem gören toptan perakende sektöründe faaliyet gösteren 5 firmanın mali performanslarının, finansal analiz yöntemleri Altman Z-skor modeli ve Springate S-skor modeli ile analizleri yapılmıştır. Çalışmada şirketlerin 2020-2010

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yıllarındaki bilanço ve gelir tablolarındaki verilerin Altman z-skor yöntemi, Altman z-skor halka açık imalat işletmeleri modeli ve Springate yöntemleri kullanılarak iflas olasılıkları belirlenmeye çalışılmıştır. Şirketlerin Altman z-Skor, Altman z-skor halka açık imalat işletmeleri modeli ve Springate değerleri karşılaştırmalı olarak, finansal başarısızlık olasılığının sayısal değerlerini ve şirketin olumlu, belirsiz ve riskli alanda olması yorumlamalarını içermektedir.

Anahtar Kelimeler: Finansal Başarısızlık, Borsa İstanbul, Toptan ve Perakende Sektörü, Altman Z-Skor Modeli, Springate Skor Modeli

Jel Kodu: G01, G17, G32

SAVUNMA SANAYİNİN TÜRKİYE VE ÜLKELER KONOMİSİNE OLAN ETKİSİ VE ROLÜ

Burak KOÇAK

Yüksek Lisans Öğrencisi Kahramanmaraş Sütçü İmam Üniversitesi Sosyal Bilimler Enstitüsü
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Özet

Son yıllar içerisinde kamu harcamalarının en önemli payını oluşturan savunma sanayi ; yerli ve milli sistemlere ihtiyaç duyulması ,teknolojik alt yapı gereksinimi, savunma sektöründe istihdam edilen personellerin gereksinimleri ,üretim platformunun sürdürülmesinde ihracata duyula ihtiyaç ,temel tedarikçinin devlet olması gibi özellikleriyle diğer kamu alımlarından ayrılmaktadır. Savunma sanayi harcamalarının milli gelire etkisi diğer alanlara hitaben arz ve ya talep yönlü ekonomik modeller ile tespit edilmektedir. Savunma sanayi harcamalarının ülke kalkınmasına etkisi ; yarattığı istihdam ,ihracat rakamlarına etkisi, Ar-Ge ve teknolojik altyapıya katkısı bağlamında değerlendirilmelidir. Savunma sanayi ülkelerin teknolojik gelişmişliğine özelliklede yüksek teknoloji ürün üretme bağlamına bağlı olarak olumlu ya da olumsuz şekilde etkilemektedir. Teknolojik alanda güçlü olunmasıyla savunma sanayi sektörünün etkisi olumlu olarak artmaktadır. Ancak savunma sistemlerinin tedarik süreci uzaması nedeniyle de olumlu etkilerinin yansımaları gecikmesine neden olmaktadır .Bu sebeplerden ötürü milli sanayilerin gelişmesi ülkelerin her zaman gündeminde yer almaktadır. Bu alanda sivil veya askeri olarak kullanabilecek savunma sistemleri ürünlerine , bu ürünleri üreten savunma şirketlerinin rekabet koşullarını sürdürmeleri açısından son derece önemlidir. Bu çalışmada savunma sanayi sistemlerinin ülke ekonomisine etkisi ,ülke ekonomisi kalkınmasında rolü ve savunma sanayi şirketlerinin tedarik ve stratejik yöntemleri kapsamı da değerlendirilmektedir.

Anahtar Kelimeler :Savunma Sanayi, Savunma teknolojileri ,Savunma Ar-Ge,Savunma Tedarikçileri

THE EFFECT OF ROLE DEFENSE INDUSTRY TURKEY ON THE ECONOMY OF THE COUNTRIES

Abstract

Defense procurement, which is an important element of public spending differentiates from other public procurement with; the need for domestic and national systems, the need for technology infrastructure, the security requirements of those employed in the sector, the need for export in the sustainability of the production line, and the fact that the basic supplier is the state. The effect of the public expenditures on economic development is determined by using demand-side and/or supply-side economic models. But the effect of defense procurement on

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the development of the country should be evaluated in terms of employment, its impact on export figures, its contribution to R&D and technological infrastructure. Defense purchases affect the economy positively or negatively depending on the technological development of the country. As the level of technological ownership increases, the positive reflections of defense purchases on the economy increase as well. On the other side, the prolongation of defense procurement periods delay the impact of positive effects and the impact of these purchases on the economy. That's why national defense industry is a hot topic on the national agenda. Accordingly, focusing on dual technologies that can be employed for civilian and military purposes is very important for defense industry companies to continue their activities under competitive conditions. In this study, therefore, the role of defense procurement in the development of the country is discussed within the scope of defense procurement strategies and methods, and some suggestions are made.

Keywords: Defense Procurement, Defense Purchases, Defense R&D, Defense Technologies.

A LITERATURE REVIEW ON *DAHLIA* SPP. (KNOWN AS YILDIZ ÇİÇEĞİ IN
TURKISH) FROM TURKEY SOURCES

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Abstract

Dahlia spp., also known as yıldız çiçeği in Turkey, is a plant that stands out among tuberous plants in its outdoor use. *Dahlia* spp. is in the *Asteraceae* family. This family is the richest family of flowering plants, which are spread naturally in almost every region of the world, except for Antarctica. With 1,000 genera and close to 25,000 species. Most dahlias are annual, biennial, or perennial herbaceous plants, and the number of those in the form of shrubs or trees is small in this family. In addition, *Dahlia* spp. naturally grow in the Central America, especially in the high mountains of Mexico. It is a plant that blooms in summer/autumn and its stem is a bush and its roots are tuberous. The flowers are star-shaped, the leaves are simple or compound, rosette-shaped. Since it is a plant that can produce large flowers with its ginger-like tuber, it is a plant that could be economically evaluated in the ornamental plants sector. In short, the fact that the plant is easy to reproduce is an element that increases its economic value. Although it is a plant that grows widely in Turkey and has the potential to grow, studies are lacking. This study aimed to determine the situation Turkey has reached in *Dahlia* spp. cultivation, to examine the theses studies and article type publications and to reveal the importance of *Dahlia* spp. in Turkey.

Keywords: Ornamental Plants, Starflower, Tuberous plant

INTRODUCTION

Ornamental plants are those that are grown purely to appeal to the aesthetic sensibilities of the viewer. However, Ay (2009) reported that today this definition has been expanded and ornamental plants have been aimed at meeting a person's direct physical needs between humans and nature and biological comfort, especially in urban areas. Dahlia is one of the plants that stand out with its outdoor use among tuberous plants. Dahlia is in the *Asteraceae* family. This family is the richest family of flowering plants, which are spread naturally in almost every region of the world, except Antarctica, with 1,000 genera and close to 25,000 species. Most of the plants in this family are annual or perennial, herbaceous plants. Moreover, the number of those in the form of shrubs or trees is small. The flowers are star-shaped, the leaves are simple or compound, rosette-shaped (Alp, 2008; Yazici and Gunes, 2018). There are only 30 varieties of dahlias that are considered common, compared to the total of about 20000 varieties. Dahlia naturally grows in the Central American especially in the high mountains of Mexico. It blooms in summer and autumn. Its body is a bush and its roots are tubular. There are 27 species in nature. Some of these species reach 8–9 m in height, while some are stunted (Brickell 1992; Hessayon 1993; Mc Claren 2004; Alp, 2008). It

blooms continuously from July until the first cold. It has different plant heights, flower shapes and sizes, as well as blooming earlier in temperate regions. Its flowers are seen as plain, water lily, anemone, pompom, ball, semi-cactus, cactus, decorative, orchid, and peony. It has all of the warm colors except the shades of blue (Figure 1).



Figure 1. The flower of Dahlia (Original image)

There are very few studies on dahlias in Turkey. Since it is a plant that can produce large flowers with its potato-like tuber, it is a plant that can be economically evaluated in the ornamental plants sector. The aim of this study was to examine the studies done in Turkey and to offer suggestions in line with the studies.

GRADUATE STUDIES ON BREEDING AND CULTIVATION OF DAHLIA SPP IN TURKEY

Studies in Turkey are limited. This data was obtained from Yök Tez (URL 1) official website search. The data are given in Table 1. It was determined that 4 thesis studies were carried out, one of which is a PhD thesis and the other three are a Master's thesis.

Table 1. The graduate research on Dahlia spp. In Turkey

Year	Thesis type	Author	Thesis Topic
2009	Master's Thesis	Mevlüde Tatar	Geleneksel Van bahçelerinde kullanılan Dahlia Cav. (yıldızçiçeği) kültür formlarının belirlenmesi (In Turkish) <i>A research on the identification of cultivars of Dahlia Cav. grown in the traditional Van gardens</i>
2018	Master's Thesis	Semih Güneş	Tokat ekolojik koşullarında bazı yıldız çiçeği (Dahlia spp.) çeşitlerinde gölgeleme uygulamalarının bitki gelişimi üzerine etkileri(In Turkish) <i>Effects on the plant development of shadowing applications in various star flowers (Dahlia spp.) varieties in tokat ecological conditions</i>
2018	PhD Thesis	Bahar Banu Batı	Konya yöresi yıldız çiçeği (Dahlia spp.) genotiplerinin karakterizasyonu ve bazı bitki büyüme düzenleyicilerin bitki gelişimine etkileri(In Turkish) <i>The characterization of dahlia (Dahlia spp.) genotypes in the Konya region and the effects of some plant growth regulators on plant development</i>

2021	Master's Thesis	Emine Tütüncü	Farklı sulama seviyelerinin yıldız çiçeği (<i>Dahlia sp.</i>)'nin bitkisel özellikleri üzerine etkilerin belirlenmesi (In Turkish) <i>Determination of effects on the plant characteristics of dahlia at different irrigation levels</i>
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EVALUATION OF GRADUATE STUDIES RELATED TO DAHLIA SPP IN TURKEY

In this study, only thesis studies conducted in Turkey were evaluated. These studies pertained to Dahlia. The departments that performed these studies are the Landscape architecture and Horticulture departments.

Van/Turkey

Tatar (2009) conducted a study in the city of Van, located in the Eastern Anatolia Region of Turkey. This study was about exotic ornamental plants belonging to various cultural centers in the Van Gardens, which date back to the Urartian period. Tatar (2009) highlighted that *Dahlia cav.* (Yıldız çiçeği) is one of the exotic plants brought to Van from outside of Turkey and grown in the gardens. As a result of the research, cultural forms belonging to the genus *Dahlia* with different morphological characteristics were identified in the Eminpaşa Neighborhood, formerly known as Şamranaltı. The groups were divided as follows: Group I; yellow flower color and 10 cm flower diameter, Group II; red flower color and flower diameter under 10 cm, and Group III; those with purple flower color and flower diameter less than 10 cm. It has been stated that the forms of dahlias, which have adapted to the climate, soil and other environmental conditions of the region, have survived to the present day in Van and its environs.

Tokat/Turkey

Güneş (2008) studied in the province of Tokat, located in the Central Black Sea Region. Different shade applications were tried on *Dahlia* spp cultivars. They determined the effects on yield, flower diameter, plant height, number of stems, plant stem diameter, stem length, stem thickness, number of buds, bud diameter and vase life of Le Castel, Seattle, Babylon Purple, Gloriosa cultivars. The results of Gunes (2008)'s study showed that shadow applications (35% and 55%) had more positive effects in terms of both yield and quality than the control. In terms of yield among varieties; the Le Castel cultivar was in the first group compared to other cultivars in 35% and 55% shade application. (Figure 2).



Le Castel

Babylon Purple

Gloriosa

Seattle

Figure 2. The studying plants of Güneş (2018) - (Original image)

Consequently, it was concluded that there was a significant difference in flower diameter measurements when the flower undergoes shading and an application of 35% shade was ideal for all cultivars.

Konya /Turkey

Batı (2018) conducted a study to identify 35 dahlia genotypes collected from the Konya region with the using morphological and molecular markers. In the study, the effects of two different plant growth regulators on 'Avignon' and 'Jocondo' cultivars of dahlia were researched. In this study, as a result of measurements and observations made within the scope of morphological identification, a wide variation was observed between genotypes and it was determined that the genetic diversity of dahlia cultivars grown in the Konya region was high. She used ISSR markers for molecular identification in her study. 96 polymorphic DNA fragments were obtained by using 13 ISSR primers which were found to be suitable. The obtained results showed that the genetic difference of dahlia genotypes can be differentiated with the help of ISSR markers.



Avignon

Jocondo

Figure 3. The studying plant of Batı (2018) -Url 3

A second research topic in the thesis study was the effect of growth regulators on *Dahlia* spp. In the study in which the effects of plant growth regulators were researched, different application methods (dipping tubers, soil soaking and leaf spraying) and doses of paclobutrazol (Bonzi) and daminozide (Alar 64) with different active ingredients were used. At the end of the research, it was seen that the applications made in the form of spraying on the leaves were more effective than other applications and the effect increased as the dose increased. The most effective applications for shortening the plant height in the 'Avignon' variety were applications of 4500 ppm and 6000 ppm daminozide in the second period, and these applications reduced the plant height by 23% compared to the control. On the other hand, the daminozide's application of 6000 ppm spraying on the leaves of 'Jocondo' cultivar caused the greatest decrease in plant height and a decrease of 21.26% was observed compared to the control in the first period (Figure 3).

Çanakkale/Turkey

Tütüncü (2021) she carried out the study to determine the effects of different irrigation levels on the vegetative properties of dahlia (*Dahlia* sp.). 5 different irrigation subjects were formed, in which 100% (S100), 80% (S80), 60% (S60), 40% (S40) and 20% (S20) were applied. Before each irrigation, physiological, leaf proportional water content, stomatal conductivity, leaf temperature, chlorophyll reading) and morphological (plant diameter, flower number, petal number, flower diameter, dry flower number) and post-harvest measurements were made

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in all plants. In most of the measured physiological and morphological features, higher values were obtained in the S100 and S80 subjects compared to other subjects. As a result, it could be said that a water restriction of 20% would not cause water stress in the dahlia plant (Figure 4).



Figure 4. The studying plant of Tütüncü (2021)

Apart from these theses, Yazici et al (2020) researched the effect of different nitrogen fertilizer applications on yield and quality traits of *Dahlia* spp. Also, Kılıçarslan and Dönmez (2016) studied Utilization of bulbous plants in landscape architecture growing in Lakes Region.

It is also available in our study on the development of different Dahlia cultivars under Tokat's ecological conditions, which is in the publication stage.

The varieties are:



Figure 5. Some varieties of *Dahlia* spp. photographs from the experimental field a: Philadelphia, b: Rebecca'sWorld's, c: American dawn, d: Marble ball, e: Mr. optimist, f: Hulin's carnival (Original)

As a result of this literature review, it can be seen that this plant is used in studies in different regions of Turkey. Studies are limited but up-to-date. Studies on this plant, which has an important place in the garden culture in Turkey, should be increased. However, it can be seen that there has been no study done in terms of variety development. In Turkey, the branches of science that are studying *Dahlia* spp. are horticultural and landscape architecture. Among the plants detected in landscape areas, there is *Dahlia* spp. (Özdemir, 1996; Çay, 2014). However, this literature review only covers studies that are specific to Dahlia.

Since Dahlia is a tuberous plant and grows in a bushy form. For this reason, dahlia use as an ornamental plant is ideal for outdoor ornamental usage in parks and gardens, and along roadsides and medians. In addition, since dahlia is a plant that can grow tall, it is useful as a support. In line with the studies carried out, the following suggestions can be made:

- Variety development and breeding programs should be increased
- New generation application trials should be made by considering different reproduction techniques
- It should be disseminated through adaptation studies
- The use of different varieties should be increased
- R&D (research and development) studies should be increased
- Studies in the field of landscape use should be increased
- Studies on tissue culture should be expanded
- In addition to production-oriented studies that increase quality and efficiency, breeding studies should be conducted
- Studies on quality and yield related to different growth regulators should be increased

REFERENCES

- Alp, Ş., 2008. Yıldız çiçeği-dahlia (*Dahlia* spp.) yetiştiriciliği, sınıflandırılması ve kullanımı Bağbahçe 17 (Mayıs- Haziran 2008). Yüzüncü Yıl Üniversitesi.
- Batı, B. B.(2018). Konya yöresi yıldız çiçeği (*Dahlia* spp.) genotiplerinin karakterizasyonu ve bazı bitki büyüme düzenleyicilerin bitki gelişimine etkileri, Selçuk Üniversitesi / Fen Bilimleri Enstitüsü / Bahçe Bitkileri Ana Bilim Dalı, Doktora Tezi
- Brickell C., 1992. Encyclopedia of gardening. The Royal Horticultural Society, London. 648.
- Çay,S. (2014).Ağır metal ağır metal iyonlarıyla kirletilmiş toprakların Karadeniz bölgesinde yetişen bazı süs bitkileri kullanılarak temizlenebilirliğinin araştırılması, Ondokuz Mayıs Üniversitesi / Fen Bilimleri Enstitüsü / Kimya Ana Bilim Dalı
- Güneş, S. (2018). Tokat ekolojik koşullarında bazı yıldız çiçeği (*Dahlia* spp.) çeşitlerinde gölgeleme uygulamalarının bitki gelişimi üzerine etkileri Tokat Gaziosmanpaşa Üniversitesi / Fen Bilimleri Enstitüsü / Bahçe Bitkileri Ana Bilim Dalı / Süs Bitkileri Yetiştiriciliği Bilim Dalı , Y.L. Tezi
- Hessayon, D.G., 1993. The Flowers Expert. Pbi Publications. 158.
- Kılıçaslan N, Dönmez Ş (2016). Göller bölgesinde doğal olarak yetişen soğanlı bitkilerin peyzaj mimarlığında kullanımı. Türkiye Ormancılık Dergisi, 17(1): 73-82.

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

McClaren B., 2004. Encyclopedia of Dahlias Timber Press. USA, 211. Önay G., 2007. Bahçem ve ben. Amatör Bahçıvanın El Kitabı. Dördüncü

Özdemir I. (1996). Ankara'da parklardaki mevsimlik süs bitkilerinde aphidoidea türlerinin saptanması üzerinde araştırmalar, nkarası Üniversitesi / Fen Bilimleri Enstitüsü, Y.L.

Tatar, M. (2009). Geleneksel Van bahçelerinde kullanılan Dahlia Cav. (yıldızçiçeği) kültür formlarının belirlenmesi, Yüzüncü Yıl Üniversitesi / Fen Bilimleri Enstitüsü / Bahçe Bitkileri Ana Bilim Dalı, Y.L. Tezi.

Tütüncü, E. 2021. Farklı sulama seviyelerinin yıldız çiçeği (Dahlia sp.)'nin bitkisel özellikleri üzerine etkilerin belirlenmesi, Ç anakkale Onsekiz Mart Üniversitesi / Lisansüstü Eğitim Enstitüsü / Peyzaj Mimarlığı Ana Bilim Dalı

Yazici, K. , Öztekin, S. & Güneş, S. (2020). Farklı Azotlu Gübre Uygulamalarının Dahlia sp'nin Verim ve Kalite Özellikleri Üzerine Etkisi . Türk Tarım ve Doğa Bilimleri Dergisi , 7 (4) , 1171-1177 .

Yazici, K., & Güneş, S. (2018). The Effects of Shading Treatments On The Plant Growth Rate of Some Varieties of Aster Flowers Dahlia Spp in The Ecologic Conditions of Tokat Turkey. Applied Ecology and Environmental Research, 16(5), 7191–7202.

Websites

Url 1: <https://tez.yok.gov.tr>

Url 2: <https://ilovedahlia.com/?product=dahlia-babylon-purpur>

Url 3: <https://www.thompson-morgan.com/p/dahlia-avignon/wkc0393TM>

ASİMETRİK ŞİFRELEMDE VERİ GÜVENLİĞİ VE GENEL SAYI CİSİM ELEĞİ (GNFS)

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Özet

Asimetrik şifreleme kriptosistemlerinde veri güvenliği; algoritmanın gücüne, algoritmada kullanılan anahtarların gizliliğine, şifreleme ve deşifreleme basamağını gerçekleştiren cebirsel fonksiyona bağlıdır. Oluşan kriptosistem saldırılara ne kadar dayanabilirse o kadar güvenlidir. Asimetrik şifreleme algoritmalarından biri olan RSA şifreleme algoritması da gücünü çarpma işleminden almaktadır. RSA güvenliği büyük sayıların çarpanlara ayrılması zorluğuna dayanmaktadır. Çarpma işlemi ve çarpanlara ayırmada kullanılan sayılar küçük olduğu zaman, ufak bir çocuk için eğlenceli bir oyuna dönüşen matematiksel beceriler; sayılar gitgide büyüdüğünde teknolojik aygıtlar için bile belirli sürelerde neredeyse imkansızlaşmaktadır. Sayılar teorisi ve kriptografi için önemli bir konu olan çarpanlara ayırma problemi matematikçiler ve bilgisayar bilimcilerin uğraş alanlarından birini oluşturmaktadır. RSA'da modül N 'i oluşturan ($N=p.q$) p ve q asal çarpanları küçük ve birbirine yakın değerler aldıklarında sistemin güvensizliği sorunu doğmaktadır. Güvenliği rastgele seçilen çok büyük asal sayılara bağlı olan RSA algoritmasında N modülü yeterince büyük olduğunda ve rastgele oluşturulduğunda RSA problemini çözmek son derece zordur. Ancak bu zorluk beraberinde hem matematiksel işlem zorluğuna hem de algoritmanın yavaş çalışmasına sebep olmaktadır. Bu çalışmada RSA algoritması için bir dezavantaj olan bu durum değerlendirilmiş, rastgele seçilen 2^k adet asal sayı kullanılarak RSA algoritmasının şifreleme ve deşifreleme basamakları gerçekleştirilmiştir. Elde edilen sonuçlar iki büyük asal sayı kullanıldığında sonuçlarla karşılaştırılmıştır. Güvenliğin test edilebilmesi için yaygın olarak kullanılan Genel Sayı Cisim Eleği (GNFS) incelenmiştir. Çalışma kapsamında önerilen RSA algoritma uygulaması GNFS çarpanlara ayırma yönteminde rastgele üretilen hem küçük hem de büyük asal sayılar üzerinde denenmiş önerilen şifreleme yönteminin başarısı sınanmıştır.

Anahtar Kelimeler: Asimetrik şifreleme, RSA güvenliği, GNFS

DATA SECURITY IN ASYMMETRIC ENCRYPTION AND GENERAL NUMBER FIELD SIEVE (GNFS)

Abstract

Data security in asymmetric encryption cryptosystems depends on the strength of the algorithm, the confidentiality of the keys used in the algorithm, and the algebraic function that performs the encryption and decryption steps. The more the crypto system can withstand attacks, the more secure it is. The RSA encryption algorithm, which is one of the asymmetric

encryption algorithms, also takes its power from the multiplication process. RSA security is based on the difficulty of factoring large numbers. Mathematical skills that turn into a fun game for a young child when the numbers used in multiplication and factorization are small; When the numbers get bigger, it becomes almost impossible at certain times, even for technological devices. The factorization problem, which is an important issue for number theory and cryptography, is one of the fields of interest of mathematicians and computer scientists. In RSA, the problem of insecurity of the system arises when the prime factors p and q , which make up the module N ($N=p.q$), take small and close values. In the RSA algorithm, whose security depends on very large randomly chosen prime numbers, it is extremely difficult to solve the RSA problem when the N modulus is large enough and it is randomly generated. However, this difficulty causes both mathematical processing difficulty and slow operation of the algorithm. In this study, this situation, which is a disadvantage for the RSA algorithm, was evaluated, and the encryption and decryption steps of the RSA algorithm were performed using 2^k randomly selected prime numbers. The obtained results are compared with the results when using two large prime numbers. The General Number Object Sieve (GNFS), which is widely used, has been examined in order to test the security. The RSA algorithm application proposed within the scope of the study was tested on both small and large prime numbers randomly generated in the GNFS factorization method, and the success of the proposed encryption method was tested.

Keywords: Asymmetric cryptology, RSA security, GNFS

MARKET TREND OF THE GLOBAL WEARABLE TECHNOLOGIES

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Abstract

Wearable devices have rapidly taken an important place in the consumer electronics market enabling the monitoring and control of movements and activities of individuals. Significant growth has also been found in the healthcare industry as medical professionals obtaining physiological, behavioral and contextual data for the diagnosis, treatment and management of chronic diseases as well as hospitals monitoring patients in intensive care and medical systems for rapid detection of virus infection. In addition, industrial and construction sectors are also increasing the use of wearable devices for physiological monitoring of workers in the construction industry for health and safety management and the use of wearable barcode scanner gloves (Pro Gloves) in the logistics industry.

Keywords: Wearable devices, Global wearable market, Healthcare industry.

INTRODUCTION

Wearable devices are technological devices consisting of electronics, software and sensors designed to be worn on the body (Billinghurst & Starner, 1999). These devices are assistive technologies to monitor human working mechanism (Lee, 2012) (Tanuwidjaja, et al., 2014), prosthetics to perform or support human functions (Oliver, et al., 2009), medical devices to detect and control early diagnosis of certain diseases such as monitoring for diabetes during pregnancy (Grönvall & Verdezoto, 2013), early breast cancer diagnosis (MacLean, et al., 2013), eating follow-up of overweight patients (Nishimura & Kuroda, 2008) and physical activity levels and quality lifestyles (Andre, et al., 2006).

Global spending on wearable devices has increased by 18.1% from \$69 billion in 2020 to \$81.5 billion in 2021 (M&C Saatchi Performance, 2021) with the demand for these devices from healthcare contributing to the growth (Markets and Markets, 2021). While the largest is currently the United States; European markets, primarily the United Kingdom, Germany, and France, are also large, specifically for medical wearables. In Europe there have been large investments in medical infrastructure with wearable devices providing patient monitoring for doctors and hospitals. Here the increase can be attributed to the global spread of COVID-19 as well as the growth in the geriatric population, tobacco use, increasing pollution levels, and changing lifestyles (Furion Analytics Research & Consulting LLP, n.d.).

Figure 1 The Global Medical Wearable Device Market is predicted to grow at a Compound Annual Growth Rate (CAGR) of 18.3% between 2020 and 2030 (PS Market Research, 2020).



Wearable Devices

A wearable device is generally a portable device. It can be worn comfortably by people. It can provide innovative functions such as real-time monitoring and information support (Lee, et al., 2011). The increase in cancer, diabetes, heart disease, neurological conditions and chronic diseases around the world is increasing the number of wearable products. (Maurer, et al., 2006) (Casale, et al., 2011) (Dinh, et al., 2009) (Cole, et al., 1999) (Asada, et al., 2003). With the exception of wristbands, every category of wearable devices has increased year over year since 2019 indicating a shift in consumer preference.

Table 2 World Wearable Devices End-User Spending by Type, 2019-2022 (Millions of Dollars) (Gartner, 2021)

Device Type	2019	2020	2021	2022
Smartwatch	18,501	21,758	25,827	31,337
Wristband	5,101	4,987	4,906	4,477
Ear-worn	14,583	32,724	39,220	44,160
Head-mounted display	2,777	3,414	4,054	4,573
Smart clothing	1,333	1,411	1,529	2,160
Smart patches	3,900	4,690	5,963	7,150
Total	46,194	68,985	81,499	93,858

Table 2 contains a summary of wearable devices, what they are, and some examples from the current market.

Table 3 Wearable products in different categories

Device type	Description	Examples
Smart watch	A device worn on the wrist with a touch screen display and sensors to monitor and track fitness, health and other functions.	Smart-watch Life Saver (Grünerbl, et al., 2015) Finger-writing with Smart-watch (Xu, et al., 2015)
Wrist bands	A device worn on the wrist without a touch screen display and sensors to monitor fitness, health, and other functions. User access to this information is typically through a smartphone link.	Bioimpedance Sensor (Cornelius, et al., 2014) Smoking Gesture Detector (Parate, et al., 2014) Embedded Wrist and Neck Piece with ultrasonic speaker (Watanabe, et al., 2013)
Smart eyewear	A display in the form of either glasses or contact lenses and equipped with sensors, wireless communication, AR/VR, and other functionality.	Google Glass (Google, n.d.) Google Contact Lens (Google, n.d.) Object Modelling Eye-Wear (Leelasawassuk & Mayol-Cuevas, 2013) iShadow (Mayberry, et al., 2014) Indoor Landmark Identification Supporting Wearables (Ugulino & Fuks, 2015) Chroma (Tanuwidjaja, et al., 2014) Project Morpheus (Goradia, et al., 2014) Microsoft HoloLens (Microsoft, n.d.)
Smart jewelry	Jewelry designed with features such as health-monitoring and handsless-control.	Typingring (Nirjon, et al., 2015) Gesture Detection Ring (Gummesson, et al., 2014)
Straps	Chest straps, belts, arm bands, or knee straps equipped with sensors for health tracking or other functionalities.	Pneumatic Armband (He, et al., 2015) BodyBeat (Rahman, et al., 2014)
Smart Shoes	It features a high-quality sensor chip with low-power Bluetooth Technology (BLE) and UA run application, placed in the right foot midsole. Electronically customizable according to foot shape.	UA HOVR infinite (Under Armour, n.d.) Nike Adapt (Nike, n.d.)
Data Gloves	Tracks and provides the movement and position of the human hand in real time to a computation device providing the ability to remotely interact and provide tactile feedback with an appropriately structured remote environment.	Data glove (Fang, et al., 2019)(Fang, et al., 2018).
Smart Garment	Smart clothing consists of shirts, pants, coats and underwear that can monitor human vital signs and biomechanics.	Athos (Athos, n.d.)
Smart Bracelet	Monitors exercise, sleep, etc. with users viewing results via a smartphone connection..	Fitbit, Nike+, Jawbone Up (Huang, et al., 2016) Huawei Band 4 (Huawei, n.d.) Mi Band (Xiaomi, n.d.).

Global Wearable Technology Market Trends

As manufactures develop next-generation functionality that brings Internet of Things (IoT), Artificial Intelligence (AI) and Virtual/Augmented Reality (AR/VR) to wearable devices the demand continues to increase significantly across the world corresponding to consumer demand for health and fitness monitors as well as by institutional demand for patient monitors, and all levels of athletes (IMARC Group, 2021). Looking at the world by region the top three largest markets are Asia Pacific, North America and Europe. Europe is anticipated to reach a market size of \$6.95 Billion USD by 2028 (Maximize Market Research, 2019) and Asia-Pacific wearable market should grow by the largest amount by 2026 due to a rapidly growing electronics industry combine with rapidly rising disposable income (Research and Markets, 2021).

Figure 2 Global Wearable Technology Market, by Region (*Maximize Market Research, 2019*)



TOP FIVE WEARABLE DEVICE COMPANIES

The wearable market is currently dominated by the top five manufacturers. With nearly 30% of the market, Apple again tops shipments and market share in the third quarter of 2021. This impressive lead has been maintained through an increase in hearables partially offsetting the significant decline in watch shipments. The hearable segment is seeing an increase in competition from the other top manufacturers which could erode Apple’s leadership position. Samsung’s latest offering in their Galaxy services, Galaxy Watch 4, has been received positively marking an evolution for Samsung and Google, with the conversion from Samsung’s proprietary OS to Google’s Wear OS. Samsung has also started bundling its wearables with its smartphones in an effort to increase market share while also attempting to grab a slice of fashion spending with custom edition watches. These changes have likely lead to the increase in Samsung’s market share in this period and combine with the nearly 25% decrease in Xiaomi’s shipments bring Samsung to split the second place position. Xiaomi’s decline is likely attributed to consumer preference shifting to watches from wristbands and a transition to this device type is in progress along with an expansion outside of China. Here Xiaomi is also bundling to its smart phone offering and wearables in a play to consumers for value. Huawei increased in shipments while decreasing in market share thanks to it hearable products and the interoperability of the device type, despite sanctions. Imagine Marketing rounds out the global top 5 thanks to a full press of advertising, low-cost products and the recent launch of watches (IDC, 2021).

Table 4 Top 5 Wearable Device Companies for the third quarter of 2021 by Shipment Volume, Market Share, and Year-Over-Year Growth (Shipments in millions) (IDC, 2021).

Company	3Q21 Shipment	3Q21 Market Share	3Q20 Shipment	3Q20 Market Share	Year-Over-Year Growth
Apple	39.8	28.8%	41.3	32.8%	-3.6%
Samsung	12.7	9.2%	11.2	8.9%	13.8%
Xiaomi	12.7	9.2%	16.2	13.2%	-23.8%
Huawei	10.9	7.9%	10.5	8.4%	3.7%
Imagine Marketing	10.0	7.2%	3.3	2.6%	206.4%
Others	52.2	37.2%	42.9	34.1%	21.6%
Total	138.4	100.0%	125.9	100.0%	9.9%

CONCLUSION

The market for wearable devices contains number of innovate products augmenting and monitoring human abilities and vitals. These devices are helping to monitor chronic disease, track athletic performance, and integrate digital information into the physical world. New products and functionality continue to enter the market as research continues into new applications and technology continues to lower the purchase price. This wide applicability has led to the global market for wearables increasing through 2021 and is projected to continue to increase per year over year through 2027 across all the regions in the world. Currently only five manufactures capturing nearly two thirds of this market through focus on the integration of their product offerings. New entrants to the field should then consider not only what innovation product they can deliver but also how it could integrate with these existing ecosystems in order to succeed.

REFERENCES

- Furion Analytics Research & Consulting LLP, n.d. *Wearable Medical Devices Market Forecast (2022 - 2027)*. [Online]
Available at: <https://www.industryarc.com/Report/205/Wearable-medical-devices-Market-Analysis-Report.html>
[Accessed 4 April 2022].
- Andre, D. et al., 2006. *The Development of the Sensewear Rarmband, A Revolutionary Energy Assessment Device to Assess Physical Activity and Lifestyle*, s.l.: BodyMedia, Inc..
- Asada, H. H. et al., 2003. Mobile monitoring with wearable photoplethysmographic biosensors. *IEEE Engineering in Medicine and Biology Magazine*, 23(3), pp. 28-40.
- Athos, n.d. *Athos Coaching System*. [Online]
Available at: <https://www.liveathos.com>
[Accessed 4 April 2022].
- Billinghurst, M. & Starner, T., 1999. Wearable devices: New ways to manage information. 32(1), pp. 57-64.
- Casale, P., Pujol, O. & Radeva, P., 2011. *Human activity recognition from accelerometer data using a wearable device*. Las Palmas de Gran Canaria, s.n.
- Cole, C. R. et al., 1999. Heart-rate recovery immediately after exercise as a predictor of mortality,. *New England Journal of Medicine*, 341(18), pp. 1351-1357.
- Cornelius, C. et al., 2014. *A Wearable System That Knows Who Wears It*. s.l., ACM, pp. 55-67.
- Dinh, A. et al., 2009. *A Wearable Device for Physical Activity Monitoring With Built-in Heart Rate Variability*,. s.l., IEEE, pp. 1-4.
- Fang, B., Sun, F., Liu, H. & Liu, C., 2018. 3D human gesture capturing and recognition by the IMMU-based data glove. *Neurocomputing*, February, 277(C), pp. 198-207.
- Fang, B. et al., 2019. A glove-based system for object recognition via visual-tactile fusion. *Science China Information Sciences*, 62(5), pp. 1-3.
- Gartner, 2021. *Gartner Forecasts Global Spending on Wearable Devices to Total \$81.5 Billion in 2021*. [Online]
Available at: <https://www.gartner.com/en/newsroom/press-releases/2021-01-11-gartner-forecasts-global-spending-on-wearable-devices-to-total-81-5-billion-in-2021>
[Accessed 5 April 2022].
- Google, n.d. *Google Contact Lens*. [Online]
Available at: https://en.wikipedia.org/wiki/Google_Contact_Lens
[Accessed 4 April 2022].

- Google, n.d. *Google Glass*. [Online]
Available at: https://en.wikipedia.org/wiki/Google_Glass
[Accessed 4 April 2022].
- Goradia, I., Doshi, J. & Kurup, L., 2014. A Review Paper on Oculus Rift & Project Morpheus. *International Journal of Current Engineering and Technology*, 4(5), pp. 3196-3200.
- Grönvall, E. & Verdezoto, N., 2013. *Beyond Self-Monitoring: Understanding Non-functional Aspects of Home-based Healthcare Technology*. New York City, ACM, pp. 587-596.
- Grünerbl, A., Pirkel, G., Monger, E. & Gobbi, M., 2015. *Smart-watch life saver: smart-watch interactive-feedback system for improving bystander CPR*. s.l., s.n., pp. 19-26.
- Gummeson, J., Briyantha, B. & Liu, J., 2014. *An Energy Harvesting Wearable Ring Platform for Gesture Input on Surfaces*. s.l., ACM, pp. 162-175.
- He, L., Xu, C., Xu, D. & Brill, R., 2015. *PneuHaptic: delivering haptic cues with a pneumatic armband*. s.l., ACM, pp. 47-28.
- Huang, Y., Xu, J., Yu, B. & Shull, P. B., 2016. Validity of FitBit, Jawbone UP, Nike+ and other wearable devices for level and stair walking. *Gait & Posture*, Volume 48, pp. 36-41.
- Huawei, n.d. *Huawei Band 4*. [Online]
Available at: <https://consumer.huawei.com/en/wearables/band4/>
[Accessed 4 April 2022].
- IDC, 2021. *Wearables Shipments Grew 9.9% in the Third Quarter of 2021 as Watches Start to Displace Wristbands in the Wrist-worn Device Category, Says IDC*. [Online]
Available at: <https://www.idc.com/getdoc.jsp?containerId=prUS48460121>
[Accessed 4 April 2022].
- IMARC Group, 2021. *Wearable Technology Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2021-2026*. [Online]
Available at: https://www.researchandmarkets.com/reports/5483491/wearable-technology-market-global-industry?gclid=EAIaIQobChMI9c-545_Q9gIVVeJ3Ch2vegDAEAAAYAAEgK6k_D_BwE
[Accessed 4 April 2022].
- Lee, B. C., Chen, S. & Sienko, K. H., 2011. A wearable device for real-time motion error detection and vibrotactile instructional cuing. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 19(4), pp. 374-381.
- Leelasawassuk, T. & Mayol-Cuevas, W. W., 2013. *3d from looking: Using wearable gaze tracking for hands-free and feedback-free object modelling*. s.l., ACM, pp. 105-112.
- Lee, Y., 2012. *Selective Device Activation for Power reduction in Accelerometer Based Wearable Guidance Systems for The Blind*. s.l., s.n., pp. 106-107.
- M&C Saatchi Performance, 2021. *Tracking Wearable Tech Trends in the USA*. [Online]
Available at: <https://www.mcsaatchiperformance.com/news/tracking-wearable-tech-trends-in-the-usa/>
[Accessed 4 April 2022].
- MacLean, D., Roseway, A. & Czerwinski, M., 2013. *MoodWings: A Wearable Biofeedback Device for Real-Time Stress Intervention*. New York City, s.n.
- Market and Markets, n.d. *Industrial Wearables Market by Device Type (AR Glasses, VR Headsets, Smartwatches, Smart Bands), Industry (Automotive, Aerospace, Manufacturing, Oil & Gas, Power & Energy), Component, and Region - Global Forecast to 2024*. [Online]
Available at: <https://www.marketsandmarkets.com/Market-Reports/industrial-wearable-market-240394537.html>
[Accessed 4 April 2022].
- Markets and Markets, 2021. *Wearable Technology Market by Product (Wristwear, Headwear, Footwear, Fashion & Jewelry, Bodywear), Type (Smart Textile, Non-Textile)*,

**6th INTERNATIONAL NEW YORK CONFERENCE ON
EVOLVING TRENDS IN INTERDISCIPLINARY RESEARCH & PRACTICES**

Application (Consumer Electronics, Healthcare, Enterprise & Industrial), and Geography - Global Forecast to 2026. [Online]

Available at: https://www.marketsandmarkets.com/Market-Reports/wearable-electronics-market-983.html?gclid=EAIaIQobChMIork4_zF9gIVWo9oCR1jSQKMEAAAYASAAEgKuafD_BwE

[Accessed 4 April 2022].

Maurer, U., Smailagic, A., Siewiorek, D. P. & Deisher, M., 2006. *Activity recognition and monitoring using multiple sensors on different body positions.* s.l., s.n.

Maximize Market Research, 2019. *Wearable Medical Devices Market Europe – Industry Analysis and Forecast (2019-2027) _ by Type, by Distribution Channel, by Device Type , by Application and by Geography.* [Online]

Available at: <https://www.maximizemarketresearch.com/market-report/wearable-medical-devices-market-europe/2221/>

[Accessed 4 April 2022].

Mayberry, A. et al., 2014. *iShadow: design of a wearable, real-time mobile gaze tracker.* s.l., s.n., p. 82–94.

Microsoft, n.d. *Microsoft HoloLens | Mixed Reality Technology for Business.* [Online]

Available at: <https://www.microsoft.com/en-us/hololens>

[Accessed 4 April 2022].

Nike, n.d. *Nike Adapt.* [Online]

Available at: <https://www.nike.com/adapt>

[Accessed 4 April 2022].

Nirjon, S., Gummeson, J., Gelb, D. & Kim, K. H., 2015. *Typingring: A Wearable Ring Platform for Text Input.* s.l., ACM, pp. 227-239.

Nishimura, J. & Kuroda, T., 2008. *Eating Habits Monitoring Using Wireless Wearable In-ear Microphone.* s.l., s.n., pp. 130-132.

Oliver, N. S., Toumazou, A. E., Cass, G. & Johnston, D. G., 2009. Glucose Sensors: A Review of Current and Emerging Technology. *Diabetic Medicine: A Journal of the British Diabetic Association*, 26(3), pp. 197-210.

Parate, A. et al., 2014. *Risq: Recognizing smoking gestures with inertial sensors on a wristband.* s.l., ACM, pp. 139-161.

PS Market Research, 2020. *Wearable Medical Devices Market Research Report: By Type (Fitness Trackers, Smartwatches, Smart Cloths, Hearing Aids, Patches, Breath Analyzers), Application (Sports & Fitness, Remote Patient Monitoring, Home Healthcare), Channel (Online, Hypermarkets, Ph.* [Online]

Available at: <https://www.psmarketresearch.com/market-analysis/wearable-medical-devices-market>

[Accessed 4 April 2022].

Rahman, T. et al., 2014. *BodyBeat: a mobile system for sensing non-speech body sounds.* s.l., ACM, pp. 2-13.

Research and Markets, 2021. *Global Smart Wearable Market - Market to Grow by 19.48% from 2021 - 2026 - ResearchAndMarkets.com.* [Online]

Available at: <https://www.businesswire.com/news/home/20210208005342/en/Global-Smart-Wearable-Market---Market-to-Grow-by-19.48-from-2021---2026---ResearchAndMarkets.com>

[Accessed 4 April 2022].

[Accessed 4 April 2022].

Tanuwidjaja, E. et al., 2014. [3]. New York City, s.n., pp. 799-810.

Tanuwidjaja, E. et al., 2014. “*Chroma: A Wearable Augmentedreality Solution for Color Blindness.* s.l., ACM, pp. 799-810.

Ugulino, W. & Fuks, H., 2015. *Landmark identification with wearables for supporting spatial awareness by blind persons.* s.l., ACM, pp. 63-74.

- Under Armour, n.d. *Men's UA HOVR Infinite 3 Running Shoes*. [Online]
Available at: <https://www.underarmour.com/en-us/p/running/mens-ua-hovr-infinite-3-running-shoes/3023540.html>
[Accessed 4 April 2022].
- Watanabe, H., Terada, T. & Tsukamoto, M., 2013. *Ultrasound-based movement sensing, gesture-, and context-recognition*. s.l., ACM, pp. 57-64.
- Xiaomi, n.d. *Mi Global Home*. [Online]
Available at: <https://www.mi.com/global/mi-smart-band-4>
[Accessed 4 April 2022].
- Xu, C., Pathak, P. H. & Mohapatra, P., 2015. *Finger-writing with smartwatch: A case for finger and hand gesture recognition using smartwatch*. s.l., ACM, pp. 9-14.

**SULAK ALANLARDA RESTORASYON, REHABİLİTASYON, YARATMA VE
GELİŞTİRME YÖNTEMLERİ VE UYGULAMA ÖRNEKLERİ**

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Özet

Sürdürülebilir kalkınma ve canlı yaşamın devamlılığı için su en önemli kaynaklardan biridir. Başka hiçbir şeyin yerini tutamayacağını bildiğimiz ve yaşamın en önemli döngüsü olan su; Hızlı nüfus artışı, sanayileşme, tarımsal faaliyetler ve kirletici faktörlerin baskısı altında kalmış ve çeşitli nedenlerle yok olma tehlikesiyle karşı karşıya kalmıştır.

Sulak alanlar dünyanın en değerli doğal su kaynaklarından biridir. Sulak alanlar, karasal ve sucul ekosistemler arasında bir geçiş sağlamanın yanı sıra, dünyadaki en zengin ve en üretken ekosistemler oldukları için korunmaları ve yönetilmesi gerekir. 20. yüzyılın başlarından itibaren tüm dünyada başlayan sanayileşme hareketleri ve ekolojik sistemlerin tahribatı nedeniyle sulak alanlar başta olmak üzere birçok yaşam alanı ciddi şekilde zarar görmüştür. Bu zararlar aynı zamanda su miktarının ve kalitesinin korunması, çeşitli bitki ve hayvanlar için yaşam alanı sağlanması ve iklim değişikliğinin dengelenmesi dahil olmak üzere sulak alanların sağladığı birçok ekosistem hizmetini de tehlikeye atmaktadır. Hasar görmemiş sulak alanların korunması çevre sağlığı için kritik öneme sahipken, tahrip olmuş sulak alanların restore edilmesi (reformu edilmesi), oluşturulması, rehabilitasyonu ve iyileştirilmesi de sulak alanların kalitesinin artırılması için gerekli yöntemlerdir.

Bu çalışmada, sulak alanların önemi ve bozulmuş veya zarar görmüş sulak alanlar için rehabilitasyon, restorasyon, oluşturma ve iyileştirme teknikleri ulusal ve uluslararası literatürden yararlanılarak açıklanmıştır. Ayrıca bu kapsamda Weiliu Sulak Alan Parkı ve Hong Kong Sulak Alan Parkı detaylı olarak incelenmiştir.

Anahtar Kelimeler: Sulak alan restorasyonu, Sulak alan rehabilitasyonu, Sulak alan yaratma ve geliştirme.

**RESTORATION, REHABILITATION, CREATION AND ENHANCEMENT
METHODS TO WETLANDS AND APPLICATION EXAMPLES**

Abstract

Water is one of the most important resources for sustainable development and the continuity of living life. Water, which we know cannot be replaced by anything else and which is the most important cycle of life; It has been under the pressure of rapid population growth, industrialization, agricultural activities and polluting factors and has faced the danger of extinction due to various reasons.

Wetlands are one of the most valuable natural water resources in the world. Wetlands need to be protected and managed because they are the richest and most productive ecosystems on earth, as well as providing a transition between terrestrial and aquatic ecosystems. Since the beginning of the 20th century, many habitats, especially wetlands, have been severely damaged due to the industrialization movements that started all over the world and the destruction of ecological systems. These damages

also endenger many ecosystem services of wetlands provide, including maintaining water quantity and quality, providing habitat for a variety of plants and animals, and balancing climate change. While the protection of undamaged wetlands is of critical importance for environmental health, restoring (reforming), creation, rehabilitation and enhance of destroyed wetlands are also necessary methods to improve the quality of wetlands.

In this study, the importance of wetlands and rehabilitation, restoration, creation and enhancement techniques for the degraded or damaged wetlands are explained using national and international literature. In addition, in this context, Weiliu Wetland Park and Hong Kong Wetland Park have been examined in detail.

Keywords: Wetland restoration, Wetland rehabilitation, Wetland creation and enhancement.

GİRİŞ

Sürdürülebilir kalkınmanın sağlanması ve canlı yaşamının sürdürülebilmesi için en önemli kaynakların başında su gelmektedir. Dünyadaki en değerli doğal su kaynaklarından biri ise sulak alanlardır. Sulak alanların karasal ve sucul ekosistemler arasında geçiş sağlamalarının yanı sıra yeryüzündeki en zengin ve üretken ekosistemler olmalarından dolayı da korunmaları ve yönetilmeleri gerekmektedir. Fakat, 20.yüzyılın başlarından itibaren dünyanın dört bir yanında sulak alanlar, endüstrileşme hareketleri ile toprak kazanma ve sıtmayla mücadele kapsamında olumsuz müdahalelere maruz kalmıştır ve yok olmaya başlamıştır. Çevreyi hızla kirleten, doğadaki kaynakları ölçsüzce tüketen ve yapay etkilerle doğal ekosistem döngülerini sekteye uğratan insanlık, aslında yaşadığı dünyayı üzerindeki tüm canlılar için yaşanabilir bir gezegen olmaktan çıkarmaktadır. Fakat insanlara sağladıkları ekosistem değerlerinin eksikliklerinin ortaya çıkmasıyla birlikte önemleri fark edilmeye başlanarak sulak alanların korunmasına ilişkin çalışmalar gittikçe artmış ve artmaya devam etmektedir (Doğa Derneği, 2011)

SULAK ALANLARIN ÖNEMİ VE FOKSİYONLARI

Genel anlamda sulak alanlar; mevsimsel olarak karasal ve sucul ekosistemler arasında geçiş özelliği gösteren, su tablasının yüzeye yakın olduğu, yılın bir bölümü veya tamamı boyunca sığ sular tarafından istila edilen araziler olarak tanımlanmaktadır (Frohn vd, 2009). Dünyada sulak alanlara yönelik ilk uluslararası sözleşme olan Ramsar Sözleşmesi(1971)'ne göre ise; “doğal veya yapay, devamlı veya geçici, suları durgun veya akıntılı, tatlı, acı veya tuzlu, denizlerin gel-git hareketlerinin çekilme devresinde altı metreyi geçmeyen derinlikleri kapsayan, bütün sular, bataklık, sazlık, turbiyerler” sulak alan olarak tanımlanmaktadır (Doğa Derneği, 2011).

Ramsar Sözleşmesi tarafından Sulak alanlar coğrafik koşullarına veya oluşum mekanizmalarına göre 3 ana başlık altında sınıflandırılmıştır:

- 1- Denizel ve Kıyusal Sulak Alanlar (mercan kayalıkları, mangrovlar, deniz çayır yatakları, ve haliçler)
- 2- Karasal Sulak Alanlar (bataklık, turbalık, göller, nehirler ve yer altı su habitatları)
- 3- Yapay Sulak Alanlar (pirinç tarlaları, barajlar, su rezervuarları ve balık gölleri) olmak üzere üç ana başlık altında toplam 42 sulak alan tipi tanımlanmaktadır (Tema,2022).

Sulak alanlar, genellikle su veya karasal sistemlerinin kenarında meydana gelen benzersiz ekosistemlerdir. Yıl boyunca ıslak, belirli mevsimlerde ıslak veya günün bir bölümünde ıslak

olabilirler (NOAA vd., 2003). Peyzajın önemli bir parçası olan bu alanların sağladığı ekosistemler servileri Sulak Alanlar Birliği'nin (2021) raporunda aşağıdaki şekilde sıralanmıştır.

Sulak alanlar;

- 1.Sahip oldukları su varlıkları ile insanlar ve diğer canlılar için su ve/veya su ortamı sağlarlar.
2. Buldukları bölgedeki nem oranını arttırarak, başta yağış ve sıcaklık olmak üzere yerel iklim elemanları üzerinde olumlu etki yaparlar. Mikro iklimi düzenlerler.
3. Sudaki tortu ve zehirli maddeleri absorbe ederler, özellikle ötrofikasyona neden olan besin maddelerini (azot, fosfor gibi) kullanarak suyu temizlerler.
4. Sahip oldukları suya bağlı olarak dünyada en fazla biyolojik üretim yapan ekosistemlerin başında gelmektedirler.
5. Dünya'nın en önemli genetik rezervuar alanlarıdır. Türlerin %40'ını, tüm hayvan türlerinin ise %12'sini barındırmaktadırlar.
- 6.Balıkçılık, tarım ve hayvancılık, saz üretimi, turizm vb. olanaklarıyla ekonomiye ciddi katkı sağlarlar.
7. Sulak alanlar en önemli sera gazlarından biri olan karbonu absorbe ederek yerküredeki karbonun %40'ını tuttukları için küresel boyutta iklim değişikliğini kontrol eden ekosistemlerin başında gelirler.



Şekil 1. Kızılırmak Deltası ve Kuş Cenneti (Url 1) (Url 2)

Zarar görmüş, çöplük olarak kullanılan ya da kentlerin dikey ve yatay gelişiminden gelen olumsuz etkenler ile kullanılamaz durumda olan sulak alanların planlaması ve tasarımı, bulunduğu yerlerin doğal ve kültürel özellikleri göz önünde bulundurularak, kırsal ve kentsel ekolojiye katkı sağlayacak şekilde yapılmalıdır. Özellikle kent yakınında ya da içerisinde bulunan sulak alanlar, kentliler ve dışarıdan gelecek ziyaretçiler için pasif ve aktif rekreasyon mekanı olması yanında kent ekolojisini canlandıran, kentin temiz su ve oksijenini artıran, kent ekonomisine katkı sağlayan mekanlar olmalıdır. Sulak alanlar olmadan suyu arıtmak daha zor ve maliyetlidir. Ayrıca sel gibi doğal felaketlerin önü açılmaktadır. Selin yanında kasırga ve fırtına gibi afetler artarak mekânlara nüfuz edebilir. Bu da çeşitli hayvan ve bitkinin habitat ortamının yok olmasının yanında canlıların da yaşamlarını kaybetmesi anlamına gelmektedir. Sulak alanların yok olması, geçim kaynaklarının tükenmesi ve gıda kesintisine kadar gidebilir. Bu yüzden sulak alanlar, bizler ve evimiz olan dünyamız için önemli yerlerdir. Bunun önemini görebildiğimiz ve farkındalık yaralattığımız birçok sulak alan parkı, (wetland park) peyzaj mimarlığındaki önemli planlama ve tasarım örnekleri arasında yerlerini almaktadır (Ertem, 2020).

SULAK ALANLARDA UYGULANAN RESTORASYON, REHABİLİTASYON, YARATMA VE GELİŞTİRME YÖNTEMLERİNİN DEĞERLENDİRİLMESİ

Restorasyon

Restorasyon, bozulmuş bir sulak alan ya da eski sulak alanın önceki durumuna ya da mümkün olduğunca bu duruma en yakın hale geri getirilmesidir. Ekolojik restorasyonun amacı, doğal bir ekosistemi bozulmadan önceki koşullarına dönüştürmektir. Ekosistem restorasyonu çoğu zaman, ekolojik bozulma olmadan önceki fiziksel koşulların yeniden yapılandırılmasını, toprak ve suyun kimyasal özelliklerinin dengelenmesini, doğal flora ve faunanın ortama yeniden kazandırılmasını kapsayan ve biyolojik uygulamalar gerektiren bir yönetim aracıdır (Şen vd., 2003).

Rehabilitasyon

Sulak alanların rehabilitasyonunda dikkatli bir planlama, istenmeyen yan etkilerin gerçekleşme olasılığını sınırlar. Planlamaya yardımcı olmak için, sulak alanın özellikleri ve sulak alanın başarısını etkileyebilecek faktörler ile ilgili ön değerlendirme yapılmalıdır (Çizelge 1). Sulak alan rehabilitasyon projelerinde; tasarımında ve geliştirilmesinde doğal süreçler ve mevcut koşullar göz önünde bulundurulmalıdır (Çizelge 1) (Ramsar Resolution, 2002).

Korunması gereken parametreler	Onarılması gereken parametreler	Uzman yardımı istenmesi gereken durumlar
Akarsu – göl içindeki ağaçlar	Beşeri hasarlar (çöp, motorlu araçlar...)	Kentsel gelişim ihlali
Yerli bitki örtüsü		
Yerli canlı türü çeşitliliği		
Tehdit altındaki türler	Habitat koridorları arasındaki boşluklar	Habitat kayıpları
Diğer sulak alanlara bağlanan koridorlar		
Doğal hidroloji	Kötü su kalitesi	
Sulak alan ve çevre arazi arasındaki bitki tampon		

Çizelge 1 Rehabilitasyonun başarısını etkileyecek faktörler

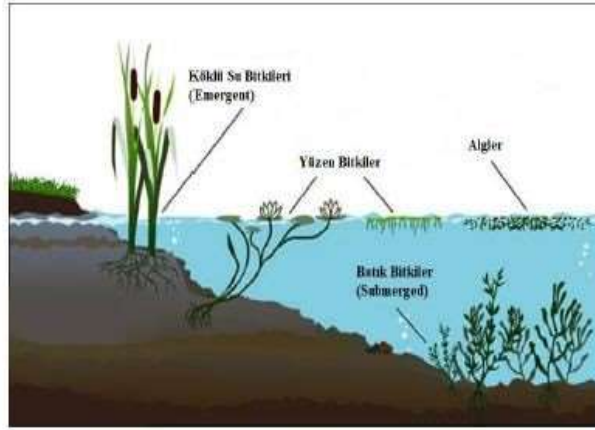
Sulak alan rehabilitasyonu bütünsel bir yapıdır. Tüm sulak alanı kapsar ve eksik /değişmiş türlerin yaşam alanlarının ve süreçlerinin yeniden tesis edilmesini, dış yükleme gibi stres kaynaklarının azaltılmasını / yok edilmesini vurgular. Rehabilitasyonun tek hedefi insan merkezli faaliyetlerin geliştirilmesi değildir. Aynı zamanda bozulma öncesi koşullara yakın bir yaklaşım üretmeye de çalışır. Ekosistemlerin rehabilitasyonu, restorasyondan daha uygulanabilir ve ulaşılabilir olması bakımından alternatif sağlamaktadır. Rehabilitasyon mümkün olduğu kadar sistemi restorasyona doğru ilerletir. Stres kaynaklarının kaldırılmasını veya azaltılmasını, önemli ekosistem türlerinin işlevlerinin yeniden tesis edilmesini vurgulayan bir yaklaşımdır. Restorasyonun mümkün ve başarılı olmadığı yerlerde göl ve havzaların rehabilitasyonu başarıyı yakalayabilmektedir (Cooke vd. 2005).

- Yabani ot yönetimi ve rehabilitasyonu: Sucul yaşam yerlerinde yoğun bitki örtüsü oluşturarak suyun etkin kullanımını ve kültürü yapılan bitkilerin gelişimini engelleyen su bitkileri olarak tanımlanan su yabancı otları; sulama, boşaltma, içme, kullanma ve endüstriyel amaçlı depolama ve dağıtım tesislerinin kapasitelerini düşürerek; kanallarda su akışını sınırlayıp, taşmalara yol açarak; su hızını azaltıp askıdaki katı maddelerin çökmesine neden olarak; çeşitli sanat yapılarını tıkayarak; balıkçılığı, su araçları kullanımını, yüzme ve diğer su

sporlarının yapılmasını engelleyerek, hastalık etmeni taşıyıcısı zararlı böcekler için koruma ve üreme yerleri sağlayarak; parçalanma ve ayrışma sonucunda balık ölümleri ile suda tad ve koku sorunları yaratarak zararlara neden olmaktadır (Çevre ve Orman Bakanlığı Devlet Su İşleri Genel Müdürlüğü, 2009).

- Sucul bitki örtüsü oluşturma: Doğal sularda sucul bitkilerin büyümesi ve gelişimi için karbon (C), azot (N) ve fosfor (P) gibi bitki besin maddelerine (nutrientlere) ihtiyaç vardır (Şekil 2). Ancak bu besinlerin sularda kabul edilebilir sınır değerlerin üzerinde olması, ciddi çevresel sorunları da beraberinde getirmektedir. Çevresel sorunların en başında, arıtılmamış atık suların doğrudan yüzeysel sulara verilmesi gelmektedir. Atık sularda nutrientler; N, P ve C'un formları şeklinde bulunur ve girdiği sularda aşırı olması sucul ekosistemi olumsuz yönde etkiler. Bu nedenle atık suların göllere, nehirlere ve alıcı ortamlara deşarj edilmeden önce arıtılması gerekmektedir (Topal vd., 2011).

Doğal arıtma; diğer arıtma yöntemleri ile karşılaştırıldığında fazla insan gücü gerektirmeyen, işletilmesi kolay ve minimum enerji gereksinimi olan alternatif bir arıtma yöntemidir. Bu yöntemde genel olarak doğal ortamlarda yetişen sucul bitkiler kullanılmaktadır (Satıl, 2016).



Şekil 2. Su bitkileri (Url 3)

Geliştirme

Mevcut olan bir sulak alanın bir veya birden fazla işlevinin geri kazandırılması ve işler hale getirilmesidir. Ancak bu durum tüm işlevlerin yeniden kazandırılması anlamına gelmez. Sulak alanın bir veya birkaç işlevi öne çıkarken, bazı işlevlerinde gerileme olabilmektedir (NOAA ve diğ, 2003).

Yaratma

Kuru bir alanın ya da bitkilendirilmemiş bir su alanının, sulak alana dönüştürülmesidir (NOAA ve diğ, 2003).

SULAK ALANLARDA UYGULANMIŞ REHABİLİTASYON ÇALIŞMA ÖRNEKLERİ

Weiliu Sulak Alan Parkı

Weiliu Sulak Alan Parkı, yağmur suyu yönetimi, su kalitesinin iyileştirilmesi, taşkın kontrolü, atık suların yeniden kullanımı, biyolojik çeşitliliğin restorasyonu gibi yeşil altyapıyı destekleyecek işlevler çerçevesinde tasarlanmıştır (Şekil 3) (Uzun, 2021).



Şekil 3. Weiliu Sulak Alan Parkı (Url 4) (Url 5)

Yapay sulak alanlar ile nehir suyunun kirlenmesine sebep olan maddeleri ortadan kaldırmak ve atık suyu yeniden kullanıma kazandırmak amacıyla tasarlanmış ve kent ile nehir arasında bir tampon alan oluşturulmuştur. Doğanın kendisini yenileme yeteneğinden ilham alınarak uygulanan habitat restorasyonu Weiliu Sulak Alan Parkı'nın önemli adımlarından bir diğeridir. Bu amaçla öncelikle insanların alana çöp ve atık malzeme atması gibi bu hassas ekosisteme zarar verecek davranışlar engellenmiştir. Sonrasında ise tasarımın ana ürünü olarak kullanılan mevcut ağaçlar, çalılar ve yabani sazlık grupları ile özellikle su ekosistemi desteklenmiş ve böylece kuşlara ve diğer canlılara yaşam alanı sağlamış veya mevcut habitatlar onarılmıştır (Uzun, 2021). Proje alanının büyük bir bölümü, doğal haline bırakılmıştır. Sulak alanın çevresini ise bir kolye gibi saran tepelikler ve göletler ile yağmur suyu filtreleme ve temizleme tampon bölgesi oluşturulmuştur. Ayrıca bu bölgede doğa ve kent arasında da hoş ve faydalı bir peyzaj ilişkisi kurulmuştur. Kentten gelen yağmur suyu filtrelenerek sulak alandaki su toplama havuzlarında biriktirilmektedir. İhtiyaç halinde burada biriktirilen su kullanılmaktadır. Sulak alanın çevresinde oluşturulan ahşap yürüme yolları ve göletler üzerine uzanan teraslar da ziyaretçiler için ruhsal yenilenmelerine olanak sağlayan mekânlara dönüştürülmüştür.

Hong Kong Sulak Alan Parkı (The Hong Kong Wetland Park)

Hong Kong Sulak Alan Parkı, 10.000 m²'lik bir ziyaretçi merkezi ve 60 hektarlık bir Sulak Alan Koruma Alanı içermektedir (Şekil 4). Ziyaretçi Merkezi'nde temalı sergi galerileri, tiyatro, hediyelik eşya dükkânı ve kapalı oyun alanı bulunmaktadır. Kent içerisindeki doğal ekosistem canlandırılırken ziyaretçilerin doğa ile etkileşimi sağlanmıştır (Ertem, 2020).



Şekil 4. The Hong Kong Sulak Alan Parkı (Url 6) (Url 7)

Tianjin Qiaoyuan Sulak Alan Parkı, Çin'in kuzey kıyısı kenti Tianjin'de yirmi iki hektarlık bir sulak alan parkıdır. Turenscape tarafından, yenileyici tasarım anlayışı ile yer şekillerini değiştirerek, bitki adaptasyonu sağlanarak ve kent gelişimindeki doğal süreçlerin etkisi göz önünde bulundurularak çöplük olarak kullanılan eski bir ıssız atış poligonu az bakım gerektiren bir sulak alan kent parkına dönüştürülmüştür. Yağmur suyunun tutulması ve arıtılması dâhil olmak üzere kent için çeşitli doğa hizmetleri sağlamak; tuzlu-alkali toprağı iyileştirmek, çevre eğitimi için fırsatlar sağlamak ve değerli bir estetik deneyim yaratmak tasarım ve planlama amaçlarından birkaçıdır. Kentsel gelişim ve altyapı inşaatı nedeni ile tahrip görmüş bu alan, ekolojik çözümler ile yenilenirken insanların su ile ilişki kurabilecekleri mekanlar da oluşturulmuştur. Kent stresi ve hızlı yaşamından kaçan kentliler burada pasif aktivitelerde bulunup doğa ihtiyaçlarını karşılayabilmektedirler (Ertem, 2020).

SONUÇ VE ÖNERİLER

Yerine başka bir şeyin ikame edilemeyeceğini bildiğimiz ve yaşamın en önemli döngüsü olan su; hızlı nüfus artışı, endüstrileşme, tarımsal faaliyetlerin ve kirletici faktörlerin baskısı altında olup çeşitli sebeplerden dolayı nicel ve nitel açıdan yok olma tehlikesi ile karşı karşıya kalmıştır. Küresel ölçekte sulak alanların en büyük ve en temel beş sorununun; sulak alanlarda su miktarındaki azalmalar, sulak alanlarda su kalitesinin bozulması, sulak alanlardaki habitat tahribi, yönetime ilişkin sorunlar ve halkın bilinçlendirilmesi ile yönetime katılmasındaki yetersizliktir.

Rehabilitasyon ve iyileştirme bahçeleri, kent yaşamı içinde sıkışan kentlilerin ferah bir nefes alması, stresten ve kaygıdan uzaklaşması, huzur bulması, kendini güvende hissetmesi, sosyalleşmesi, doğa ile iç içe olması, egzersiz yapması, flora ve faunayı keşfetmesi ve doğa içerisinde gezinti yapması için fırsat sunmaktadır. Bu sorunların iyileştirilmeleri amacıyla uygulanması gereken rehabilitasyon tekniklerinin; sulak alan habitatlarının rehabilitasyonu, sulak alanlarda yabancı ot yönetimi, yerli bitki örtüsünün rehabilitasyonu, otlama yönetimi, toprak rehabilitasyonu, su miktarı ve su kalitesinin rehabilitasyonu şeklinde sınıflandırılmıştır.

Ancak, politik, yasal ve kurumsal anlamda elde edilen bu kazanımlara rağmen Türkiye'deki sulak alanlar hala büyük tehlikelerle karşı karşıyadır ve sulak alan kayıpları halen devam etmektedir. Sulak alan kayıplarının en önemli nedenlerinden birinin sulak alanların önemini karar vericiler, arazi / su kullanım planlamacıları ve yerel halk tarafından yeterince anlaşılmamıştır.

Ülkemizdeki sulak alan kayıplarının önlenmesi ve sulak alanların rehabilite edilebilmesinin, sulak alanlar için iyi birer yönetim planının geliştirilebilmesine bağlı olduğu belirlenmiştir. Bu bağlamda

sulak alanların korunması, geliştirilmesi ve akılcı kullanımını öngören yasal düzenlemeler mutlak suretle güçlendirilmeli ve uygulanabilirliği takibe alınmalıdır.

KAYNAKÇA

- Cooke G.D., Welch E.B., Peterson S.A. ve Nichols S. A., 2005. Restoration and Management of Lakes and Reservoirs, Taylor & Francis Group, LLC).
- Çevre ve Orman Bakanlığı Devlet Su İşleri Genel Müdürlüğü. 2009. Su Yabancı otları Yayılış Alanları, Yaşamları, Çevresel İlişkileri, Sorunları ve Savaşım Yöntemleri. <https://cdn.nys.tarimorman.gov.tr/api/File/GetFile/425/KonuIcerik/767/1115/DosyaGaleri/su-yabanci-otlari.pdf>
- Demir N. 2020. Su bitkileri 3. Ankara Üniversitesi Ders Notları. https://acikders.ankara.edu.tr/pluginfile.php/25686/mod_resource/content/0/ZS%C3%9C%20308%20SU%20B%C4%B0TK%C4%B0LER%C4%B0%203.pdf
- Doğa derneği, 2011. Türkiye'nin Ramsar Alanlarında Sulak Alan Yönetim Planları Değerlendirme Raporu .
- Ertem G. 2020. Sulak Alan Parkları (Wetland Park) ve Dünyadan 5 Önemli Örneği. <https://peyzax.com/sulak-alan-parklari-wetland-park/>
- Frohn R. C., Reif M., Lane C. & Autrey B. 2009. Satellite Remote Sensing of Isolated Wetlands Using Object-Oriented Classification of Landsat-7 Data. Wetlands.
- Kocabaş Y. Z., Topal F. & Sarı A. 2020. Kahramanmaraş Florası Sucul Bitkileri. <https://dergipark.org.tr/tr/download/article-file/1413583>
- National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA); Army Corps of Engineers, Fish and Wildlife Service(FWS), and Natural Resources Conservation Service(NRCS), 2003. An Introduction and User's Guide to Wetland Restoration, Creation and Enhancement, 95pp.
- Ramsar Resolution, 2002. Report of main proceedings for 25 November 2002 <https://enb.iisd.org/events/8th-meeting-conference-parties-ramsar-convention-cop8/report-main-proceedings-25-november>
- Satıl, F. 2016. Su Mercimeği. Zafer Dergisi 479. Sayı. <https://www.zaferdergisi.com/makale/11685-su-mercimegi.html>
- Şen B., Koçer M. A. T., Alp M. T. 2003. Ekolojik Restorasyon ve Göl Restorasyon Metotları. XI. Ulusal Su Ürünleri Sempozyumu 2003. Elazığ.
- Topal M., Karagözoğlu B., Öbek E. & Arslan Topal E. I. 2011. Bazı Su Mercimeklerinin Nutrient Gideriminde Kullanımı. Mehmet Akif Ersoy Üniversitesi Fen Bilimleri Enstitüsü Dergisi MAKUFEBED (2011) 4: 12-28. <https://dergipark.org.tr/tr/download/article-file/181636>
- TEMA, 2022. Sulak Alan Ekosistemleri, <https://sutema.org/mavi-gezegen/sulak-alan-ekosistemleri.39.aspx> (31.03.2022)
- Url 1. <https://samsun.bel.tr/uploads/turizm/ler/b46f0.png> (23.03.2022)
- Url 2. <https://peyzax.com/wp-content/uploads/2020/09/Kizilirmak-Fotograf-2.jpg> (23.03.2022)
- Url 3. [https://concept-stories.s3.ap-south-1.amazonaws.com/test/Stories%20-%20Images_story_123594/image_2020-10-24%2022%3A55%3A07.865463%2B00%3A00\(23.03.2022](https://concept-stories.s3.ap-south-1.amazonaws.com/test/Stories%20-%20Images_story_123594/image_2020-10-24%2022%3A55%3A07.865463%2B00%3A00(23.03.2022)
- Url 4. <https://peyzax.com/wp-content/uploads/2020/11/Weiliu-Sulak-Alan-Parki-10.jpg>(21.03.2022)
- Url 5. <https://peyzax.com/wp-content/uploads/2020/11/Weiliu-Sulak-Alan-Parki-11.jpg>(11.03.2022)
- Url 6. <https://img.traveltriangle.com/blog/wp-content/uploads/2018/09/hong-kong-wetland-park-aerial-cover.jpg>(20.03.2022)
- Url 7. <https://sworld.co.uk/img/img/577/photoAlbum/128550/originals/0.jpg>(22.03.2022)
- Uzun G. 2021. Weiliu Sulak Alan Parkı. <https://peyzax.com/weiliu-sulak-alan-parki/> (18.03.2022)